KITIMAT LNG TERMINAL PROJECT

ASSESSMENT REPORT

With Respect to
Review of the Application for an Environmental Assessment Certificate
Pursuant to the *Environmental Assessment Act*, S.B.C. 2002, c. 43

and

COMPREHENSIVE STUDY REPORT

With Respect to
The Requirements of a Comprehensive Study
Pursuant to the *Canadian Environmental Assessment Act, S.C 1992, c. 37*

April 13, 2006

Prepared by

Environmental Assessment Office

And

Transport Canada
Environment Canada
Indian and Northern Affairs Canada

Canada

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Environmental Assessment Office

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LIST OF ACRONYMS AND DEFINITIONS

AB	Archaeology Branch of MTSA
Application	Application for an Environmental Assessment Certificate (dated May 25, 2005, and accepted by the EAO on June 6, 2005)
ATOR	Approved Terms of Reference for an EA Application
BCEAA	British Columbia *Environmental Assessment Act* (S.B.C. 2002, c. 43)
CCG	Canadian Coast Guard
CDC	BC Conservation Data Centre
CEAA	*Canadian Environmental Assessment Act* (S.C. 1992, c. 37)
CEA Agency	Canadian Environmental Assessment Agency
CEAR	Canadian Environmental Assessment Registry
CEPA	Canadian Environmental Protecton Act, 1999
Certificate	Environmental Assessment Certificate issued pursuant to BCEAA
CMT	Culturally Modified Trees
COSEWIC	Federal Committee on the Status of Endangered Wildlife in Canada
CS	Comprehensive Study
CSR	Comprehensive Study Report prepared pursuant to CEAA
CWH	Coastal Western Hemlock ecosystem
Db	Decibels
dwt	Dead weight tonnes
DOK	District of Kitimat
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EAO	BC Environmental Assessment Office
EC	Environment Canada
ECP	Erosion Control Plan
EPP	Environmental Protection Plan
ERP	Emergency Response Plan
ES	Environmental Supervisor
FSR	Forest Service Road
GDP	Gross Domestic Product
GHG	Green house gas
HADD	Harmful Alteration, Disruption and Destruction of Habitat
ha	Hectare(s)
Haisla	Haisla First Nation, as represented by the Kitamaat Indian Band
HC	Health Canada
HCA	Heritage Conservation Act
HIA	Heritage Impact Assessment
ILMB	Integrated Land Management Bureau
INAC	Indian and Northern Affairs Canada
IR	Indian Reserve
Kalum LRMP	Kalum Land and Resource Management Plan (2002)
Kitimat LNG Inc.	Proponent
km	Kilometre(s)
LNG	Liquefied Natural Gas. A natural gas, consisting primarily of methane, cooled to -160^{0} Celsius, which condenses the gas to a liquid at atmospheric pressure, and which reduces its volume by a factor of 600
m	Metre(s)
MAL	Provincial Ministry of Agriculture and Lands – until June 16, 2005 land tenure functions under Land and Water British Columbia Inc.
MARR	Provincial Ministry of Aboriginal Relations and Reconciliation

MEMPR	Provincial Ministry of Energy, Mines and Petroleum Resources – until June 16, 2005, the Ministry of Energy and Mines
MED	Ministry of Economic Development
MFR	Provincial Ministry of Forests and Range – until June 16, 2005, the Ministry of Forests
MOE	Provincial Ministry of Environment – until June 16, 2005, the Ministry of Water, Land and Air Protection
MOT	Provincial Ministry of Transportation
MTSA	Provincial Ministry of Tourism, Sport and the Arts – includes archaeological resource functions which until June 16, 2005 were part of Ministry of Sustainable Resource Management
NGL	Natural Gas Liquids
NHA	Northern Health Authority
NO_X	Oxides of nitrogen
NWPA	*Navigable Waters Protection Act (R.S. 1985, c.N 22)*
OGC	BC Oil and Gas Commission
OCP	Official Community Plan (1997) of the District of Kitimat
PMP	Pest Management Plan
PNG	Pacific Northern Gas Ltd.
Project	Proposed Kitimat LNG Terminal Project
Proponent	Kitimat LNG Inc.
RA	Federal Responsible Authority under CEAA
RDKS	Regional District of Kitimat-Stikine
Report	Joint provincial Assessment Report/Federal Comprehensive Study Report
ROW	Right-of-Way
SARA	*Species at Risk Act (S.C. 2002, c. 29)*
SCV	Submerged Combustion Vapourizer
Section 11 order	Procedural Order issued under section 11 of BCEAA
Section 13 order	Procedural Order issued under section 13 of BCEAA
TC	Transport Canada
TEM	Terrestrial Ecosystem Mapping
TERMPOL	Technical Review Process of Marine Terminal Systems and Transhipment Sites
TFL	Tree Farm License
TOR	Terms of Reference
TRP	TERMPOL Review Process
TUS	Traditional Use Study
VC	Valued Component
WG	Working Group established for the Kitimat LNG Terminal Project

PART A - GENERAL REVIEW BACKGROUND

1. INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This Report has been collaboratively prepared as a common basis for a provincial Assessment Report and a federal Comprehensive Study Report (CSR) on a proposal by Kitimat LNG Inc. (Proponent) to construct and operate facilities for liquefied natural gas receiving, storage, gasification and send-out, including a marine terminal facility and connecting road and pipelines, on a site along Douglas Channel, approximately 14 km south of Kitimat, BC (**see Figure 1**).

A preliminary project description was reviewed by the BC Environmental Assessment Office (EAO) in July 2004. On the basis of this information, the EAO identified reviewable project triggers under the BC *Environmental Assessment Act* (BCEAA) and confirmed that the proposed Project required a provincial environmental assessment.

A preliminary project description was reviewed by the Canadian Environmental Assessment Agency (CEA Agency) and interested federal agencies in September 2004. The *Canadian Environmental Assessment Act* (CEAA) triggers and potential federal Responsible Authorities (RAs) were identified as: a possible subsection 5(1) approval pursuant to the *Navigable Waters Protection Act* from Transport Canada; a possible subsection 35(2) authorization pursuant to the *Fisheries Act* from Fisheries and Oceans Canada (DFO); and a possible section 127(1) permit from Environment Canada under the *Canadian Environmental Protection Act, 1999*.

On August 18, 2004, the Proponent submitted an Application to EAO for an Environmental Assessment Certificate (Application) pursuant to the BCEAA, for the Kitimat LNG Terminal Project (Project), with a marine terminal and liquefied natural gas (LNG) facilities located at Emsley Cove. This Application also provided the basis of the information required under CEAA for the federal Comprehensive Study and report by the responsible authorities (RAs).

On December 19, 2005, the Proponent requested EAO, CEA Agency and RAs to undertake a more thorough assessment of an alternative site for the LNG terminal, specifically the Bish Cove (also referred to as Beese Cove) site, as a result of an agreement-in-principle signed with the Haisla First Nation that supports the location of the LNG facilities on Bees Indian Reserve No. 6 and the marine terminal in Bish Cove, should the EA confirm the acceptability of these sites. Additional information and assessment of the Bish Cove site is therefore provided in this joint provincial Assessment Report / federal CSR.

Should the LNG facilities be located on Bees Indian Reserve No. 6, the Proponent will require a lease from Indian and Northern Affairs Canada (INAC) under Section 53(1) (b) of the *Indian Act*, in order to use and occupy the upland. Consequently, INAC will have a CEAA Section 5(c) land trigger.

The purpose of a provincial Assessment Report is to:

- Briefly describe the Project;
- Report on the adequacy of the Proponent's public and First Nations consultations;
- Summarize the issues considered during the Application review;

- Report on whether the Application has considered and adequately addressed the Project's identified potential environmental, health, heritage, social and economic effects; and
- Identify the measures required to prevent or reduce to an acceptable level any adverse effects of the Project.

The purpose of a federal CSR is to:
- Identify the potential environmental effects of the Project, including the environmental effects of any accidents or malfunctions that may occur in connection with the Project and any cumulative effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out;
- Describe measures that are technically and economically feasible to mitigate any adverse environmental effects of the Project;
- Report on all public concerns raised in relation to the Project and how they have been addressed; and
- Based on the CSR and public comments, provide conclusions with respect to whether the Project is likely to result in significant adverse environmental effects.

A full listing of the factors to be considered in a comprehensive study is found in Section 2.4 of this Report.

1.2 PROVINCIAL AND FEDERAL ENVIRONMENTAL ASSESSMENT PROCESSES

1.2.1 Provincial Process and BCEAA Requirements

On September 14, 2004, EAO issued an order under section 10(1)(c) of BCEAA, designating the Project as reviewable and requiring the Proponent to obtain an environmental assessment certificate (Certificate) before proceeding with the Project. The Project was considered reviewable, pursuant to the BCEAA *Reviewable Project Regulation* (BC Reg. 370/02) because it includes:

- Proposed facilities with the capability to store energy that can yield by combustion $\geq$ 3 petajoules of energy; and
- A new natural gas processing plant facility that has the design capacity to process natural gas at a rate of $\geq$ 5.634 million m^3/day.

On March 30, 2005, EAO issued an order under section 11 of BCEAA outlining the scope, procedures and methods to be applied in the pre-Application and Application review stages of the assessment.

A Terms of Reference (TOR) for the Application was developed by the Proponent, with input from EAO, federal and provincial agencies, local governments and Haisla. The TOR was approved by EAO on April 13, 2005, as fulfilling the information requirements of EAO pursuant to section 16(2) of BCEAA. Federal agencies provided conditional support at that time, pending the outcome of a public review of the proposed scope of the review, as required under CEAA and final confirmation by the federal Minister of Environment of the appropriate level of review.

On April 15, 2005, the Proponent submitted an Application to EAO. The Application was screened against the Approved Terms of Reference (ATOR) for the Application, and accepted by EAO with minor revisions on June 6, 2005.

On June 14, 2005, EAO issued an order under section 13 of BCEAA amending the scope of the Project as described in the order under section 11. This amendment was necessary to accommodate

changes to some of the Project components that had been made during the development of the Application.

Figure 1. Location of Kitimat LNG Terminal Project Area

On December 30, 2005, EAO issued another section 13 order to accommodate a more detailed assessment of Bish Cove as part of the Project review, and to confirm that the shoreline modification associated with locating the marine terminal at Bish Cove constitutes an additional trigger under the BCEAA *Reviewable Project Regulation* (BC Reg. 370/02).

1.2.2 Federal Process and CEAA Requirements

Application of CEAA

Under subsection 5(1) of the *Canadian Environmental Assessment Act*, a federal environmental assessment (EA) will be required when, in respect of a project, a federal authority, for the purpose of enabling the project to be carried out in whole or part:

- Is the proponent;
- Makes or authorizes payment or any other form of financial assistance to the proponent;
- Sells, leases or otherwise disposes of lands; or
- Issues a permit, or license or other form of approval pursuant to a statutory or regulatory provision referred to in the *Law List Regulations*.

These planned actions of federal authorities are commonly called "triggers." In the case of the Kitimat LNG Terminal Project, there are federal approvals required that are listed on the *Law List Regulations* which trigger a federal environmental assessment under CEAA.

A Comprehensive Study (CS) under CEAA is required when a proposed project meets at least one of the requirements in the CEAA *Comprehensive Study List Regulations*. The CS process requires preparation of a "project scoping document" that is distributed to the public for formal review and comment, in order to obtain input on the proposed scope of the project for the purpose of the EA, the factors proposed to be considered, the proposed scope of those factors, and the ability of the CS process to address the issues related to the project. A report is then made by the RAs to the federal Minister of Environment, who determines whether the assessment will continue as a comprehensive study, or whether the assessment will be referred to a mediator or a review panel.

After completion of the project review, a CSR is prepared and distributed for public comment. Upon completion of public review, public comments are forwarded to the federal Minister of Environment to be considered in a decision.

The Minister of Environment reviews the CSR and any public comments filed in relation to its contents. If the Minister is of the opinion that additional information is necessary or actions are needed to address public concerns, the Minister may request the RAs to address these concerns. Once these concerns are addressed, the Minister issues an environmental assessment decision statement that includes:

- The Minister's opinion as to whether the Project is likely to cause significant adverse environmental effects; and
- Any additional mitigation measures or follow-up program that the Minister considers appropriate.

The Minister then refers the project back to the RAs for a course of action or decision.

If it has been determined that the project is not likely to cause significant adverse environmental effects, an RA may exercise any power or perform any duty or function that would permit the project, or part of the project, to be carried out, such as issuing a permit or authorization.

Application of CEAA to the Kitimat LNG Terminal Project

For the EA of the Project, Transport Canada (TC), DFO, and Environment Canada (EC) were initially identified as RAs as they will be required to issue statutory or regulatory approvals noted on the *Law List Regulations* under CEAA for various aspects of the Project. As a result of the Proponent's December 19, 2005 request for a more thorough assessment of Bish Cove for the marine terminal and plant site, INAC was also identified as an RA. The specific powers, duties or functions of the RAs with respect to the Project are outlined in detail in section 3.1.

TC, EC and INAC determined that the scope of project meets the requirements of the paragraph 13(d) of the *Comprehensive Study List Regulations*, because it proposes to "construct a facility for the liquefaction, storage or regasification of liquid natural gas, with a liquefied natural gas processing facility of more than 3,000 tonnes /day or a liquefied natural gas storage capacity of more than 50,000 tonnes."

For the purposes of this CS, there are three RAs including: TC, EC and INAC. The conclusions of those three RAs are outlined in this Report. In reaching those conclusions, the RAs received specialist advice from the following expert federal authorities: DFO and Health Canada (HC).

For the Project, the RAs, in conjunction with the CEA Agency, prepared the Comprehensive Study Scoping Document for the Kitimat LNG Inc. Proposed Liquefied Natural Gas (LNG) Terminal at Kitimat, British Columbia, and advertised its availability for public review. The 30 day public review period ended on May 25, 2005. The ensuing report to the Minister of Environment led to confirmation, on November 2, 2005, that the environmental assessment under CEAA would continue as a comprehensive study.

1.2.3 Fisheries and Oceans Canada (DFO) Screening

DFO determined that they would likely be required to exercise regulatory decision making authority under s.35(2) of the *Fisheries Act* in regard to some components of the Kitimat LNG Terminal development proposal that could result in the harmful alteration, disruption, or destruction of fish habitat.

As an RA, DFO determined, based on its anticipated CEAA triggers, the issuance of authorizations under s.35(2) of the *Fisheries Act*, that the scope of project for the purposes of DFO's environmental assessment would be the construction and operation of the following:

- The shoreline LNG tanker berthing and uploading jetty;
- The separate tug boat berth; and
- Potential watercourse crossings associated with the following components:
  - the approximately 13-18 km send-out gas pipeline;
  - the 3 approximately 13-18 km NGL product pipelines; and
  - the upgrading and extension of the access road.

As none of these components were on the CEAA Comprehensive Study List Regulations, DFO is conducting a screening pursuant to the CEAA.

DFO supports the implementation of a single federal process allowing all RAs to fulfill their respective obligations pursuant to CEAA, and will therefore use the documentation generated for the comprehensive study and provincial EA process to inform its screening level environmental assessment.

DFO is an expert federal authority for the CS process and has been engaged in the review of the Application and the preparation of this joint provincial Assessment Report and federal Comprehensive Study Report.

1.2.4 Harmonized Review

The Canada - British Columbia Agreement for Environmental Assessment Cooperation (2004) provides for coordinated environmental assessment processes to avoid uncertainty and duplication between the provincial and federal environmental assessment processes and to facilitate a "one project – one review" approach when both processes are triggered.

The harmonized assessment of the Project was conducted in accordance with the Agreement, through a joint federal-provincial work plan. The provincial Environmental Assessment Office (EAO) and the federal Canadian Environmental Assessment Agency (CEA Agency) provided a coordination role for the EA process. The EAO role is to neutrally administer and manage environmental assessments, and the powers and responsibilities of that office. Likewise, the CEA Agency, as the Federal Environmental Assessment Coordinator, is the principal point of contact for federal authorities during the assessment process, consolidating information requirements for the assessment as well as coordinating the actions of federal authorities with those of the EAO.

This Report is a collaborative effort intended to provide a common basis for an Assessment Report under BCEAA and a CSR under CEAA. It captures the process followed; issues raised, potential effects and the Proponent's proposed mitigation measures for the purposes of both federal and provincial review, and will be the common basis for federal and provincial environmental assessment decisions. The provincial Minister of Environment and the Minister of Energy, Mines and Petroleum Resources will use this Report and other accompanying materials as the basis for a decision on issuing an environmental assessment certificate under BCEAA.

The federal RAs and expert federal authorities (FAs) have participated in the development of this Report and are satisfied with its conclusions. However, a final federal determination and conclusion of whether the Project is likely to cause significant adverse environmental effects will be made by the Minister of the Environment in a federal environmental assessment decision statement.

2. PROJECT DESCRIPTION AND SCOPE OF REVIEW

2.1 PROPONENT INFORMATION

The Proponent, Kitimat LNG Inc. (Kitimat LNG) is a subsidiary of Galveston LNG Inc. of Calgary, Alberta. Galveston LNG is a private company established in 2004, and focused on the development of liquefied natural gas (LNG) and related facilities within North America.

Kitimat LNG Inc. is dedicated to the development and operation of the proposed Kitimat LNG Project. Galveston's other subsidiary company, LNG Impel, is an LNG marketing and trading company with key responsibility to secure supply and markets for the Project.

2.2 PROJECT DESCRIPTION

The purpose of the LNG[1] import terminal is to receive and store LNG unloaded from tankers, regasify the LNG into natural gas and deliver natural gas via a 14 to 18 km send-out pipeline lateral to Kitimat. The Project facilities will consist of a berth for the LNG tankers, an LNG terminal containing a process area, storage tank/containment area and a natural gas send-out pipeline lateral. The Proponent proposes to construct and operate the facilities for LNG receiving, storage, gasification and send-out, with the associated marine docking facility and connecting roads and pipelines, on a site along Douglas Channel, approximately 14 km south of Kitimat, BC. The Project area is shown in **Figure 1** and the location of key Project components is shown in **Figure 2**. The Proponent has provided information for the assessment of the Project at both Emsley Cove and Bish Cove, which are approximately 3.1 km apart along the north shore of Kitimat Arm.

All Project components are located within the asserted traditional territory of the Haisla First Nation and within the District Municipality of Kitimat. Both Emsley Cove and Bish Cove are designated for industrial use in the Kalum Land and Resource Management Plan (May 2002). The Haisla have designated Bees IR No. 6 for commercial industrial use. This was done pursuant to the *Indian Act*, and Privy Council Order 1997-1052 accepts the designation by the Haisla and gives effect to terms and conditions that apply to the use of the reserve as set out in the designation. Use for an LNG facility would be consistent with the designated uses.

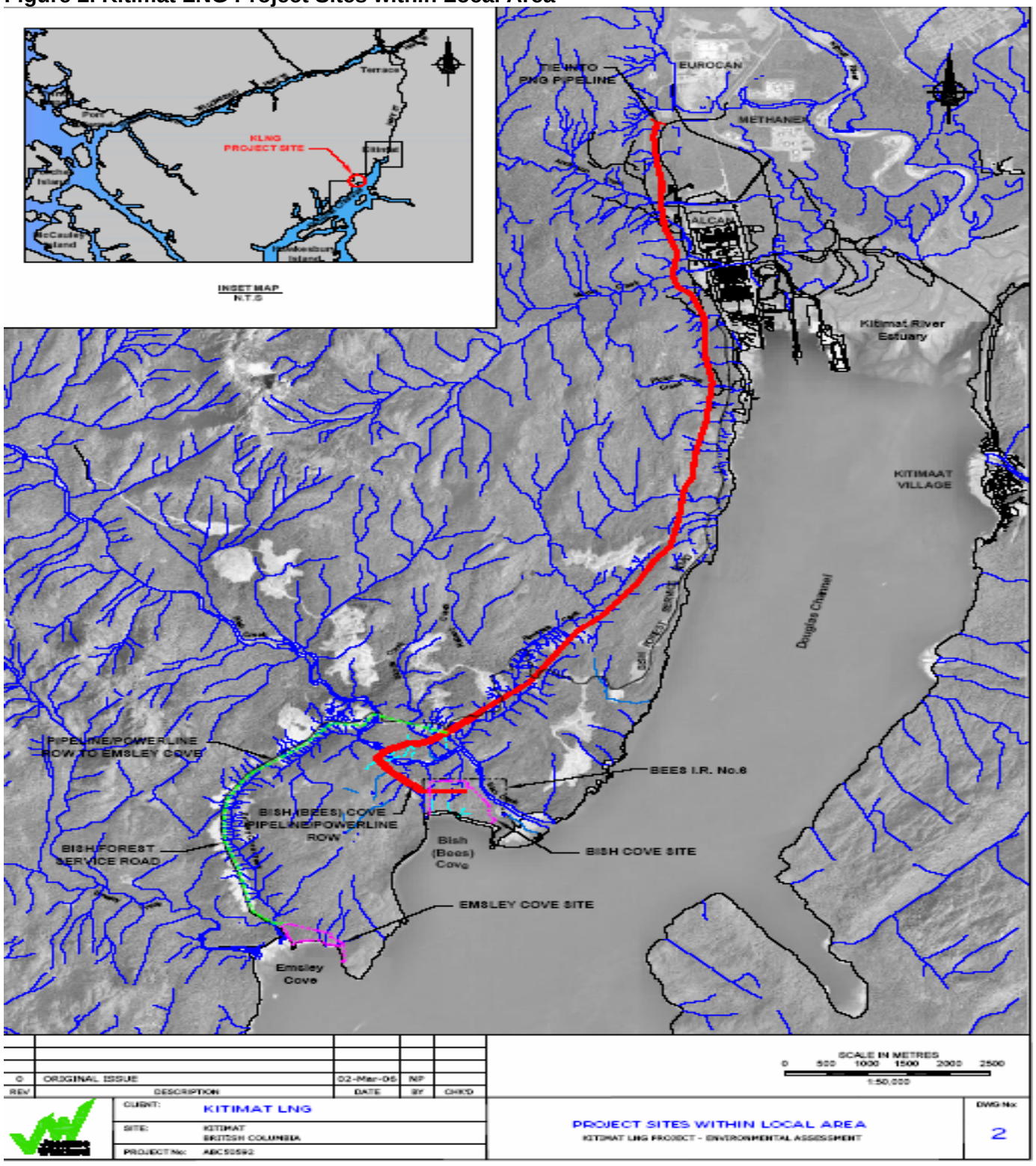
The marine and land-based facilities have been designed for a Project lifespan of approximately 25 years. There are no provisions for bunkering fuel for LNG tankers.

The major components of the Project are:

- The marine terminal facilities (including the construction and operation of the shoreline LNG tanker berthing and uploading jetty, the tug boat berth and barge jetty, and related LNG tanker operations in the vicinity of the terminal and at berth and dredging activities and potential disposal of dredged materials at sea if required);
- The upland facilities including the LNG storage tanks and natural gas liquids (NGL) separation unit;
- The lateral pipelines, access road, road upgrades, and aerial transmission line, extending between the LNG import terminal and the Pacific Northern Gas (PNG) pipeline, and;
- Ancillary facilities and activities.

[1] LNG is natural gas, consisting primarily of methane, cooled to minus 160^{0} Celsius, which condenses the gas to a liquid at atmospheric pressure, and which reduces its volume by a factor of 600.

Figure 2. Kitimat LNG Project Sites within Local Area



2.2.1 Marine Facilities/Activities

LNG for the project will be transported by LNG carriers (tankers) from Pacific offshore countries to the Project site via Douglas Channel. The marine-based portion of the Project will include a construction barge loading and tug berth facility, as well as a terminal for the offloading of LNG tankers. The marine terminal has been designed to handle LNG carriers up to 250,000 m^3 capacity, although existing carriers do not exceed 160,000m^3. The marine terminal facilities would cover an area of approximately 0.75 ha of water and foreshore area at Emsley Cove and 2 ha at Bish Cove (see **Figures 3 and 4**). A minimum water depth of 14.5 m below chart datum at the LNG tanker berth will be maintained to provide safe underkeel clearances for the anticipated range of LNG tankers. The elevation of the berth platform takes into account tidal variations and waves, including locally induced or remote tsunamis. The marine facilities would require an estimated 9,000 m^3 of dredging and excavation (mostly rock) for an Emsley Cove location, but none at Bish Cove due to the intended use of a vibro-densification process which strengthens and stabilizes marine sediments for foundation purposes through the piped injection of gravel columns at closely spaced intervals. Vibro-densification will disturb an estimated 2 ha of seabed in Bish Cove.

2.2.2 Land Facilities/Activities

The land terminal will contain facilities to move the LNG from ships to containment tanks via an elevated pipe rack. Two full containment tanks, each having an operating capacity of 160,000 m^3 will be constructed at the terminal with provisions made for construction of the third tank in the future.

The LNG will be regasified using submerged combustion vapourizers (SCVs), and the plant will have a send-out capacity of up to one billion standard cubic feet per day (1Bscfd). Seven SCVs, operating in parallel, are required for the initial send-out capacity. One standby vapourizer is also provided in the event of an unexpected shutdown. The fuel gas for the vapourizers is drawn from the natural gas discharge of the vapourizers. When rich LNG is supplied to the terminal, ethane may be added to the natural gas to fuel the SCVs.

The LNG facility has been designed to receive LNG from different suppliers; therefore, some of the LNG batches received may have a higher heating value (Btu content) than the pipeline specification. In order to control the heating value of the send-out gas, a natural gas liquid separation plant has been included in the facility design. Natural gas liquid products will be separated out from the LNG for removal by three separate pipelines. Internal roads and infrastructure will be included in the terminal footprint. The land-based portion of the LNG terminal would have a larger overall footprint if located at Bish Cove due to soils and terrain (approximately 47 ha at Bish Cove and 30 ha at Emsley Cove).

2.2.3 Pipelines, Roads, and Transmission Lines

Natural gas will be transported from the terminal via a pipeline lateral to connect with the Pacific Northern Gas (PNG) pipeline located in Kitimat. The PNG line will send the natural gas to Duke Energy's existing Westcoast Energy Mainline gas transportation system. The pipelines associated with the Project are as follows: one 30 inch diameter natural gas send-out pipeline lateral, one 6 inch diameter ethane pipeline lateral, one 6 inch diameter propane pipeline lateral, and one 6 inch diameter butane pipeline lateral. All 4 pipelines will share the same 30 m ROW. The 3 NGL pipeline laterals will be constructed in a single trench while the natural gas pipeline lateral will be constructed in its own trench. The design discharge pressure from the vapourizers is 1,450 pounds per square inch gauge (psig). At this pressure, the 30 inch diameter pipeline lateral is adequate for delivering the send-out capacity to the Kitimat tie-in to the PNG pipeline. The pipeline lateral has been designed for continuous operation with an initial send-out capacity of 610 million standard cubic feet per day

(MMscfd). Provisions have been made for the possibility of 1 billion standard cubic feet per day (Bscfd) send-out capacity in the future.

For an Emsley Cove facility, the proposed lateral will be approximately 18 km in length and routed northeast from the LNG terminal, following the natural terrain and the existing Bish Creek Forest Service Road (FSR). There will also be three natural gas liquids (NGL) product lines in the pipeline lateral right-of-way. For a Bish Cove facility, the total length of pipelines is approximately 13.7 km, and also routed in parallel with an access road and the Bish FSR.

The LNG terminal will require an access road linking the terminal site to the existing Bish Forest Service Road (FSR). If the plant site is located at Emsley Cove, the length of this access road is anticipated to be approximately 800 m. The proposed access road from a plant site at Bish Cove to the Bish FSR is 2.3 km in length (see **Figure 2**). This access road will be a high grade gravel road and will require a 30 m wide ROW. This ROW of the existing forestry road will be 30 m wide as well.

The Bish FSR is within Tree Farm License (TFL) 41, owned by West Fraser Mills Ltd., and will require upgrading and maintenance to its crossing of Bish Creek through agreements between the Proponent and West Fraser Mills. An upgrading of the Bish FSR from its Bish Creek crossing to its western terminus would be required for an access road built to Emsley Cove (see **Figure 2**).

A 287 kV aerial transmission line will also be constructed by BC Hydro parallel to the Bish FSR, and plant access road to supply power to the LNG plant site. The transmission line will extend from Kitimat to Emsley or Bish Cove, with an anticipated width of 15 m. A step down transformer is required and will be located within the fence line of the terminal.

2.2.4 Ancillary Facilities and Activities

In addition to the process equipment the following will be required:

- Various supporting utilities and safety systems required for safe operation of the terminal;
- On-site infrastructure (roads, car park, fencing, and buildings), including:
  - control room;
  - maintenance/warehouse building;
  - compressor building;
  - generator building;
  - vapourizer building;
  - medium pressure pumps building;
  - high pressure pumps building;
  - motor control building;
  - utility building;
  - indoor parking building;
  - berth control room; and
  - gate house
- Emergency power generation facilities;
- Concrete batching plant during construction; and
- Hazard detection and control systems

The administration offices for Kitimat LNG will be located in rented premises in Kitimat.

Figure 3. Proposed Emsley Cove terminal layout.

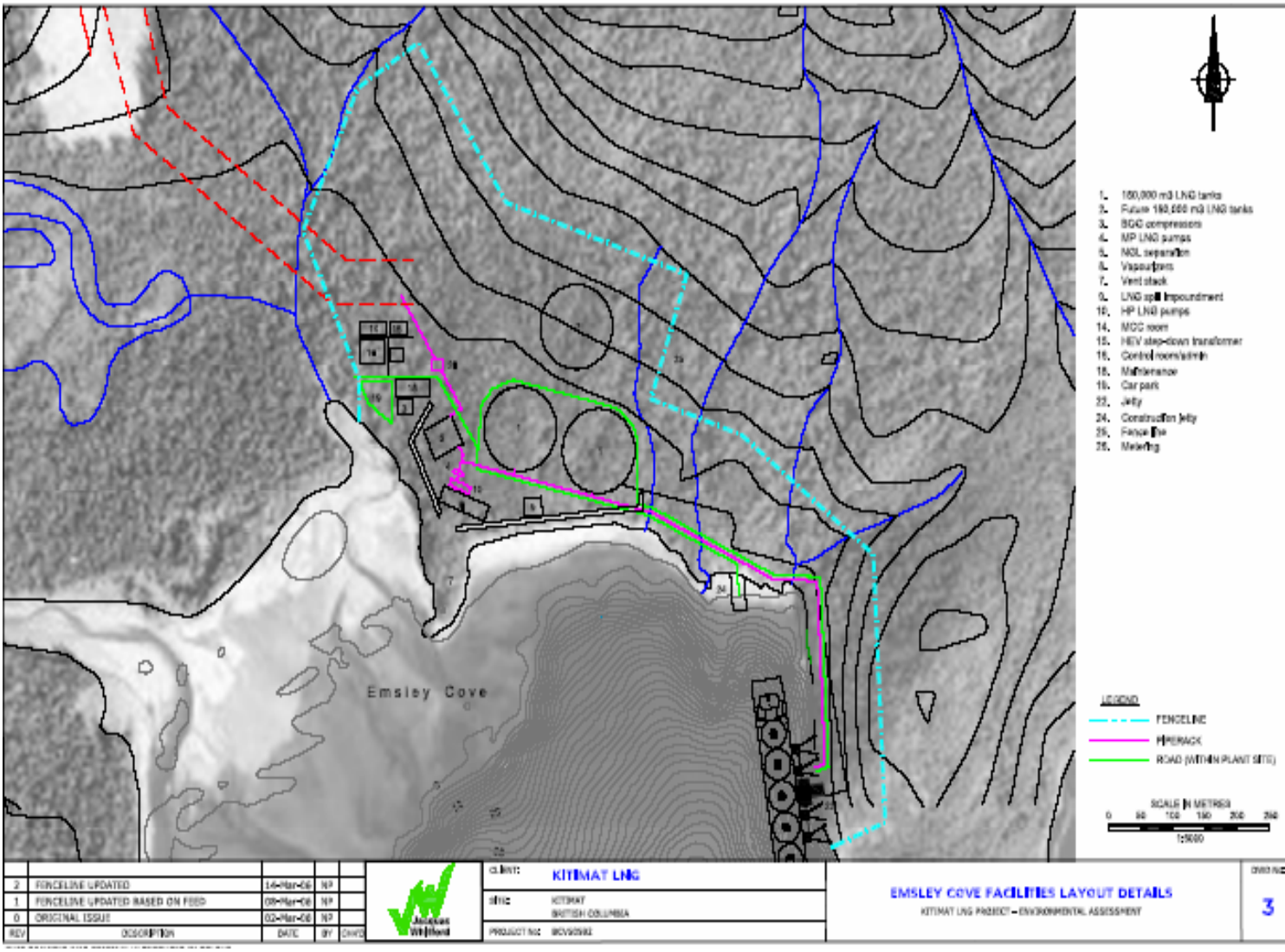
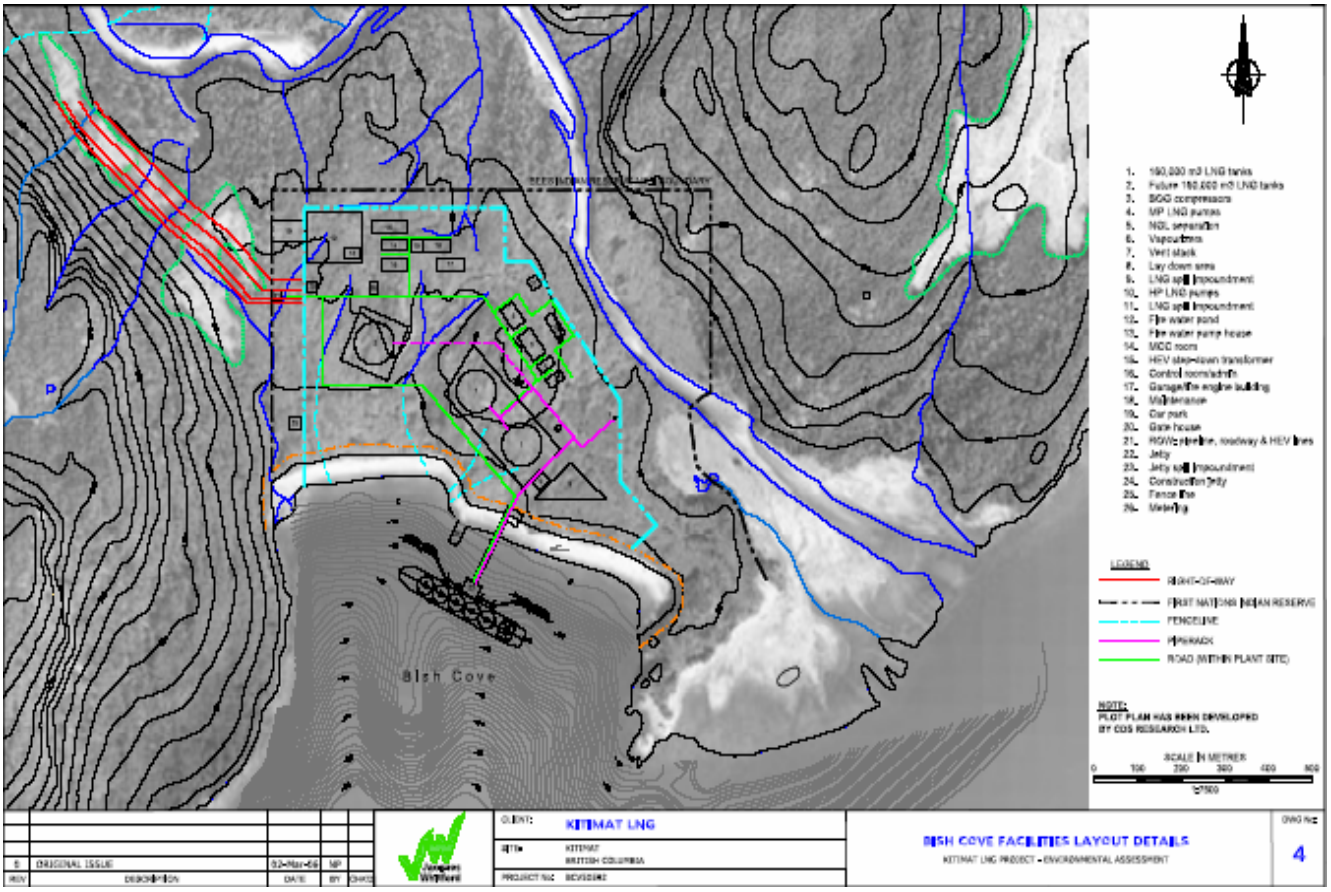


Figure 4. Proposed Bish Cove terminal layout.



The proposed LNG terminal will require a potable water source during construction and its operational lifetime. During operation, this requirement will be met with an in-plant well. During construction, potable water may need to be trucked from Kitimat, prior to establishment of the well. The largest fresh water requirement will occur prior to commissioning during hydrostatic testing of the LNG tanks and pipeline laterals. Approximately 100,000 m^3 of water will be required for this task. This water will not be taken directly from the local fresh water environment.

2.3 CAPITAL COSTS AND EMPLOYMENT

Capital cost of the Project, including the pipeline lateral and infrastructure, is estimated at approximately $700 million CAD (2005$). The Project is expected to create approximately 700 jobs during construction and 50 jobs during normal operations. Project construction is expected to take 30-36 months and to be completed by April 2009.

2.4 PROJECT SCOPE

The joint provincial-federal Application TOR, the provincial section 11 order[2], the provincial section 13 orders[3], the federal-provincial work plan, and the Canadian Environmental Assessment Registry (CEAR) all set out the scope of the Project, for BCEAA and CEAA purposes.

The scope of the Project for the joint provincial Assessment Report / federal Comprehensive Study Report is the construction, operation, and decommissioning of the following on-site and off-site components and activities potentially associated with an LNG terminal at either Emsley Cove or Bish Cove:

Marine terminal facilities including:

- A shoreline LNG tanker berthing and unloading jetty and a separate tug boat berth;
- Related LNG tanker operations in the vicinity of the terminal and at berth;
- Berth for receiving materials and equipment during construction; and
- Dredging activities and potential disposal of dredged materials at sea if required.

Lateral pipelines, access road, road upgrades, and aerial transmission line, extending between the LNG import terminal and the Pacific Northern Gas (PNG) pipeline, including:

- A send-out gas pipeline (30 inch diameter, underground);
- Three NGL product pipelines (6 inch diameter, underground);
- Off-site facility access road and upgrades to the existing access road; and
- Aerial transmission line (287 kV supply from BC Hydro) and associated right-of-way.

Upland facilities including:

- LNG storage in three 160,000 m^3 (operating volume) full containment LNG tanks;
- Pipe rack;

[2] On March 30, 2005, the provincial EAO issued an order under section 11 of BCEAA outlining the scope, procedures and methods to be applied in the pre-Application and Application review stages of the assessment.

[3] On June 14, 2005 and December 30, 2005, the provincial EAO issued an order under section 13 of BCEAA amending the scope of the Project as described in the order under section 11 to accommodate changes to the Project.

- Natural gas liquids (NGL) separation unit;
- Vent stacks and re-condenser;
- Low pressure, medium pressure and high pressure LNG pumps;
- Submerged burner type LNG vaporizers;
- Vapour handling system, including boil-off gas compressors;
- Send-out impoundment; and
- Water supply piping (i.e. closed loop or intake/discharge, potable water).

Ancillary facilities and activities including:

- Various supporting utilities and safety systems required for safe operation of the terminal;
- On-site infrastructure (roads, car park, fencing, and buildings);
- Emergency power generation facilities;
- Concrete batching plant during construction; and
- Hazard detection and control systems.

Spatially, the environmental assessment applies to both Emsley and Bish Coves and includes the send-out pipeline, access road, road upgrades, and aerial transmission line, extending northwards from the LNG facilities and infrastructure to Kitimat. The geographic scope of the LNG shipping activities for the purpose of the assessment includes the waters encompassed within the Coves and extends out to the existing shipping lane.

The temporal boundaries will encompass the entire lifespan of the Project (expected to be approximately 25 years). The environmental assessment will discuss the effects of the Project in all phases, beginning with the construction phase and throughout the operations phase (including any maintenance and/or modifications) and where appropriate, through to the completion of the decommissioning phase.

2.5 SCOPE OF ASSESSMENT

The Application's Approved Terms of Reference (ATOR), the provincial section 11 order and the federal-provincial work plan all confirm the scope of assessment, for the purposes of BCEAA, as the consideration of the potential effects of the Project, including environmental, social, economic, health and heritage effects and potential effects on aboriginal interests, taking into account practical means of preventing or reducing to an acceptable level any potential adverse effects of the Project. Specifically, the assessment has considered air quality, visual quality, noise levels, freshwater and marine ecosystems, terrestrial ecosystems, wildlife, fisheries, vegetation, navigation, social, economic, cultural and heritage values.

For the purposes of CEAA, the scope of assessment defines the factors proposed to be considered in the environmental assessment and the proposed scope of those factors. The RAs are required to consider the factors specified in section 16 of the CEAA, taking into consideration the definitions of the environment, environmental effect and the project, prior to making a decision regarding whether to take action (e.g. grant funding, dispose of land, or issue a permit or authorization) that would permit the Project to proceed.

The factors considered in the environmental assessment, pursuant to section 16 of the CEAA, include the following:

- *the environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out;*
- *the significance of the environmental effects referred to above;*
- *comments from the public that are received in accordance with the Act and the regulations; and*
- *measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project.*

Additional factors to be considered as part of the CSR include:

- *the purpose of the Project;*
- *alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;*
- *the need for, and the requirements of, any follow-up program in respect of the Project; and*
- *the capacity of renewable resources that is likely to be significantly affected by the Project to meet the needs of the present and those of the future.*

As defined under CEAA, "environmental effect" means, in respect of a project:

a) any change that the project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of the Species at Risk Act

b) any effect of any change referred to in paragraph (a) on

i. health and socio-economic conditions
ii. physical and cultural heritage
iii. the current use of lands and resources for traditional purposes by aboriginal persons, or
iv. any structure, site or thing that is of historical, archaeological, palaeontological or architectural significance, or

c) any change to the project that may be caused by the environment.

In order to focus the environmental effects analysis, the Proponent identified components of the environment that are valued for traditional or contemporary use, economic reasons, and/or cultural/social reasons The following Valued Components (VCs) were selected for this Project, based on consultations with First Nations, resource users, local communities, and government agencies (federal and provincial).

- Atmospheric Environment;
- Marine Environment;
- Freshwater Fish and Fish Habitat;
- Wildlife and Wildlife Habitat;
- Avifauna;
- Vegetation Resources;
- Archaeological and Heritage Resources;
- First Nations Communities and Land Use;
- Land and Resource Use (including commercial and recreational fisheries);
- Employment and Business;
- Community and Regional Infrastructure and Services; and
- Public Health and Safety.

The scope of the factors to be considered under CEAA is similar though not identical to that under BCEAA. Specifically, the federal environmental assessment did not consider Employment and Business and Community and Regional Infrastructure and Services. Both these VCs have been considered in this report under Communities and Economy.

In order to effectively assess the potential environmental effects of the Project, the spatial boundaries for VCs varied based on the spatial characteristics of the Project and various VCs. Part B of this Report provides details on the proposed scope of the factors to be considered under CEAA, including the spatial boundaries or areas applicable to each VC. These boundaries may extend beyond physical project limits, and even beyond the limits of potential direct interactions between the Project and the VCs, particularly in the case of migratory species, or regional or national socio-cultural and economic systems.

3. REQUIRED STATUTORY APPROVALS

3.1 FEDERAL APPROVALS

The following federal approvals, authorizations, permits and lease will be required for the proposed Project. As noted in section 1.2.2, at the conclusion of this environmental assessment the federal Minister of Environment will issue an environmental assessment decision statement. The federal departments will be able to proceed with their regulatory decisions if the Minister's environmental assessment decision statement indicates that, in the opinion of the Minister, the Project is not likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures:

- Construction of the proposed marine terminal will require an approval issued by Transport Canada under section 5(1) of the *Navigable Waters Protection Act*;
- Construction of the pipeline in a navigable stream may require an approval issued by Transport Canada under section 5(1) of the *Navigable Waters Protection Act*;
- Construction of a bridge across a navigable stream will require an approval issued by Transport Canada under section 5(1) of the *Navigable Waters Protection Act*;
- Any harmful alteration, disruption or destruction of fish habitat would require formal authorization from Fisheries and Oceans Canada (DFO) under Section 35 of the *Fisheries Act*;
- Disposal of any dredged material at sea will require a permit from Environment Canada (EC) under section 127(1) of the *Canadian Environmental Protection Act 1999* and
- Construction and operation of proposed LNG facilities and associated infrastructure on Bees IR No. 6 will require a lease granted by Indian and Northern Affairs Canada (INAC) under Section 53(1)(b) of the *Indian Act*.

With the exception of the lease requirement above, the above list relates to those federal statutory and regulatory approvals in the CEAA *Law List Regulations* under CEAA that require environmental assessments under CEAA if they enable a project to be carried out. There may be additional federal permit requirements for the Project that are not listed above.

3.2 PROVINCIAL APPROVALS AND CONCURRENT REVIEW OF PERMITS

In accordance with the September 14, 2005 section 10 order[4] issued for the Project, no provincial authorizations, permits, tenures or licenses may be issued under any provincial statutes until the Project has received a Certificate from provincial ministers. In addition, the issuance of a Certificate does not guarantee that the necessary permits and authorizations will be granted, as the Project must comply with the requirements of the appropriate provincial regulatory agencies.

The "permitting stage" refers to the stage following an EA certificate decision in which approvals may be issued by regulatory agencies. Key provincial regulatory agency approvals required by the Project in the permitting stage are shown in **Table 1**.

Table 1. Key Provincial Agency Permitting Required for Kitimat LNG Terminal Project

Statute	Authorizing Agency	Purpose	Authorization Type
Land Act, Section 14 **Forest Act** and **Forest Practices Code Act**	Oil and Gas Commission (OGC)	Gas processing facilities (at Emsley Cove)	2 year temporary occupation Permit Cutting Permit
Land Act, Section 39	OGC	Gas processing facilities (at Emsley Cove)	2 year Licence of Occupation
Land Act, Section 38	OGC	Gas processing facilities (at Emsley Cove)	30 year Lease of Crown land
Land Act, Section 14	Ministry of Agriculture and Lands (MAL)	Marine terminal facilities	2 year temporary occupation Permit
Land Act, Section 39	MAL	Marine terminal facilities	2 year Licence of Occupation
Land Act, Section 38	MAL	Marine terminal facilities	30 year Lease of Crown land
Land Act, Section 14 **Forest Act** and **Forest Practices Code Act**	OGC	Hydro line	2 year temporary occupation Permit Cutting Permit
Land Act, Section 39	OGC	Hydro line	3 year Licence of Occupation
Land Act, Section 40	OGC	Hydro line	30 year Statutory Right-of-Way
Land Act, Section 14 **Forest Act** and **Forest Practices Code Act**	OGC	Pipeline	2 year temporary occupation Permit Cutting Permit
Land Act, Section 39	OGC	Pipeline	3 year Licence
Land Act, Section 40	OGC	Pipeline	30 year Statutory Right-of-Way
Petroleum and Natural Gas Act	OGC	Road, new construction	Initial Approval under PNG Act

[4] On September 14, 2004, EAO issued an order under section 10(1)(c) of BCEAA, designating the Project as reviewable and requiring the Proponent to obtain an environmental assessment certificate (Certificate) before proceeding with the Project.

Land Act, Section 39	OGC		20 year License of Occupation
Water Act, Section 8	OGC	Temporary withdrawal of fresh water for storage tank flushing; hydrostatic testing of the pipeline	Approval for Short Term Use of Water
Water Act, Section 7	Ministry of Environment (MOE)	Withdrawal of freshwater for plant use	Water licence
Water Act, Section 9	OGC	Stream crossings for road and pipeline upgrade and construction	Approval of Changes In and About a Stream
Environmental Management Act	OGC	Any emissions or other waste discharges from the facility	Waste Discharge Permit
Heritage Conservation Act	Ministry of Tourism, Sport & the Arts (AB)	Inspection and survey of Project area for heritage sites Systematic data recovery Heritage site alteration or disturbance	Heritage Inspection Permits Heritage Investigation Permits Site Alteration Permits

Under section 23 of BCEAA and British Columbia Regulation 371/2002, a proponent may apply to EAO for concurrent review of applications submitted to provincial regulatory agencies, at the same time their environmental assessment application is being reviewed.

On June 2, 2005, the Proponent made an Application to EAO for the concurrent review of three applications made to the OGC for a gas processing facility at Emsley Cove, a pipeline lateral and NGL lines, and a transmission line. The EAO accepted these applications for concurrent review as part of its letter of formal acceptance of the Project Application, also dated June 6, 2005. However, on December 21, 2005, the Proponent requested that EAO acceptance of the concurrent review application be withdrawn, as a result of the uncertainty created by the assessment of the Bish Cove site for the LNG terminal. The EAO accepted this request on December 22, 2005, and the three applications made to the OGC were withdrawn from active review by the OGC, pending new and more definitive applications.

4. INFORMATION DISTRIBUTION AND CONSULTATION

4.1 PROJECT WORKING GROUP

Project working groups are used by the EAO as the primary source of policy and technical expertise for considering issues identified during project assessments. In addition to conducting the EA review, the working group identifies information and consultation requirements for provincial statutory permit approvals. It also identifies federal information needs where a review is conducted as a harmonized federal/provincial review.

The Project Assessment Director established a Kitimat LNG Terminal Project Working Group (WG) in November 2004, comprised of representatives of federal, provincial and local government agencies and the Haisla First Nation. The CEA Agency agreed to participate as a co-chair of the WG, to enhance and underline the harmonized nature of the federal and provincial EA review. The WG members are identified in **Appendix B**.

WG members undertook the following activities, based on the mandate of the organizations they represent:

- reviewing and commenting on drafts of the Application Terms of Reference;
- reviewing and commenting on the Application;
- providing advice on issues raised during the course of the assessment of the Project; and
- providing advice on the assessment findings to be reported to provincial ministers and the federal Minister of Environment at the conclusion of the EA.

WG meetings and conference calls were held in December 2004, in June, July, August and September 2005 and in February 2006 to identify specific issues and concerns with information, and to resolve issues. Notes from Working Group meetings in both the pre-Application and Application review stages of review are available on the EAO website as identified in **Appendix A**.

4.2 MEASURES UNDERTAKEN WITH THE PUBLIC

The EAO, CEA Agency and federal RAs are responsible for ensuring Project information is adequately distributed and that the public is consulted at key stages of a project EA. The section 11 and section 13 orders issued to the Proponent by the EAO required specific public consultation procedures to be followed both during pre-Application and Application review stages. The public participation for the federal environmental assessment process followed the provincial process while including additional participation steps required for a comprehensive study. The additional steps under CEAA are outlined in Section 4.3.

The Proponent initiated a consultation program in April 2004 with the general public, as well as community organizations, the District of Kitimat (DOK), and the Regional District of Kitimat-Stikine (RDKS). The purpose of this program was to determine interest in, and issues associated with the proposed Project.

Pubic consultations during pre-Application included a community workshop in Kitimat (November 2004) that was attended by approximately 120 people. Section 2 of the Project Application describes the Proponent's pre-Application consultation activities, and includes a summary of issues and

concerns regarding the Project raised during this period. The EAO confirmed in its May 4, 2005 letter to the Proponent that the Proponent's pre-Application public consultation measures were considered to be adequate.

For the Application review period, the EAO required the Proponent to advertise the availability of the certificate Application and commencement of a 45 day public review and comment period, extending from June 15, 2005 until July 30, 2005. The EAO also required open houses in Terrace (June 21, 2005) and Kitimat (June 22 and 23, 2005), and participated in and monitored these events. These open houses were attended by approximately 150 people. During the Application review period, the Proponent also held an open meeting with the Kitimat Chamber of Commerce that was attended by approximately 18 people.

The section 13 order issued by the EAO on December 30, 2005 also established a requirement to advertise an additional public review period to allow public comments on the supplementary information being generated by the Proponent for a more through assessment of the Bish Cove location for the LNG plant site and marine terminal. This public comment period was set as January 18 to January 31, 2006 and was subsequently extended by the EAO to February 22. A public meeting was held by EAO on the Bish Cove plans and assessment work on February 15, 2006 in Kitimat, at the request of the District of Kitimat Council. The public meeting attracted approximately 76-100 participants.

Throughout the process, the EAO utilized its electronic Project Information Centre (ePIC) to post relevant information, meeting records and correspondence related to the Project. The Proponent also utilized a web site (http://www.kitimatlng.com/) and other means of public distribution throughout the process, in accordance with EAO requirements. Both EAO and the Proponent notified the public of the availability of information and opportunity to comment on the Application.

In the formal June 15 to July 30, 2005 public comment period for the Application review, 44 written comments were received from members of the public, in addition to a number of comments provided during the three open house meetings. Most public comments expressed support for the Project, although the public did express some concerns about the potential effects of the Project on: air quality; noise levels; fishing in, and public recreational access to Emsley Cove; recreational boating effects in Douglas Channel; the marine environment at Emsley Cove, particularly on eelgrass beds; marbled murrelet effects; and terminal-related emissions on plants, birds and wildlife. Some concerns were also expressed about the potential for accidents and explosions.

During the 30 day review period and associated public meeting on supplementary information related to Bish Cove, 3 written responses and 11 questions/comments were received (the latter made verbally at the public meeting). They included comments on the potential effects of the marine facility on eelgrass beds, public access to the Cove, health and safety hazards associated with the terminal, and the number and size of LNG tankers.

Appendix C of this joint Assessment Report / Comprehensive Study Report provides a summary of public issues raised in the two public comment periods on the Application as well as comments received during the public review of the CEAA scoping document.

4.3 PUBLIC PARTICIPATION UNDER CEAA

4.3.1 CEAA Section 21 – Public Participation Regarding Proposed Scope of Project

Under subsection 21(1) of the CEAA, for a comprehensive study, RAs must ensure public consultation on the proposed scope of the project, the proposed factors to be considered in the environmental assessment, the proposed scope of those factors, and the ability of a comprehensive study to address issues relating to the Project. An invitation for members of the public to review and comment on a scoping document was advertised in community newspapers during the weeks of April 25th to May 9th 2005 and also placed on the Canadian Environmental Assessment Registry (CEAR). Around the same time, the public was made aware, by way of advertising in community newspapers, of the availability of participant funding for public participation in the comprehensive study process and review of the CSR.[5]

Public notices were placed in newspapers. The notice requested that the public provide comment to Environment Canada by May 25, 2005. The notices also provided details concerning how to access the scoping document, and how to provide feedback. Copies of the scoping document were made available at four viewing locations in the area and also mailed directly to the Haisla. A meeting on June 10, 2005 between the Haisla and representatives of the Crown provided additional clarification on issues raised as part of the scoping document review.

The scoping document was posted on the Proponent's website. The Proponent also sent an e-mail to the stakeholders on the Proponent's project database notifying stakeholders of the availability of the scoping document for review and comment. There were a total of 479 people on the stakeholder distribution list from government agencies, First Nations, local industry, community service groups, community recreation groups, environmental groups, human resource/development/training organizations, online inquires, and public event attendees.

Two submissions from the District of Kitimat were in support of the Project and did not raise environmental concerns. Two CEAR comments from the public discussed potential effects and access to Emsley Cove, and the proximity of the terminal to populated areas. Two issues raised by the Haisla and their representatives are being dealt with collaboratively through a consultation process with the Haisla. These concerns were evaluated as part of the comprehensive study review and are specifically noted in the issues section in Part B of this Report.

In their Environmental Assessment Track Report submitted to the Minister of the Environment, the RAs, in consultation with the expert federal authorities, indicated that the comprehensive study could fully address issues related to the Project. The Minister of the Environment confirmed, on November 2, 2005, that the environmental assessment under CEAA would continue as a comprehensive study.

Participant Funding Program recipients were also confirmed November 2nd, 2005. The CEA Agency has provided $40,000 to three applicants to support their participation in the environmental assessment of the proposed Kitimat Liquefied Natural Gas (LNG) Project. The recipients were the Kitimat Valley Naturalists, Kitamaat Village Council (Haisla), and Kitimat Chamber of Commerce.

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[5] The CEA Agency administers a Participant Funding Program which supports individuals and non-profit organizations interested in participating in environmental assessments (i.e. comprehensive studies and review panels).

4.3.2 CEAA Section 21.2 - Public Participation in the Comprehensive Study

As a part of the cooperative provincial/federal review of the Project, the RAs shared the formal comment period on the Application as prescribed in the BCEAA. This process is further discussed in Section 4.2 of this Report.

4.3.3 CEAA Section 22 - Public Access to the Comprehensive Study Report

A third opportunity for public input on the Project and the associated environmental assessment is through commentary on this Report. Pursuant to section 22(1) of the *Canadian Environmental Assessment Act*, the CEA Agency will facilitate public access to the CSR, including administering a formal public comment period. All comments submitted will be provided to the RAs and will become part of the public registry for the Project. The RAs will be asked by the Agency to advise whether their conclusions have been altered as a result of the public comments received.

4.4 MEASURES UNDERTAKEN WITH GOVERNMENT AGENCIES

The section 11 order issued to the Proponent by the EAO required specific consultation procedures with federal, provincial and local government agencies to be followed both during pre-Application and Application review stages, using individual consultation as well as the Project Working Group.

The Proponent's government agency consultation program began with the District of Kitimat and the Regional District of Kitimat-Stikine, to determine interest in, and identify issues associated with the proposed Project. The Proponent also contacted the Ministry of Economic Development to gain a better understanding of provincial government agencies and requirements, and held a number of exploratory meetings with the EAO and provincial agencies in Victoria. This led to consultations with federal agencies to discuss process and information requirements. After November 2004, the Proponent was able to use the newly established Project Working Group as the primary vehicle for agency consultation respecting development of its Application and meeting the requirements of both CEAA and BCEAA.

During Application review, the primary vehicle for resolving issues was through the Working Group and its sub-groups. The WG and sub-groups were used to identify, document and resolve Project-related issues. Much of the work done in this EA was conducted by an Issues Sub-Group and Alternative Sites Sub-Group comprised of federal agencies, the EAO and the Haisla.

Appendix D of this joint Assessment Report / Comprehensive Study Report provides a summary of government agency issues raised during the Application Review stage.

4.5 MEASURES UNDERTAKEN WITH FIRST NATIONS

The Project lies within the asserted traditional territory of the Haisla. On the basis of information submitted to the BC Treaty Commission and the Haisla TUS documents, there is no indication of another First Nation asserting traditional territory in the Project area.

The EAO initially contacted the Haisla to discuss their involvement in the EA for the Project and invited the Haisla to participate in the Project Working Group. The EAO also provided the Haisla with opportunities for formal review and comment on the draft section 11 order. Through the Project WG,

the federal RAs and EAO also engaged the Haisla in review of the draft Terms of Reference, and review of the Application. EAO and the RAs offered to meet at any time with the Haisla on the Project, and capacity funding assistance was provided by the EAO. The Haisla also received participant funding from the CEA Agency to support their participation in the environmental assessment of the proposed Project. Haisla representatives participated in all phases of the Project assessment and provided two technical representatives to the Project Working Group.

Staff from the EAO as well as provincial ministries and federal departments consulted with the Haisla in addition to the Project Working Group meetings on four separate occasions to discuss issues raised by the Haisla with respect to potential effects of the Project on asserted Haisla aboriginal rights.

The Proponent made early efforts to consult the Haisla and secure their support for the Project. This included the funding of independent studies and professional advisors for the Haisla and efforts to obtain agreements and business arrangements to address any potential infringement of asserted aboriginal rights.

The EAO obligated the Proponent, through its section 11 order, to undertake consultations with the Haisla on the effects of the Project, and to report the outcome of these consultations to the EAO.

The Proponent met with Haisla representatives approximately 22 times between April 2004 and November 2005 to attempt to address Haisla concerns regarding the Project. During the Application review, the Proponent was also required to hold a community open house in Kitimaat Village (August 11, 2005) that was attended by approximately 57 people. Issues raised included concerns about the location of the Project at Emsley Cove, effects on traditional and contemporary uses, and questions related to employment, training and business opportunities.

On December 15, 2005, the Proponent issued a media release announcing that KLNG Inc. had signed an agreement-in-principle with the Haisla on the Project. A December 15, 2005 letter from the Haisla to the EAO and federal agencies confirmed this agreement and indicated support for the Proponent's request for a more thorough assessment of the Bish Cove site. The letter states the Haisla's support for any recommendation from the EA to locate the Project at Bish Cove on Bees IR No. 6.

The Proponent continued meeting with the Haisla to negotiate a specific impacts and benefits agreement during the months of January to April 2006, and on April 13, 2006 advised the EAO and the RAs that an impacts and benefits agreement had been reached for Bish Cove.

Appendix D of this joint Assessment Report / Comprehensive Study Report provides a summary of issues raised by the Haisla First Nation as members of the government agency Working Group. **Appendix E** provides a provincial summary of issues raised by the Haisla on potential aboriginal rights impacts of the Project.

4.6 CONSULTATION SUMMARY

As noted, **Appendices C, D and E** of this Joint Assessment Report / Comprehensive Study Report contain a complete list of issues identified by the public, government agencies and the Haisla during the review of the Proponent's Application, as well as the Proponent's response to these issues.

The public, Haisla and government agency notification and consultation process has complied with the procedures outlined in the section 11 and section 13 procedural orders issued to the Proponent for the Project. All issues raised by the public, Haisla and federal, provincial and local government agencies during the review of the Project, that are deemed to be within the scope of the review, have been considered in the Application review process and the documents generated as part of the review.

As required under CEAA, this Report considered comments from the public that have been received in accordance with the CEAA and its regulations. In addition, public comment received on the conclusions and recommendations and any other aspect of this Report will be taken into consideration by the federal Minister of the Environment in the environmental assessment decision statement.

5. ASSESSMENT OF ALTERNATIVES

5.1 GENERAL

As outlined in the Terms of Reference and specifically as required under CEAA, the joint provincial Assessment Report and federal Comprehensive Study Report is to examine the need for the Project, the purpose of the Project, the alternatives to the Project; and the technically and economically feasible alternate means of carrying out the Project and the environmental effects of any such alternative means.

The "need for" and "purpose of" the Project are established from the perspective of the Project Proponent and provide the context in which any alternatives were considered. A clear statement of the need for the project is used to establish the scope of the alternatives to be considered (i.e. those within the control or interest of the Proponent).

"Alternative means" of carrying out the Project are defined as the various technically and economically feasible ways that the Project can be implemented. As required under Section 16(2)(b) of CEAA, project alternatives must be considered for a Comprehensive Study level of assessment. The alternative means of carrying out the project include facilities siting, pipeline lateral routing, LNG storage options, LNG regasification options, NGL product separation options and electrical energy supply options. The alternative means of carrying out the Project were evaluated on the basis of normal selection criteria including commercial, engineering, safety and environmental considerations, as applicable. The assessment of alternatives for the Kitimat LNG Terminal consisted of two parts; Alternate Locations and Alternate Facility Design.

5.2 NEED FOR THE PROJECT

As per the CEA Agency Operational Policy Statement regarding the assessment of project need and alternatives, the need for the project is defined as *the problem or opportunity the project is intending to solve or satisfy,* therefore establishing the fundamental rationale for the project.

Natural gas demand in North America is projected to increase by an average of 1.8 percent annually from 2001 to 2025, while production is expected to increase by only 0.7 percent annually over the same period. This trend is also expected for the Canadian natural gas market, with consumption increasing by 2.2 percent per year. The downward reassessment by the National Energy Board (NEB) of natural gas production in Canada, and an increase in demand from projects such as the oil sands in Alberta, are potential drivers of this trend. Conventional natural gas reserves are declining in Canada, and Canadian gas producers are finding it increasingly difficult to tap new reserves sufficient to offset declines in existing production.

The Proponent indicated that in other jurisdictions around the world such as Japan, Korea and parts of Europe, the natural gas shortage has been partially addressed by the import of Liquefied Natural Gas (LNG). A key advantage of LNG is that it provides a new supply option for the use of this clean burning fuel.

5.3 PURPOSE OF THE PROJECT

As per the CEA Agency Operational Policy Statement regarding the assessment of project need and alternatives, the purpose of the project is defined as *what is to be achieved by carrying out the project.*

The Proponent outlined that this Project is designed to meet the growing demand for natural gas by responding to the projected supply shortage within the North American market. Over the long term, consumer demand for natural gas in North America is expected to significantly outpace supply. Domestic supplies cannot keep up with the growing demand for natural gas. Both government and industry recognize that this gap will continue to grow, and are looking towards LNG to temper the imbalance.

According to the Proponent, historically, there have been high costs associated with the LNG value chain. In recent years, advances in technology have reduced the costs associated with exploration, liquefaction and shipping, making LNG regasification facilities commercially viable. As the demand for natural gas is expected to increase, prices are estimated to range from US$4.00 to US$6.00 per Million British Thermal Units until the end of the decade. These prices make the import of LNG commercially feasible.

The Proponent noted that the proposed Kitimat LNG terminal is located near large industrial users and an existing pipeline distribution system, making it well positioned to supply local, provincial, national and North American gas markets.

5.4 ALTERNATIVES TO THE PROJECT

The analysis of "alternatives to" is intended to validate that the preferred alternative is a reasonable approach to meeting need and purpose. This analysis should identify the alternatives to the project, and identify the preferred alternative to the project based on the relative consideration of the environmental, economic and technical benefits and costs.

Alternatives to a project are defined as functionally different ways to meet the project need and achieve the project purpose. Examples of alternatives to the KLNG Project include: expanding existing LNG import facilities; reducing consumption or encouraging more efficient use of natural gas in Canada and in North America; proposing a project that employs alternate methods of energy generation (coal, wind, etc.); or awaiting the completion of the northern pipeline projects.

Although the alternatives noted above could fulfill the need and purpose of the Project, it is essential to acknowledge that "alternatives to" need to be established from the perspective of the Proponent. None of the above options are in the control of, the ability of, or the interests of the Proponent. In this circumstance, the only way to meet the need and purpose is to create a new LNG import facility. As a result, the only viable “alternatives to” the Project is the null or “do nothing” option.

5.5 ALTERNATIVE LOCATIONS

To assess alternative locations, the Proponent applied economic/commercial, technical and community criteria prior to any environmental criterion. If a location was found to be unfeasible for economic or technical reasons (e.g. due to lack of take-away pipeline capacity), no assessment of environmental criteria was conducted. After economically/commercially and technically viable locations were identified, comprehensive environmental, technical, social and economic criteria were applied to the final site selection.

The Proponent developed criteria for three phases of alternative assessment: preliminary site selection; secondary site selection; and final site selection.

Preliminary site selection was based primarily on high-level economic/commercial considerations. The secondary site selection was based on commercial viability and general operational constraints, as well as a relative estimate of environmental concerns. The final site selection was conducted using a comparative analysis of comprehensive environmental, technical, social and economic criteria. A preferred location was selected from the final site selection process.

5.5.1 Alternative Site Evaluation

In an effort to determine a preferred location for an LNG import and regasification terminal, the Proponent developed a preliminary site selection process that evaluated six locations across a wide area including; the Pacific Northwest in the United States, southwest BC close to Vancouver, Prince Rupert, and the Kitimat region.

The following initial criteria were used in selecting the preferred location of the LNG terminal among the above mentioned areas:

- Location on the west coast of North America;
- Access to existing natural gas take-away pipeline;
- Deep water all-season port;
- Supportive government, community and First Nations; and
- Commercial feasibility for entire Project.

Based on the above criteria, the Proponent discounted potential locations in the United States Pacific Northwest and Vancouver due to either lack of public support and/or the lack of take-away pipeline capacity. The Prince Rupert location was discounted due to issues surrounding the take-away pipeline capacity. As a result of the preliminary site selection process, potential sites were narrowed down to those in the Kitimat Area (**Table 2**).

Table 2. Preliminary Site Selection Summary for Kitimat LNG Terminal Project

Criterion	Cherry Point, Washington	Columbia River, Washington	Vancouver	Vancouver Island	Prince Rupert	Kitimat Area
West Coast of North America	YES	YES	YES	YES	YES	YES
Pipeline capacity	NO - no pipeline	NO - no pipeline	NO - no capacity	NO - peak shaving facility	NO - no capacity (confirmed by PNG)	YES -possible capacity upgrade to accommodate
Deep Water All-Season Port	YES	YES	YES	YES	YES	YES
Supportive Government, Community and First Nations	NO	NO	NO	NO	YES	YES
Commercial Feasibility for Entire Project	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**

The secondary site selection process developed by the Proponent examined several potential sites in the Kitimat area that were identified as potentially suitable through the preliminary site selection process. Secondary site selection criteria included commercial viability, general operational constraints and a preliminary estimation of environmental concerns. Specifically, criteria included:

- Commercial concerns;
- Availability of suitable industrial lots;
- Available take-away pipeline capacity;
- Tanker manoeuvrability;
- Proximity to nearest community; and
- Comparatively high-level environmental considerations.

The Proponent indicated that the Kitimat area had several characteristics that made it an attractive location for an LNG terminal, including:

- The Port of Kitimat is a major deepwater port with existing major industrial development that includes methanol, ammonia, aluminium and pulp and paper;
- A developed shipping channel (Douglas Channel) provides convenient access;
- The area is in close proximity to the existing Pacific Northern Gas Ltd. (PNG) gas pipeline system;
- The communities have had some exposure to the concept of an LNG facility due to a previously proposed LNG liquefaction and export terminal proposal;
- The communities of Kitimat and Kitamaat Village had previously been supportive of an LNG facility;
- Available locations existed that were identified for industrial uses;
- Proximity to trained labour pool;
- Proximity to an accredited industrial education institution;
- Access to market/industrial demand;
- Availability of industrial land with technically acceptable attributes; and
- Safe site removed from a populated centre.

The Proponent dismissed locations in the Kitimat industrial area because the land parcels were deemed to be too small for an LNG regasification facility. Clio Bay was also dismissed as the preferred site due to its remote location on the eastern side of the Kitimat Arm, a longer pipeline lateral requirement, and increased disruption of land near the Kitamaat Village, Minette Bay and within Kitimat itself. Based on the secondary site selection criteria, the Proponent narrowed down potential sites to two in the Kitimat area: Bish Cove and Emsley Cove.

5.5.2 Summary and Justification of Preferred Location

The two sites deemed most suitable were Emsley Cove and Bish Cove. The Proponent initially deemed the Emsley Cove location to be more commercially viable than Bish Cove, and based its initial evaluation and environmental assessment application on the Emsley Cove location.

The agreement-in-principle reached between the Proponent and the Haisla in December 2005, however, resulted in the Proponent requesting that the EA provide a more thorough assessment of Bish Cove, and providing supplementary information on Project requirements, layout and potential effects at a Bish Cove location.

The comparative analysis conducted for these two sites is provided in **Table 3** and includes technical, social, and environmental criteria to gauge their relative suitability. The comparative analysis indicates that both sites have positive and negative attributes, with some of the compared criteria similar between the two sites. After review of the comparative analysis presented in **Table 3**, the Bish Cove location was confirmed by the Proponent as the preferred location.

Table 3. Comparative Analysis of Emsley Cove and Bish Cove Project Locations

CRITERIA	EMSLEY COVE	BISH COVE	COMMENT AND ASSUMPTIONS
PROJECT FOOTPRINT			
Length of Bish FSR to be upgraded (km)	16.8	10.6	The shorter road upgrade, pipeline and transmission line required for the Bish location would result in less environmental impact while reducing construction and maintenance costs. However the length of new access road is longer for the Bish cove location which would result in additional costs. The facility site area is greater at the Bish Cove location which will result in greater habitat loss than found at the Emsley Cove. Clearing required for these areas is presented in the following section -Vegetation Resources and Cleared Areas.
Length of New Access Road Construction (km)	0.8	2.3	
Pipeline distance (km) – Plant fence line to PNG interconnect	18.2	13.8	
Length of Pipeline (km) – from the common ROW divergence	5.9	2.3	
Transmission line distance (km) – from sub-station to fence line	12.4	7.9	
Total Facility Site Area (ha)	30.0	47.2	
VEGETATION RESOURCES AND CLEARED AREAS			
Total Area of Project Footprint Requiring Clearing (ha)	158.4	134.8	Bish Cove will result in clearing less total area, and specifically less mature and old growth forest, than Emsley Cove. However, there will be a greater area of rare plant communities that will be cleared from the Bish Cove location. No wetlands will be affected at either terminal location. The area cleared for the Bish Cove location is predominantly early seral (pole/sapling) plant communities. Overall, potential direct effects on vegetation are considered minimal at both locations.
Total Area of Mature and Old Growth Forest Clearing (ha)	82.5	46.0	
Total Area of Cleared Wetland (ha)	0	0	
Total Area of Plant Communities of Conservation Concern in Cleared Area (ha) – Red Listed Salmonberry and Blue Listed Devil's Club plant communities.	16.8	22.1	

CRITERIA	EMSLEY COVE	BISH COVE	COMMENT AND ASSUMPTIONS
TERRESTRIAL HABITAT			
Total Area of High and Moderately High Suitability Wildlife Habitat Cleared (ha)			Bish Cove has a larger area of high and moderately high suitable wildlife habitat primarily due to proximity to Bish Creek and its estuary. These areas provide high and moderately high suitable habitat for black bear, grizzly habitat, black-tailed deer, moose and marten. Bish Cove has high suitability habitat for deer. At Emsley Cove, more high and moderately high suitable habitat for Marbled Murrelet and coast tailed frog will be affected; however presence for these two species hasn't been confirmed. Overall, potential direct effects on wildlife are considered minimal at both locations.
Black Bear (fall)	0.9	9.2	
Black Bear (spring)	1.2	8.0	
Black Bear (summer)	0.9	8.0	
Grizzly Bear (fall)	0	4.6	
Grizzly Bear (spring)	0.3	3.8	
Grizzly Bear (summer)	0	3.8	
Black-Tailed Deer	1.0	0.4	
Moose	0	0.9	
Marten	1.0	8.8	
Mountain Goat	0	0	
Marbled Murrelet	5.6	4.0	
Tailed Frog	4.5	2.4	
AQUATIC AND MARINE HABITAT			
Total Number of Streams Affected (pipeline crossings + total road crossings)	127	125	Road crossings include Bish FSR road and new access road only.
New Stream Crossings (fish bearing) for Pipeline and Powerline	8 new crossings of fish bearing streams. Of these streams, two of them are less than 1.5 metres in width, two of them are 1.5-5 metres in width, three are between 5-20 metres in width and one is greater than 20 m wide. Riparian areas are currently disturbed for six of the eight streams.	22 new crossings of fish bearing streams. These new crossings will be over predominantly S4 (<1.5 m) streams but also includes Bish Creek (> 20 m wide) and Skoda Creek (between 5 m to 20 m wide). Both are important fisheries streams and these crossings would constitute the second crossing on each stream. Riparian areas are currently undisturbed at potential crossing locations.	Emsley and Bish locations will require a similar number of stream crossings (fish bearing and non-fish bearing) in total when comparing existing and new crossings for both locations. However, larger streams are crossed at the Bish location. Stream crossings at either location will require permitting through DFO.
New Stream Crossings (fish bearing) for Access Road	2 new crossings of fish-bearing streams associated with	22 new crossings of fish-bearing streams	There are a similar number of total stream crossings at either location and more new crossings / upgraded crossings at Bish vs. Emsley.

CRITERIA	EMSLEY COVE	BISH COVE	COMMENT AND ASSUMPTIONS
	the road to Emsley Cove from the Bish FSR divergence point; one S1 (5-20 m) and one S4 (<1.5 m).	associated with the new road to Bish Cove from the common road divergence point. These are the same crossings as described above for the powerline and pipeline ROW.	
New Stream Crossings (fish bearing) for Facility	The Emsley Cove site will affect three streams that are fish bearing at their mouths.	The Bish Cove site would affect ten fish bearing streams.	Bish site requires sections of creeks to be in-filled or lost due to grading.
Total Fish Escapements (1980 to 1998)	Coho Salmon 25 Pink Salmon 1,283 Chum Salmon 133	Coho Salmon 715 Pink Salmon 16,994 Chum Salmon 3,535	The Bish Creek Watershed has significantly higher fisheries production than Emsley – however the following comment addresses estuary habitat that is essential to fisheries production.
Distance to Centre of Estuary (km)	0.41	3.16	Emsley Cove has an estuary located within the Cove itself.
Total Eelgrass Area in Cove (ha)	4.7	1.9	Eelgrass coverage shows the presence of sensitive habitats, and there is considerably less eelgrass found in Bish Cove compared to Emsley.
Estimated area of Eelgrass to be Directly Affected	6.4%	None	A more accurate measure of habitat compensation would be required by DFO as a result of habitat loss incurred by construction and infrastructure of the Barge and Tug jetties. However, there is a greater amount of eelgrass habitat that would be directly affected by jetties and their associated traffic at Emsley Cove. Eelgrass habitat would not be directly affected by jetties and their associated traffic at the Bish Cove location.
SITE SUITABILITY CRITERIA			
Land Use Zoning	Designated as industrial site in the Kalum Land and Resource Management Plan (LRMP). The District of Kitimat has jurisdiction over planning and development in the area. Emsley Cove is currently zoned in the OCP as forestry (G5) with recognition of the site as a potential future industrial site. The District of Kitimat is in the process of changing the	Designated as an industrial site in the Kalum LRMP. The Haisla have approved use of Bees IR No. 6 for heavy commercial industrial use as set out in Privy Council Order 1997-1052, and use for an LNG facility is consistent with the designated uses.	Industrial Zone designation has been completed at Bish.

CRITERIA	EMSLEY COVE	BISH COVE	COMMENT AND ASSUMPTIONS
	official zoning from forestry to industrial.		
Area available for Development (ha)	120	100	Both sites have acceptable areas available for development.
MARINE DEPTH PROFILE			
Water Depth Required for LNG Vessel Mooring Location (m)	+15	+15	Similar
Depth at Mooring Location (m)	40	25	Both the Emsley Cove and Bish Cove sites provide adequate water depth.
Tanker Manoeuvrability (700 m) Achieved?	Yes	Yes	Similar
Maximum Depth at Centre of Cove (m)	75	75	Similar
Amount of Dredging Required (m^3)	9,000 m^3	0	Dredging required at Emsley but not for Bish.
Marine Surficial Geology	Sandy silt overlying bedrock to loose sandy silt in the centre of the Cove.	Very soft organic silt, and very loose to loose sandy silt.	More difficult and costly construction for the marine terminal at Bish Cove.
Terrestrial Surfical Geology	Limited topsoil with bedrock – providing good foundation for storage tanks and other infrastructure but space for site layout due to topography	Existence of alluvial clays results in a more defined location where the storage tanks and other infrastructure can be located.	Both locations allow for adequate foundation to site the storage tanks and ancillary facilities. Considerable geotechnical work completed for Bees IR No. 6, while layout at Emsley Cove is preliminary and would be subject to further geotechnical investigations for hazards and constraints.
Exposure to Wind	The eastern profile of Emsley Cove and the position of the LNG Berth next to the Emsley Point rock outcrop provides adequate protection from outflow winds.	The eastern profile of Bish Cove and the position of the LNG Berth next to Bish Point rock outcrop provide adequate protection from outflow winds.	Both locations provide adequate protection from outflow winds.
HEALTH AND SOCIO-ECONOMIC CRITERIA			
Proximity to Population Centre (km)	Kitimat city centre 18.0 Kitamaat Village 11.6	Kitimat city centre 15.0 Kitamaat Village 8.6	Emsley Cove is slightly farther away from local population centres. Both sites are well removed in case of emergency.
Recreational Usage	There are no official recreational trails or sites in the Emsley Cove area; however there is direct access to the cove via Bish FSR and ATV trail. Local residents	There is an established Recreation Site and trail north of Bish Cove/Creek (North Cove Trail, North Cove Recreation Site). However no	Neither of these areas attracts significant numbers of recreational users.

CRITERIA	EMSLEY COVE	BISH COVE	COMMENT AND ASSUMPTIONS
	may occasionally access Emsley Cove by boat but community consultation indicates that use is infrequent.	direct use of land as it is an IR. Frequency of boat access in Bish Cove is unknown.	
Vessel Usage	Recreational boating is somewhat less than Bish Cove due to its increased distance from Kitimat. Salmon trolling in the area occurs farther out in the water rather than near the shore. Commercial fishing occurs well outside of Cove area.	More recreational boating exists at Bish Cove since it is closer to Kitimat and salmon congregate in the area from mid May to September. Salmon trolling occurs close to shore. No commercial fishing allowed close to Bish Creek. Occurs closer to shore than at Emsley	Slightly more recreational fishing occurs near Bish Cove. Commercial fisheries at both sites are out into open water, but closer to the shore at Bish.
Aesthetics	Emsley Point provides a visual and sound barrier from Kitimat. A line of sight analysis has been completed. A facility at Emsley Cove will not be visible from Kitimat or Kitamaat Village.	Bish Point provides a visual and sound barrier from Kitimat. A line of sight analysis has been completed. A facility at Bish Cove will not be visible from Kitimat or Kitamaat Village.	Similar. Neither location can be seen from Kitimat or Kitamaat Village.
HERITAGE AND ARCHAEOLOGICAL CRITERIA			
Archaeological Resources	Three of 4 CMT sites have been removed by timber harvesting. Newly recorded sites were one isolated lithic find, one lithic scatter , and a shell midden. One additional potentially pre-1846 culturally modified tree site	Bees IR No. 6, has 6 previously recorded archaeological sites. Five are within the vicinity of the terminal and three consist of culturally modified tree (CMT) sites. Just outside the facility footprint, 6	At Emsley Cove, the proposed terminal facilities are currently undisturbed whereas the proposed rights-of-way coincide with existing clear cut in many segments. Recorded heritage resource sites in the vicinity of the development consist of culturally modified trees recorded in association with past timber harvesting activities. Archaeological heritage issues at Bish Cove have been largely addressed through designation of Haisla reserve for industrial use and would result in less scrutiny and costs than at Emsley Cove. Both Emsley and Bish Cove have been and are being used for traditional uses (hunting, fishing, plant gathering). Heritage and archaeological resources

CRITERIA	EMSLEY COVE	BISH COVE	COMMENT AND ASSUMPTIONS
	was recorded.	CMTs were recorded. Another site has historic building remains (cabin?) and lithic precontact materials. Once site contains only disturbed surface precontact lithic materials identified during a monitoring program. Of historic significance is the reported presence of a village site described as extending eastward for some 300 metres from the southwest corner of the IR. Two of the previously recorded sites, are at the mouth of Bish Creek.	would be handled comparably at either location, in accordance with the BC Heritage Branch and the Haisla Nation. Development at either site would require Proponent to mitigate any significant effects to archaeological and heritage resources through appropriate mitigation measures as identified through consultation with the Haisla and the BC AB for provincially administered land and Parks Canada for federally administered land.
FIRST NATIONS CRITERIA			
Acceptability for the Haisla	Emsley Cove has not yet been considered for industrial purposes by the Haisla.	Bish Cove has previously been accepted by the Haisla as an industrial site. An Impacts and Benefits agreement with the Haisla provides long-term contract-based certainty over the IR land use.	Bish Cove offers a substantially superior location in terms of business and legal certainty. Also a competitive advantage re: timing of post EA approvals and construction.

5.6 ALTERNATIVE FACILITY LAYOUT

5.6.1 Onshore Facilities

The proposed layout of the LNG terminal onshore facilities was directed by three primary considerations: locating the LNG tanks on bedrock or another highly competent soil such that the tanks would not be at risk in an earthquake; protection of the aquatic resources within the facility footprint by utilizing environmental setbacks from the creeks and marine foreshore; and incorporation of separation distances between facility buildings in accordance with Canadian and international design standards (CSA Z276- 01 and NFPA 59A, 2006). The preferred terminal layout for both Emsley Cove and Bish Coves has been determined and is presented in **Figures 3 and 4.** The on shore facility site area is greater at the Bish Cove location which will result in greater habitat loss than found at the Emsley Cove. The specifics of the vegetation clearing are outlined in Table 3 above. Both locations allow for adequate foundation to site the storage tanks and ancillary facilities.

The site configurations as shown meet the requirements of current (2001) and anticipated (2006) North American standards (Canadian Standards Association, CSA Z276-01, Liquefied Natural Gas (LNG) – Production, Storage, and Handling and NFPA 59A, Standard for the Production, Storage, and Handling of Liquefied Natural Gas, 2006, not yet published). The final layout, especially the location of the LNG storage tanks, will be based on a full geotechnical evaluation of the site. The Bish site layout is more definitive than for Emsley, and is based on significant geotechnical work done when Bees IR No. 6 was being assessed for development and designation. Other considerations in the final layout of the onshore terminal will include efficiency of piping arrangements and supporting equipment, site topography, hazard assessment, earthquake scenarios and other environmental considerations. The primary goal is to optimize efficiency and meet design requirements while minimizing environmental effects.

5.6.2 Marine Facilities

The marine facilities that are required for receiving LNG tankers at the proposed facility include those structures to safely berth and moor the vessel, and those structures that provide the interface between the vessel and the shore to safely and efficiently offload cargo. The marine structures will include four berthing/breasting dolphins, six mooring points and one unloading platform.

Two locations were considered in siting the marine facility at Emsley Cove, including the delta front in the middle of the cove and the eastern Emsley Point shoreline. The former was dismissed as a feasible location as it required construction of a long access and piping trestle extending from the shoreline to the proposed LNG tanker berth. The trestle would add significant cost to the Project, and result in more substantial effect on the existing bottom vegetation than the eastern shore. In addition, the deltaic sediment was not considered suitably stable as a foundation material for the marine structures.

The eastern shoreline at Emsley Cove is considered to be well suited for siting the berth facility based on preliminary site observations and geophysical and bathymetric surveys. The eastern shoreline provides good sheltering from northern wind and waves, appears to provide suitable rock foundation material, and provides a deep water berth at the least distance from the shoreline (essentially eliminating the need for an access trestle). Dredging, blasting and excavation of some 9,000 m^3 is anticipated for the site.

In Bish Cove, the Proponent proposed three alternative locations for the marine facilities, including alternatives for ship berth and a combined construction jetty/ tug berth facility. In determining the preferred location for the marine facilities, the following factors were considered: ease of vessel navigation approach and departure; exposure to wind, waves, current; water depth, blasting and dredging requirements; sea bed geotechnical conditions; geo-hazards; proximity to plant site; cost; risk/safety; and environmental sensitivity.

Originally, the Proponent proposed a location in the eastern portion of Bish Cove, necessitating elimination of a known eelgrass bed and the dredging of approximately 500,000 m^3 of bottom sediments. This was the preferred location since it offered better navigation access, minimized vessel exposure to crosswinds, offered access to a stable rock slope to locate the jetty foundations, pipe-rack areas and access road, had lower risk with respect to geo hazards, and reduced costs.

The rationale for not locating the marine facilities on the west side of the Cove was further documented, and included the susceptibility of this portion of the Cove to terrain instability that would create major engineering, cost and safety concerns.

Concerns raised by DFO on the habitat impact of this site led the Proponent to a re-evaluation and a new proposal to locate these facilities in the centre of Bish Cove in 20-25 m of water, thereby avoiding loss of eelgrass beds. The new proposal also included use of vibro-densification over a 2.0 ha area to provide support for pilings, thereby eliminating the likelihood of dredging and blasting in water. Specifically, the final proposed location in the centre of Bish Cove is the preferred location due to the following: smaller footprint; little or no direct impact to eelgrass; no anticipated dredging; no maintenance dredging; little or no propeller wash concerns; with additional costs being offset by operational advantages such as being closer to the on shore facilities. Geo-hazards, safety and navigational issues can be adequately addressed at the preferred location. Provided the vibro densification process addresses the sediment stability issue, the centre location is considered to be the best location for the marine facilities.

The preferred marine facility layout for both Emsley Cove and Bish Cove has been determined and is also shown presented in **Figures 3 and 4.**

5.6.3 Natural Gas and Natural Gas Liquids Pipeline Laterals

Emsley Cove and Bish Cove were both evaluated as the point of origin for the send-out pipeline lateral. The existing PNG pipeline is the known terminus for the send-out pipeline lateral. The preferred route considered these previously established end points. The pipeline lateral route was selected to follow previously cleared forestry lands wherever possible, to minimize the number of stream crossings, and to minimize the potential for erosion.

The route selection criteria considered many factors, including the existing topography, locations of previously disturbed areas (e.g. previously clear-cut forestry operations), feasibility of paralleling the existing road, minimizing environmental effects, and minimizing interaction with resources and future development. The factors considered within the routing analysis have led to an evolving preferred route as opposed to distinctive route options. Properly considering all of these factors ultimately leads to a more economically feasible route option.

The Emsley Cove location will require approximately 18 km of pipeline to the PNG connection, and will entail 5.9 km of new pipeline ROW from the common ROW divergence along the Bish FSR. The Bish Cove location will involve 13.75 km of pipeline to the PNG connector, and only 2.3 km of new pipeline ROW.

The natural gas liquids pipeline laterals will be contained within a 30 m right-of-way (ROW) and will be below ground. Where possible, and where required by DFO, horizontal directional drilling (HDD) will be used on significant stream crossings. Crossing methods for all streams will be decided upon in consultation with DFO.

5.6.4 LNG Storage Tank Options

The evaluation of the LNG storage tank options refers to both the Emsley Cove and Bish Cove sites.

In LNG terminology, “containment” refers to the safe storage and isolation of LNG. Safe use of LNG, or any cryogenic substance, requires an understanding of how materials behave at cryogenic temperatures. At extremely low temperatures, carbon steel loses its ductility and becomes brittle.

Therefore, the material selected for tanks, piping, and other equipment that comes in contact with LNG is critical. The use of high nickel content steels, aluminum, and stainless steels is costly but necessary to prevent embrittlement and material failures. High alloy steels composed of nine percent nickel and stainless steel will be used for the inner tank of LNG storage tanks and for other LNG applications.

There are three tank options for storing LNG (single, double, or full containment storage tanks). Single and full containment tanks are the most widely used. Three 160,000 m^3 (operating volume) LNG storage tanks are being considered for the terminal. Two of the tanks would be constructed initially with provisions to construct the third tank in the future. For the purposes of the Application, the environmental effects were assessed for three LNG storage tanks.

A single containment tank for LNG is a tank system comprised of an inner tank and an outer container. For this type of tank, only the inner tank is designed to contain LNG. The outer container serves primarily to contain insulation and vapor and to provide a weather shield. Single containment tanks are generally less expensive and rely on a separate impoundment to contain the design spill. The low earthen type of impoundment system required for these tanks have a large footprint, resulting in large heat flux exclusion zones.

A double containment tank is designed and constructed so that both the inner tank and the outer containment are capable of independently containing the LNG. The independent primary (inner) tank contains the LNG and vapour under normal operating conditions. The outer containment (impoundment) is intended to contain any LNG leakage from the inner tank.

Similar to a double containment tank, a full containment tank is designed and constructed so that both the inner tank and the outer containment are capable of independently containing the stored LNG. The inner tank contains the LNG under standard operating conditions. The outer shell and bottom are made out of pre-stressed concrete. The tank roof is constructed of reinforced concrete. The outer tank supports the outer roof and is also intended to contain the LNG. The tanks are designed in accordance with international LNG standards (CSA Z276 and US NFPA 59A). A full containment tank with concrete roof is less susceptible to damage from external events. Full containment tanks offer the highest level of safety and have been chosen as the preferred option for this Project.

5.6.5 Regasification and NGL Separation Technologies

The evaluation of the regasification and NGL separation technologies refers to both the Emsley Cove and Bish Cove sites.

Regasification involves changing LNG from a liquid state back into natural gas. The industry uses three technologies for this process; open rack vapourizer (ORV), submerged combustion vapourizer (SCV), and intermediate fluid vapourizer (IFV). The most commonly used vapourizers are SCV and ORV.

An Open Rack Vapourizer (ORV) uses sea water as its heat source. Sea water flows down on the outside surface of either aluminum or stainless steel heat exchanger panels and vaporizes LNG inside the panel. Baseload operations commonly use ORVs as the operating cost is quite low; however capital costs can be high, depending on the complexity of the sea water intake structure and intake distances. The seawater temperature at the Project site is not compatible with this type of vapourizer (which is typically used in temperate regions); therefore, the ORV is not considered to be a viable option for this Project.

Intermediate Fluid Vapourizers (IFV) use either seawater or waste heat. As is the case for the ORV, Kitimat LNG does not have access to warm seawater or waste heat (such as condensate from a power plant); therefore, the IFV is not considered to be a viable option for this Project.

A Submerged Combustion Vapourizer (SCV) is a self contained unit that uses heated water to vaporize LNG. The vapourizer consists of an enclosed water bath into which exhaust from a natural gas fired burner is allowed to percolate through and heat the water. Submerged stainless steel tubing

in the water bath allows LNG to flow through the vapourizer where it is regasified by the heated water bath. The advantages of this system include: no water requirement except for initial fill; quick start up ability and tolerance for load fluctuation; and high thermal efficiency.

Of the three options that were evaluated, the SCV is viewed as the most cost effective and environmentally sound type of vapourizer and is therefore the preferred option for this Project.

In North America, pipeline gas must comply with specific requirements for composition and heating value. In reviewing viable options for controlling composition and heating value, natural gas liquids (NGL) separation using a conventional fractionation process has been retained because it allows receiving LNG from various sources.

5.6.6 Electrical Energy Supply

Provisionally, the terminal whether located at Emsley Cove or Bish Cove will require approximately 16 mega watts (mW) of electrical energy supply. Two alternatives for the primary electrical energy supply were evaluated for the Project: on-site natural gas-fired electrical generators; and an aerial transmission line connecting into the existing BC Hydro power grid.

Environmental issues that were considered include additional emissions for the on-site electrical generators, and disturbance and potential effects on freshwater fish habitat for the transmission line.

Given the ROWs required for the road and pipeline laterals, the additional ROW required for the transmission line was considered nominal.

An aerial transmission line supplying electrical energy from BC Hydro has been determined to be the preferred option. This preference is based on environmental considerations to limit the amount of air emissions from Project activities. Natural gas-fired generators would add an additional source of air emissions at the terminal, whereas the use of electrical energy supplied from BC Hydro provides cleaner, “green” energy source for the terminal. The transmission line will be sited adjacent to the existing ROW for the road.

Back-up electrical energy generation will also be required for the terminal. Alternatives for a back-up energy supply were not considered. An on-site stand-by turbo-generator rated for 8 mW will be used to maintain a nominal send-out in the event of temporary loss of the main power supply. Given the need to allow at least 30 minutes for bringing the turbo-generator online, a 500 kW emergency diesel generator has also been included, primarily to provide electrical power supply for the LNG tanks foundation heating, lighting and critical controls. The diesel generator and ancillaries will be designed to remain in operation after the Safe Shutdown Earthquake scenario.

PART B - REVIEW OF THE APPLICATION

1. CONSIDERATION OF POTENTIALLY SIGNIFICANT PROJECT EFFECTS

1.1 INFORMATION CONSIDERED

For the purpose of assessing the potentially significant effects of the Project, the Proponent's June 6, 2005 Application and supporting Appendices, as well as relevant documentation and correspondence provided by the Proponent after submission of the Application have been considered. These documents are identified in **Appendix A** of this Report and can be accessed on the EAO website.

The Proponent's documents provided information about the Project and considered the Project's possible effects on the atmospheric environment, water and freshwater environment, marine environment and marine mammals, terrestrial environment, wildlife and wildlife habitat, local communities and economy, public safety and health, land and resource use, navigable waters, heritage and archaeological resources, First Nations, alternative means of carrying out the Project, effects of accidents and malfunctions, effects of the environment on the Project, and cumulative environmental effects, and the capacity of renewable resources to meet present and future needs.

The above documents include the Proponent's response to the issues raised by the public, government agencies and the Haisla during the review (see **Appendices C and D** of this Report). They also include issues raised by the Haisla respecting asserted rights and title (**Appendix E**), and a summary table of the Proponent's commitments, monitoring requirements and mitigation measures (see **Appendix F**).

This Report and its conclusions are based on a review of the information, commitments and proposals identified in the documents considered as Application components.

1.2 BASIS OF REVIEW

The Proponent identified a number of components of the environment that are considered "valued" and of interest when considering the potential effects of a Project. These "Valued Components" (VCs), are addressed in the various sections of Part B of this Report.

For each topic heading, the Report summarizes:

- Background or existing setting as well as spatial and temporal boundaries used in the evaluation, provided by the Proponent;
- Potential Project effects and proposed mitigation, as identified in the Application and other documents provided by the Proponent;
- Issues associated with potential effects of the Project raised by the public, government agencies and the Haisla during the Application review that required additional information or new commitments and/or mitigation measures from the Proponent to be considered as satisfactorily addressed;
- In some cases, topic headings also highlight issues that were frequently raised, and accordingly warranted reiteration of the Proponent's design features or mitigation measures to address these recurring issues; and

- The significance of the predicted residual effects after mitigation arising from the Project as well as the likelihood of the effect occurring, as identified in the Application and other documents provided by the Proponent.

The evaluation of the nature and extent of the residual adverse effects and whether the adverse effects are significant involved utilizing a number of criteria including: extent (magnitude and geographic extent); occurrence (duration and frequency); reversibility; and context (see Tables 6-13).

Magnitude refers to the severity of the adverse effects. Minor or inconsequential effects may not be significant. On the other hand, if the effects are major or catastrophic, the adverse environmental effects will be significant.

Geographic extent of the adverse effects refers to the spatial effect anticipated. Localized adverse environmental effects may not be significant. Alternatively, widespread effects may be significant.

Occurrence refers to the duration and frequency of the adverse effects and the length of time the effect is expected to occur. Long term and/or frequent adverse effects may be significant.

Reversibility refers to the degree to which the adverse effects are reversible or irreversible. Reversible adverse effects may be less significant than adverse environmental effects that are irreversible.

Context refers to the degree that the region has already been adversely affected. The effects of projects may be significant if they occur in areas or regions that have already been adversely affected by human activities, and/or are ecologically fragile and have little resilience to imposed stressors.

2. ENVIRONMENTAL EFFECTS

2.1 ATMOSPHERIC ENVIRONMENT

2.1.1 Background

Climate

The Assessment Area is included in the Pacific climate region, a thin coastal strip of west-facing slopes, uplands and indented fiords that extend no more than 150 km from the sea. Pacific air streams ensure mild winters, mild but not hot summers, and small seasonal temperature differences. Cloudy, rainy weather prevails over the Assessment Area on most winter days. This is owing to a steady stream of low pressure disturbances that originate over the Pacific Ocean and track over the West Coast. These systems produce intense gale force winds and high seas. In the Assessment Area these systems result in strong southwesterly winds and rainfall. Incoming low pressure disturbances can produce extremes of rain and wind; however, most of these storms are short-lived. There is a strong seasonal influence on wind direction. Winds in fall and winter prevail from the north-northeast quadrant. In summer the reverse is true, with winds prevailing from the west-southwest. Wind speeds average approximately 3 m s^{-1} (10 kph), and show little seasonal variation. Strong winds are observed more frequently from the west-southwest, with summer having more frequent strong winds. Fall is the season with the weakest winds.

Air Quality

There has been extensive monitoring of ambient air quality in the Kitimat area for more than 20 years. At present, there are four locations with active ambient air quality monitoring stations in the area. At one of these stations SO_2, (sulphur dioxide), H_2S (total reduced sulphur), NO_x (oxides of nitrogen), PM_{10} (inhalable particulate matter), $PM_{2.5}$ (respirable particulate matter), and O_3 (ozone) are monitored on a continuous basis. However, greenhouse gas (GHG) emissions, including primarily CO_2 (carbon dioxide), from industrial and other sources, are not monitored and there are no reliable GHG emission estimates for the Kitimat area.

The Kitimat area has a relatively heavy industrial base. Major sources of air contaminants in the area include the Alcan aluminium smelter and casting facility, the Eurocan unbleached Kraft pulp mill, and the Methanex methanol/ammonia manufacturing facility. There are also smaller commercial and industrial sources of air contaminants including an asphalt plant and Portland cement batch plant and forestry related activities, and emissions from marine vessels, trucks and other motor vehicles, prescribed fires and wildfires and residential space heating.

Eurocan is the largest source of emission of air contaminants in the Kitimat area. Emissions (in descending order) consist primarily of carbon monoxide, particulate matter, oxides of sulphur, oxides of nitrogen, volatile organic carbon species and total reduced sulphur and ammonia. Alcan emissions consist primarily of particulate matter with some minor emissions of oxides of nitrogen (NO_X). Methanex emissions consist primarily of oxides of nitrogen, carbon monoxide, oxides of sulphur and particulate matter, although plant closure is anticipated, which would eliminate this source. Emissions from other sources include particulate matter (including fugitive road dust), oxides of nitrogen, carbon monoxide and volatile organic carbon species.

The Proponent compiled a summary of ambient air quality data collected at the monitoring stations between 1999 and 2003. This analysis indicated that, for the contaminants monitored, only PM_{10} and H_2S occasionally exceed the 24-hour and 1-hour objectives set out in the British Columbia Interim Air

Quality Objective in some locations. It also indicated that the residential areas of Kitimat experience good air quality with respect to PM_{10}.

Infrequent exceedance in Kitimat of the British Columbia Interim Air Quality Objective for PM_{10} may be attributable to industrial emissions, fugitive dust, local activities, or long-range transport (e.g., smoke from forest fires). Incidences of exceedance of the British Columbia 1-hour Level-A Objective for H_2S are attributable to the Eurocan pulp mill, and are largely restricted to the industrialized west side of the valley. The analysis indicated that, for the remaining contaminants monitored, emissions are well below the applicable standards in the British Columbia Interim Air Quality Objective.

Sound Quality

The existing sound quality in the area of proposed LNG terminal-related activities has not been directly measured. The existing sound quality in the area of proposed LNG terminal-related activities was characterized based on published noise levels from existing sources. It is expected that there would be substantial variation in the existing ambient sound quality over the Project Area. In the District of Kitimat existing sound pressure levels would be lower in the largely residential east side of the valley. In the industrial west side of the valley, the existing sound pressure levels are likely to be higher. The proposed LNG terminal is more than 15 km distant from the District Municipality of Kitimat and more than 8 km from Kitamaat Village. Both of these potential sound receptors are obstructed by terrain, and therefore are not in the path of sound propagating over water from the LNG terminal. Given the remote character of the proposed LNG terminal and low levels of human activity in the vicinity of the LNG terminal, it is expected that there would be a little variation in the existing ambient sound quality locally. The ambient sound pressure levels at the LNG terminal are expected to be characteristic of a rural area, with little influence from motor vehicle traffic present on the nearby Bish FSR (3 km distant). The sound pressure levels associated with the passage of marine vessels and aircraft are expected to be nominal.

2.1.2 Project Effects and Proposed Mitigation

In the Application and supplemental materials, the Proponent assessed the potential for environmental effects of the Project on three distinct sub-components or aspects of the atmospheric environment including: climate; air quality; and sound quality and proposed measures to mitigate these potential effects. These aspects are valued due to their intrinsic importance to the health of humans, wildlife and vegetation.

Climate was selected to address the environmental effects of the LNG terminal to local and regional weather changes. Air Quality was selected to address the environmental effects of conventional physical and chemical emissions associated with the LNG terminal, which may result in possible changes to ambient air quality in the zone of influence of the LNG terminal. Sound Quality was selected to address the LNG terminal-related environmental effects of noise on sound quality.

Key Aspects and Issues of Atmospheric Environment

Aspects of VC on which the EA Focused	Issues Considered
Climate	• Weather patterns as they relate to Construction and Commissioning, Operation, and Decommissioning and Abandonment, including extreme conditions • Adaptive management strategies and Best Available Technology
Air Quality	• Emissions of Criteria Air Contaminants including particulate matter, SO_2, NO_x, CO, and natural gas • Emissions of greenhouse gases to the atmosphere, including

Key Aspects and Issues of Atmospheric Environment

	CO_2 • Ambient concentrations of particulate matter, inhalable particulate matter, respirable particulate matter, SO_2, NO_x, and CO.
Sound Quality	• Sound pressure levels, frequency, and duration of noise producing activities

Assessment Boundaries

The boundary for the proposed Atmospheric Environment VC includes the proposed LNG terminal site (both Emsley and Bish Coves) and a study region that captures all areas potentially affected by LNG terminal emissions and all emissions sources that may contribute to environmental effects in the Assessment Area.

The spatial boundaries for the assessment of the Air Quality and Climate aspects of Atmospheric Environment consist primarily of the zone of influence associated with the LNG terminal (the "Assessment Area"). The Assessment Area is approximately 300 square kilometres in size and encompasses an elliptically shaped area approximately 36 km long and 10 km wide stretching southwest to northeast. It includes land on both sides of the Kitimat Arm of Douglas Channel from southwest of the proposed LNG terminal site to the northeast, and includes the District of Kitimat and Kitamaat Village.

The boundaries for the Climate Change analysis included British Columbia and Canada in order to properly assess the environmental effects of this global environmental issue in the context of national emissions of CO_2.

The spatial boundary for Sound Quality aspects of Atmospheric Environment is defined as the LNG terminal footprint (i.e., the area covered by the proposed LNG terminal, and the existing ROW for the pipeline lateral to Kitimat). This boundary is also extended to include a zone of 200 m on either side of the Bish Creek Mainline Forest Service Road (Bish FSR) to reflect possible Noise Sensitive Areas (NSAs) and potential effects from LNG terminal-related noise from transportation sources.

Potential Effects and Evaluation

Climate

Climate change is a global issue. With respect to a national or global context, the LNG terminal-related emissions of greenhouse gases are very small. The addition of the small amounts of greenhouse gases to the atmosphere is not expected to cause a substantive or measurable change in temperature, precipitation, wind, or sea level. It is anticipated that the LNG terminal will not result in any substantive interaction with the climate in a way that would result in discernible changes to regional, national, or global climate patterns. Given the importance of climate change as a global issue, the Proponent has suggested mitigation and adaptive management strategies aimed at minimizing LNG terminal-related greenhouse gas emissions.

Air Quality

Construction and operation of the Project is expected to result in emissions into the atmosphere that may affect air quality. Construction and transportation equipment (earth movers, graders, blasting, trucks, vessels, concrete batch plant, etc.) will likely generate dust and emit combustion gases, including greenhouse gases or GHGs (primarily carbon dioxide). Project operations, including LNG storage tanks, submerged combustion vaporizers (SCVs) used in regasification, demethanizer pre-heaters, marine vessels and vehicle traffic, will also generate fugitive emissions of natural gas,

methane, particulate matter, combustion gases and GHGs (primarily carbon dioxide), and possibly small releases of natural gas. Air emissions during Project decommissioning may also occur, although these are expected be low.

Fugitive dust and particulate matter emissions from construction activities (such as clearing, grubbing, blasting, and similar earth-moving activities) and operational activities (such as vehicle travel) are transient in nature and are dependent on many factors such as the moisture in the soil, the level of activity at a particular location, and meteorological conditions at the time of the construction or operational activities. These emissions are expected to be nominal, and are expected to occur intermittently. Any potential for dust or particulate matter generation would likely occur during periods of high winds or extremely dry periods, and as such are expected to be of low frequency and short duration. Given the expected low magnitude of these emission sources, the low frequency of occurrence, limited duration of occurrence, and the mitigation that will be applied, dust and particulate matter emissions from construction and operation not expected to be substantive.

Emissions of PM, SO_2, NO_x and CO associated with construction activities were 1 %, 4 %, 8 % and 7 % respectively of the total emissions from all other sources of criteria air contaminants in the Assessment Area. The small number and spatial and temporal distribution of equipment units used during typical construction practices are expected to result in sufficient dispersion of these emissions. This, coupled with the relatively low emissions ensures that the applicable air quality objectives will not be exceeded during this phase of the work. The emissions of criteria air contaminants associated with the LNG terminal construction activities are small in comparison to other sources in the Assessment Area. The resultant increase in criteria air contaminant emissions to the Assessment Area is less than 6 % of present annual emissions. They occur over a relatively short period and are not expected to result in exceedances of the applicable ambient air quality objectives.

Emissions of PM, SO_2, NO_x and CO associated with operational activities are 1 %, 12 %, 7 % and 11 % respectively of the total emissions from all other sources of criteria air contaminants in the Assessment Area. The Proponent conducted a dispersion assessment of the potential emissions from the LNG terminal and associated marine activity during operation to determine if exceedances of the applicable air quality objectives are possible for three substances of concern: respirable particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2) and sulphur dioxide (SO_2). The dispersion assessment demonstrates that for two of the three identified substances of concern ($PM_{2.5}$, NO_2) exceedances of the applicable ambient air quality objectives are not expected. For SO_2, exceedances are predicted for Emsley Cove due to the vertical rise in the topography adjacent to the marine tanker berth; however dispersion models are inherently conservative. Simplifying assumptions made in the dispersion modelling exercise may result in over-estimates. While dispersion model output is not intended to be taken literally, but used as a tool to understand the sources interaction with meteorology, terrain and receptors, the Proponent agreed to undertake SO_2 monitoring to verify that there will be no exceedances. The Proponent does not expect that SO_2 concentrations will be manifest in the ambient environment in excess of the ambient air quality objectives.

The emissions of greenhouse gases from activities associated with construction (approximately 25,171 tonnes per year) and operation (approximately 325,761 tonnes per year) of the proposed facility are minute when compared to Canadian CO_2 emissions for 2000 (694 million tonnes per year.

Sound Quality

Estimates of noise associated with the construction activity (including blasting) and the proposed operation were made from published noise levels from designated sources. Potential effects on sound quality are expected to be greatest during construction, and will include noise from vehicle traffic and heavy equipment operation, from blasting and pile driving. Noise emissions during Project operation is expected to be much lower and generally derived from facility operations such as pumps, engines, other on-site machinery, and from marine vessel unloading LNG at berth.

The potential sound quality effects are applicable to both Emsley Cove and Bish Cove locations for the LNG terminal and marine facilities as the existing setting and baseline data utilized are the same. Sound emissions during Project decommissioning may also occur, although these are expected be low.

The access road (Bish FSR) is remote in nature, and situated well away from human receptors. The changes on the access road are of limited duration and will be reversible. The potential changes in sound quality on other local roads resulting from increased vehicle traffic during construction are not expected to be noticeable. The potential changes in ambient sound pressure levels are expected to be low.

Noise generated by construction activities is usually of relatively short duration, and is also very localized and transient at the location of the proposed LNG facility and along the length of the proposed natural gas and gas liquids pipeline laterals. The noise emissions from construction as well as operation of the LNG terminal have the potential to affect land use directly adjacent to the construction areas. However, the construction sites are remote in nature, and situated well away from human receptors.

The operation of construction equipment is expected to be intermittent, transient, and distributed over a wide area throughout the construction site rather than concentrated in one area. The largest expected source of noise emissions during construction of the facility is from pile driving during construction of the berth. Pile driving will occur at any time of day but its duration will not be continuous.

Sound emissions from the marine vessels would mainly be generated by the operation of the vessel's engines. The vessel engines are substantially attenuated by their placement deep within the confines of the vessel. Only one vessel will be using the berth at any given time. There is a substantial topographic barrier between the berth and Kitamaat Village. As such, the facility can be considered 'remote' from a noise control perspective. The increase in sound emissions from marine vessels using the berth is not expected to result in a noticeable increase in sound (< 3dBA). As well, sound emissions from marine vessels will occur on an intermittent and infrequent basis.

There is very little potential for adverse environmental effects in the form of nuisance at nearby residences or other noise sensitive receptors. There is substantial attenuation of noise emissions associated with construction and operation activities. Given the great distance to the nearest sensitive receptor, the preferential day time pile driving, isolating potentially noisy operations to daylight hours, and the intermittent and infrequent basis of the noise, the potential for adverse environmental effects is expected to be very low.

Description of Proposed Mitigation

The Proponent committed in the Application to undertake mitigative measures to to address potential effects on greenhouse gas emissions, including:

- Provision of an annual report on GHG emissions after the operation commences and prior to the GHG emissions reporting deadline established by the federal government as part of its implementation of the Kyoto Agreement;
- Working with regulatory agencies to manage GHG emissions from the LNG terminal with a view to minimizing emissions through adaptive management;
- Managing GHG emissions from the LNG terminal in accordance with requirements of the Large Final Emitters group identified as part of Canada's implementation of the Kyoto Agreement;
- Using adaptive management to control GHGs, with Best Available Technology that is the norm for industry or better to be used; and
- Undertaking a Hazard Operability Analysis of the terminal design to assist in minimizing the potential for spills or unintentional releases of both LNG and natural gas.

The Proponent committed in the Application to undertake mitigative measures to to address potential effects on criteria air contaminant emissions, including:

- Following air quality equipment maintenance schedules to minimize changes to air quality, and requiring equipment to be operated using low sulphur diesel where possible;
- Implementing a preventative maintenance and leak detection and repair (LDAR) system to minimize and correct any leaks associated with the terminal infrastructure that may occur;
- Using natural gas fired engines in LNG vessels where possible and nitrogen purging of pipes following vessel unloading; and
- Ensuring steady-state operation of burners to minimize transient emissions.

The Proponent committed in the Application to undertake mitigative measures to to address potential effects on fugitive emissions, including:

- Controlling dust and fugitive emissions in Project construction and operation by adoption of best practices, including the application of dust suppressants during periods of heavy activity and/or dry periods, limiting the extent of clearing, and restricting dust generating activities during windy conditions; and
- Minimizing fugitive emissions of particulate matter by paving high-traffic areas.

The Proponent committed in the Application to undertake mitigative measures to to address potential noise effects, including:

- Employing noise control measures on vehicles working in the area (e.g. use of strobe lights instead of back-up beepers), and minimizing the number and frequency of deliveries; and
- Conducting activities that generate noise during regular business hours only.

2.1.3 Issues Raised and Proponent Response

The following key issues concerning potential effects of the Project on the atmospheric environment (including climate, air quality and sound) were raised by the public, some government agencies and the Haisla during the environmental assessment:

1. **Potential for significant adverse effects from LNG terminal and marine facility emissions in the absence of further mitigation, and resultant need for additional mitigation measures from Proponent.**

   Proponent Response: The Proponent has made a new commitment to monitor passive SO_2 at three locations and for a specified time period (both determined in discussions with Environment Canada) to verify the dispersion modelling results and verify the conclusions of its effects assessment. The Proponent also made new commitments to ensure all land vehicles (and marine vehicles where practicable) use on-road diesel fuel, and to consider use of lower-sulphur fuel by ships as a condition of marine terminal use. Ship speed restrictions will be put in place near shore areas where SO_2 effects are predicted; and appropriate code of practice provisions will be applied from the draft report on Best Practices for Reduction of Air Emissions from Construction and Demolition Activities. The Proponent also committed to abide by any new emission reduction standards provided by either federal or provincial agencies.

2. **Clarification required on the assumptions and background data used in emission and dispersion modelling from land and marine sources related to the Project, in order to better interpret the results.**

   Proponent Response: The Proponent provided details respecting the assumptions and background data used. Methodology, assumptions, and data used were detailed in correspondence with the Ministry of Water, Land and Air Protection (now Ministry of Environment) and were deemed acceptable by the Ministry. Environment Canada has acknowledged that the emission estimates used in the assessment are robust and conservative, and in all likelihood the dispersion model results are conservative.

A complete list of issues concerning potential effects of the Project on the atmospheric environment (including climate, air quality and sound) identified by the public, government agencies and the Haisla during the Application review stage of the Project's environmental assessment, and the Proponent's response to these issues, is contained in each of **Appendices C and D** of this Report.

2.1.4 Conclusion of Effects and Mitigation

During the harmonized environmental assessment, the EAO and the federal RAs have considered: the Application; additional Project review material listed in Appendix A; public, government agency and Haisla comments on the potential effects of the Project; responses by the Proponent; and the discussions of the Working Group.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** (particularly section 2), the EAO and the federal RAs are satisfied that the Project is not likely to result in significant adverse effects on the atmospheric environment, taking into account the location of the LNG facility and marine terminal at either Emsley Cove or Bish Cove.

2.2 TERRESTRIAL ENVIRONMENT

2.2.1 Background

The Project is situated within the Coast Mountains physiographic region, with topography characterized by mountainous terrain typically shaped by alpine glaciation processes. This physiographic region primarily consists of intrusive igneous rock, chiefly of the late Mesozoic geological era. These rocks are typically of a coarse crystalline nature, consisting of mostly granodiorite and quartz diorite with minor gneiss and schist. Igneous rocks in the region are relatively resistant to weathering and as a result, slopes on these rocks are generally steep and the topography is rugged.

In general, the Project area (including Emsley and Bish Coves) slopes downward from west to east with an approximate 30 percent gradient. On most slopes, there are extensive bedrock outcrops and accumulations of colluvial material (unconsolidated rubble of varying sizes), deposited by glacial processes and mass wasting. Glacial till materials in the area are composed of clay, silt, and sand sorted to varying degrees.

Basins, plains and lowlands in the region largely consist of sediments deposited by ancient glacial meltwater, or by modern stream action. Alluvial sands and gravels of recent origin are found along the stream channels, with minor deposits of organic materials consisting of peat evident in depressions.

Marine processes have also significantly influenced the areas immediately adjacent to the coastal waters. Marine deposits consist of marine clay overlain by outwashes of sand and gravel.

Soils in the Project area are primarily Podzolic, which are usually developed over acid, coarse-grained parent materials and underneath coniferous forested areas. The soils tend to vary in thickness of top (organic) layers and mineral content with elevation changes. Organic, poorly drained soils tend to form in low lying areas.

The Project is situated in the Kitimat Ranges Ecosection and is represented by the Coastal Western Hemlock (CWH) Biogeoclimatic Zone. It occurs typically west of the coastal mountains, penetrating the coastal mountain barrier somewhat in major river valleys. A Submontane Variant of the CWH Very Wet Maritime Subzone (CWHvm1) is found at lower elevations generally below 350 m, and comprises the majority of the area. A Montane Variant of the CWH Very Wet Maritime Subzone (CWHvm2) occurs at higher elevations above the CWHvm1, and is found within small pockets in the west and north part of the area.

Characteristic floristic features of the two zonal ecosystems found within the Project area include a prominence of western hemlock, a sparse herb layer, and the prevalence of several moss species, including step moss and lanky moss.

Western hemlock, amabilis fir, western red cedar, Sitka spruce, and (especially with increasing elevation) yellow cedar dominate the forests of the wetter maritime subzones. Western hemlock and amabilis fir dominate the canopy of older stands. Sitka spruce occurs mainly on alluvial soils. Deciduous trees occur mainly on floodplains, fluvial terraces and on landslide scars where disturbance exposes mineral soil. Deciduous trees found within the Assessment Area include red alder and trace amounts of black cottonwood.

Plant and vegetation species of special conservation status are listed provincially as “Red” (endangered or threatened in British Columbia) or “Blue” (of special concern because of characteristics that make them sensitive to human activities or natural events) by the British Columbia Conservation Data Centre (CDC). They are listed federally under the *Species at Risk Act* (SARA).

A rare plant survey conducted in the summer of 2005 for CDC listed species resulted in the identification of three “Blue” listed plants (Bog adder’s-mouth orchid, Regel’s rush and eminent bluegrass), all in lowland areas of Emsley Cove. None of the rare plant species were observed within the proposed ROWs or terminal siting areas.

The Bish Cove site was logged in 1974 and today consists predominantly of young (pole-sapling) mixed coniferous/deciduous forest dominated by western hemlock, red alder, western red cedar and Sitka spruce. Salmonberry and devil’s club dominate the understory. One previously identified rare plant element occurrence is located within the Project Area. Eminent bluegrass (*Poa eminens*), a provincially blue-listed species, was observed by the CDC within the mouth of Bish Creek in 1977.

2.2.2 Project Effects and Proposed Mitigation

In the Application and supplemental materials, the Proponent assessed the potential for environmental effects of the Project on terrain, soils and vegetation resources and proposed measures to mitigate these potential effects.

Key aspects of the Terrestrial Environment VC include rare plants and rare plant communities potentially affected by the Project. Vegetation species of special conservation status identified on provincial red and blue lists and by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and/or Schedule 1 of the *Species at Risk Act* (*SARA)* were assessed as part of this VC. Vegetation resources were selected as a VC because of their ecological, aesthetic and recreational importance to the public as well as the potential for direct interactions with the construction of Project facilities, including the pipeline laterals.

Assessment Boundaries

The spatial boundaries for the VC include the Project site (both Emsley and Bish Coves) and the proposed pipeline lateral corridor, as well as the transmission line right-of-way (ROW) and access road. Consistent with other pipeline projects completed in British Columbia, a corridor centered on the pipeline lateral ROW is used to assess environmental effects from Project activities. The width of the corridor includes a 1 km buffer on the west side of the proposed alignment and extends eastwards to the coastal shoreline.

Potential Effects and Evaluation

For both Emsley Cove and Bish Cove terminal locations, construction and commissioning activities such as site preparation for the LNG tanks and other terminal infrastructure, installation of the pipeline laterals, upgrades and extension of the access road, and installation of the aerial transmission line and associated ROW have the potential to result in a variety of environmental effects on terrain, soils, plant communities and rare plants. These effects may include increased soil and slope erosion, increased stream sedimentation, increased slope instability, rockfalls, loss of wetland habitat, introduction of noxious weeds or invasive plants, loss of salvageable timber, and loss of plants or plant communities of special conservation concern.

It is anticipated that 30.0 ha will need to be cleared at Emsley and 47.2 ha at Bish to accommodate the terminal facilities. The entire area will be cleared and fenced.

There is the potential for the direct loss of rare plants within the terminal footprint, ROWs or temporary workspaces. Direct loss of individual or groups of rare plants could result from a number of construction activities such as vegetation clearing, grubbing of root systems, topsoil salvage, backfilling and clean-up and reclamation. The resulting environmental changes along the pipeline lateral, transmission line and access road ROW due to removal of the adjacent forest may include higher ground temperatures and localized changes in groundwater movement. These may adversely affect the microhabitats necessary to support rare plants or plant communities. Even if the adjacent vegetation and/or soils are not directly affected by construction activities, the change in the growing conditions, such as level of light exposure, soil temperature or soil moisture regime, may affect the viability of plants within 60 to 120 m of the ROW. The periodic clearing of trees/woody debris from the ROWs may result in the loss of individual or groups of rare plant species, as well as delay the re-establishment of natural plant communities.

Two plant communities identified by the BC Conservation Data Centre (CDC) as being of special conservation concern are potentially affected by ROW and LNG terminal construction, the BaSs – Devil's club site series (blue listed) and the Ss – Salmonberry site series (red listed). The "Red" listed Salmonberry site series, and the "Blue" listed Devil's club site series plant communities will potentially be affected by ROW and LNG terminal construction.

The total area of potential vegetation clearing associated with the construction of the LNG terminal at Emsley Cove, the pipeline lateral, transmission line and access road ROWs is 158.4 ha, of which 82.5 ha are currently identified by Terrestrial Ecosystem Mapping (TEM) as supporting mature or old growth forest.

The total area of potential vegetation clearing associated with the construction of the LNG terminal at Bish Cove, the pipeline lateral, transmission line and access road ROWs is 134.7 ha, of which 46.0 ha are currently identified by Terrestrial Ecosystem Mapping (TEM) as supporting mature or old growth forest. This represents up to 3.1 percent of the total mature and old growth forest in the Assessment Area.

The Proponent suggests that the project-related vegetation clearing will have no effect on wetland plant communities in the Assessment Area.

The ROW layout and engineering design has taken into consideration the location of the listed plant communities and make adjustments to the ROW alignments where possible to minimize the disturbance to these communities. The ROW alignments will also take into consideration the location of existing disturbed habitats (i.e. forest cutblocks) and selectively locate ROWs in these areas to minimize disturbance to mature and old forest communities.

The Terrestrial Ecosystem Mapping (TEM) field program conducted by the Proponent in the fall of 2004 did not find any rare plants listed by CDC within the footprint of the LNG terminal or in areas sampled along the proposed pipeline lateral ROW for Emsley Cove. However, any areas that have not been previously surveyed and that involve vegetation clearing will require additional rare plant surveying.

During pipeline lateral, transmission line and road construction, there are opportunities for the seeds of noxious weeds and other invasive species to be introduced to the ROW by equipment or by natural means of dispersal (e.g., wind). In addition, weed seeds can be introduced from contaminated seed. The window of opportunity is limited to periods with a combination of exposed (disturbed) soils and activities that may introduce seeds to these soils (e.g., use of equipment carrying seeds from previous work sites). Introduction of noxious weeds or invasive plant species onto the ROW may have adverse effects on the structure of existing native vegetation assemblages, regeneration of trees planted in adjacent cutblock areas or provide a site from which they may spread to other areas of potential

concern to landowners, forest companies and government agencies. Given the relatively small amount of mature forest habitat that will be lost, the control of invasive plant introduction and that the effect on plant communities of special conservation concern within the ROWs will be minimized through alignment adjustments or other mitigative techniques, the potential adverse environmental effects on rare plants and plant communities will be minimal.

In the absence of proper planning and other mitigation, salvageable timber could be lost during clearing activities; however, the EPP will require salvageable timber to be retrieved.

Project operation may also increase natural stormwater runoff and increase erosion. ROW vegetation maintenance could potentially cause a loss of rare plant species or communities.

Project decommissioning and abandonment associated activities have the potential to introduce of noxious weeds or invasive plants onto the ROWs or terminal site during the removal of facilities.

Description of Proposed Mitigation

The Proponent committed in the Application to undertake mitigative measures to address potential effects on stability, soil erosion and sedimentation, including:

- Minimizing the grubbing and stripping of soils for construction requirements;
- Covering of erosion-prone, exposed slopes and covering of stockpiled excavation materials;
- Recontouring and seeding of ROWs, and specialized control measures on high erosion hazard ROW areas;
- Implementing erosion and sediment control measures as outlined in the Environmental Protection Plan (EPP), including: the construction of berms to direct runoff away from sensitive plant communities; the installation of silt fences to remove suspended solids before runoff water leaves the ROW; and crossing riparian habitat at right angles to minimize disturbance;
- Implementing necessary erosion control measures as outlined in an erosion control plan (ECP) to be applied during construction for each stream class, crossing type and type of waterbody to be crossed;
- Assessment of erosion control and sediment control devices by an environmental monitor during construction and decommissioning;
- Undertaking geotechnical investigations, detailed road design, hydraulic analysis of all culverts/bridges, and environmental protection measures during construction; and
- Preparing a formal reclamation and stabilization strategy will be prepared for all ROWs with potential slope instability.

The Proponent committed in the Application to undertake mitigative measures to address potential effects on vegetation, including:

- Conducting a rare plant survey during construction, with the findings of the survey being used to avoid identified plants or apply protective measures;
- Minimizing removal of vegetation and grubbing during construction;
- Taking into consideration the location of the listed plant communities and mature and old forest communities in ROW layout and engineering design, and adjusting the ROW alignment where possible;
- Keeping the pipeline, powerline and road ROW in a single corridor wherever possible to minimize vegetation disturbance;
- Implementing the Hazardous Spill Contingency Plan, Timber Clearing and Salvage, Clean-up, Reclamation, and Fire Prevention and Suppression sections of EPP;

- Implementing a Noxious Weed Management Plan and weed control measures; and
- Implementing a Timber Harvest Plan for clearing of the ROWs and plant site.

2.2.3 Issues Raised and Proponent Response

The following key issues concerning potential effects of the Project on the terrestrial environment (including geology, terrain, soils and vegetation) were raised by the public, some government agencies and the Haisla during the course of the environmental assessment process:

1. **Need to ensure that the ROWs are stable given the steep terrain and potential for erosion and wash-outs that could result from the high rainfall of the Kitimat area.**

   Proponent Response: The Proponent has revised existing commitments so as to develop an EPP that includes ROW preparation measures, sediment control and clean-up and re-vegetation measures. All of these components of the EPP will act to ensure that the risk of erosion and wash-outs are minimized. The Proponent made a new commitment to ensure that all engineering design work is undertaken in accordance with all applicable federal and provincial codes and standards, and is supervised and approved by a Professional Engineer registered in the province of British Columbia. For the Bish Cove access road, the Proponent has proposed a route that crosses relatively flat terrain and avoids building on unstable and steep side slope conditions along Bish Creek.

2. **Management and maintenance of pipeline and powerline ROWs during operation to prevent erosion and minimize adverse vegetation effects.**

   Proponent Response: The Proponent has revised an existing commitment to ensure that its EPP will include provisions for re-vegetation and erosion control on the ROW that Kitimat LNG Inc. controls and manages. The Proponent has made a new commitment to refrain from applying herbicides as a standard vegetation management technique on the Project controlled ROWs. Vegetation will be managed using mechanical means and herbicides will only be used around above-ground pipeline infrastructure.

   The power line ROW will be maintained by BC Hydro, and is subject to the provincial *Integrated Pest Management Act* and regulations which require a Pest Management Plan (PMP) to be prepared for vegetation management. Treatment options and selection criteria will be established in the PMP. Where herbicides are to be used, the PMP specifies pre-treatment inspection requirements, operational information (qualifications and procedures for application of herbicides), and environmental protection strategies.

3. **Effect of the road and pipeline rights of way on wetland communities.**

   Proponent Response: The access road and pipeline alignments had the potential to interact with wetland communities in several locations. The road access to Emsley and Bish Coves will not result in clearing of any wetland areas. The Proponent has had numerous discussions with Environment Canada and has realigned the road access to both Emsley Cove and Bish Cove so as to avoid or minimize potential loss of wetlands. The Proponent made a new commitment to attempt to avoid areas of the Amabilis fir – Sitka spruce/Devil's club plant community through ROW alignment adjustments wherever possible. If disturbance of the community cannot be avoided, mitigation measures such as drainage, erosion control and vegetation restoration will be utilized to protect and promote recovery of the altered plant community.

A complete list of issues concerning potential effects of the Project on the terrestrial environment (including geology, terrain, soils and vegetation) identified by the public, government agencies and the Haisla during the Application review stage of the Project's EA, and the Proponent's response to these issues, is contained in each of **Appendices C and D** of this Report.

2.2.4 Conclusion of Effects and Mitigation

During the harmonized environmental assessment, the EAO and the RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments on the potential effects of the Project; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** (particularly section 3), the EAO and the federal RAs are satisfied that the Project is not likely to result in significant adverse effects on the terrestrial environment, taking into account the location of the LNG facility and marine terminal at either Emsley Cove or Bish Cove.

2.3 WILDLIFE AND WILDLIFE HABITAT

2.3.1 Background

The Project area supports a number of large mammal species including black-tailed deer, moose, gray wolf, coyote and both black bear and grizzly bear. In addition, a number of small mammal species (voles, mice, red squirrels) as well as furbearers (weasel, marten) are also known to occur. Wildlife habitat in the Project area is comprised predominately of mature and old coniferous forests as well as early seral vegetation communities, which are the result of past as well as recent forest harvesting activities. Many of the tree and shrub species are typical of mature, mid-seral and early seral coastal forests.

Avifauna include bird species associated with the terrestrial and marine environment, including migratory, non-migratory resident, and wintering species. The Project area is moderately important in terms of overall avifaunal habitat. The bird use of the coniferous forests in the area is restricted, becoming less intense at higher elevations. The lowland forest contains suitable habitat for a number of bird species, although the occurrence of the majority of species is restricted to the breeding period. Waterfowl and seabirds occur year round, but the majority of birds congregate in the area in the spring and to a lesser extent, the fall while in transition along migratory routes. Although the Kitimat area forms a part of the Pacific Flyway, the ecosystems in the Project area do not meet the requirements of many species. The marine habitat in the vicinity of the LNG terminal supports the highest number of species and individuals during spring and autumn migration periods. Avifaunal terrestrial habitat is relatively homogenous and somewhat fragmented by the Bish Creek Forest Service Road (Bish FSR) and clear cuts.

A search of the CDC database for species of conservation concern in the Kalum Forest District identified six Red listed species (Marbled Murrelet, Pelagic Cormorant, Common Murre, Western Grebe, Swainson's Hawk, Fisher) and nine Blue listed species (coastal tailed frog, Great Blue Heron; Western Screech Owl; Short-eared Owl, Northern Saw-whet Owl, Dusky Canada Goose, Wandering Tattler, Wolverine and Grizzly Bear). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has identified the Marbled Murrelet as Threatened and the coastal tailed frog, Great Blue Heron, Western Screech-owl subspecies *kennicottii*, Short-eared Owl, wolverine and the grizzly bear as species of Special Concern.

Marbled Murrelets are fairly common on marine waters along the coast during spring and winter, but uncommon along the coast during the breeding season (April to September). Foraging sites include shelves at mouths of inlets and shallow banks. These birds are not migratory in the usual sense; rather they shift their distribution from northern and outer coasts to southern and inland waters. Marbled Murrelets have been observed feeding in Emsley Cove. A federal recovery plan is in place for the Marbled Murrelet.

Great Blue Heron are common, but widely distributed, in the Kitimat area during fall and winter. Herons are most numerous during the summer months when they are at breeding colonies and foraging sites. Preferred foraging areas include tidal mudflats with large eel grass meadows, estuaries and slow moving streams. There are no known breeding colonies near the Project area. The majority of Great Blue Heron observations in Emsley Cove have occurred in the autumn and were limited to groups of one or two individuals.

The Western Screech-owl subspecies *kennicottii* potentially breeds in the Kitimat region, but nesting has not been observed in the Project area. These owls typically do not migrate and can be found in a variety of habitat types. Western Screech-owls nest in natural tree cavities and woodpecker holes.

During the December 2005 site visit several avian species, including Northern Flicker, Belted Kingfisher and an unidentified wren were observed in Bish Cove. Several Glaucous-winged Gulls and a female Bufflehead were observed in waters of the Cove. Additional avifaunal records indicate that at least 35 species utilize terrestrial and marine habitats around Bish Cove. Preliminary observations suggest that birds tend to utilize Bish Creek and estuary more than Bish Cove. Species at risk that have been observed in both areas include the Marbled Murrelet, with a total of ten birds observed at various times of year over the past fifteen years. Other notable records include a foraging Great Blue Heron and Bald Eagles (one immature bird and several adults).

The coastal tailed frog inhabits mountain streams with step-pool morphologies and overall gradients that are not too low or excessively steep. Optimal stream habitat contains very few or no fish species. Step-pools in cool, permanent streams adjacent to mature or old forest with significant understory provide suitable habitat for this species. The Project area contains a limited amount of potentially high and moderate suitability habitat. In a follow-up survey conducted in the summer of 2005, presence of coastal tailed frog and tadpoles was confirmed in one stream flowing into Emsley Cove.

The Project area is on the western boundary of the North Coast Grizzly Bear Population Unit (GBPU) and within the southern end of the Bish Creek Grizzly Bear Identified Watershed (GBIW), established by the Province of British Columbia. Critical grizzly bear foraging habitats typically include moist floodplain forests, riparian areas, salmon-producing streams, avalanche chutes, high berry-producing habitats and sedge meadows. In addition, grizzlies may also use dense forested cover and early seral openings. The Emsley Cove estuary and Bish Creek estuary are important spring and fall habitat areas.

The “Kermode” black bears are common in the Assessment Area and have critical habitat that is similar to that of the grizzly bear.

Mountain goats, a provincially Yellow listed species of regional concern, were also assessed due to their sensitivity to disturbances from land and resource use activities. Overall, the Project area contains very little mountain goat winter range because it lacks suitable escape terrain. No goats were observed.

2.3.2 Project Effects and Proposed Mitigation

In the Application and supplemental materials, the Proponent assessed the potential for environmental effects of the Project on wildlife and wildlife habitat and proposed measures to mitigate these potential effects.

Key aspects of the wildlife and wildlife habitat VC include the potential interaction of Project activities or physical works with avifauna, mammals and/or their habitats. This VC was chosen because of the ecological, aesthetic and recreational importance of avifauna and wildlife resources to the public and First Nations. Specific wildlife VCs that have the potential to interact with the Project include:

- Grizzly bear (*Ursus arctos*);
- Black bear (Kermode) (*Ursus americanus kermodei*);
- Mountain goat (*Oreamnos americanus*);
- Moose (*Alces alces*);
- Black-tailed deer (*Odocoileus hemionus*);
- Marten (*Martes americana*); and
- Coastal tailed frog (*Asaphus truei*).

For the purpose of this EA, a number of indicator species were chosen to focus the environmental effects analysis in a meaningful way, and to represent Avifauna.

Assessment Boundaries

The spatial boundaries for the Wildlife and Wildlife Habitat VC include the Project site and the proposed pipeline lateral corridor including areas immediately adjacent that may be influenced by the Project through noise and human disturbances. Specifically, the Assessment Area extends inland from Emsley and Bish Coves along the Douglas Channel coastline to one kilometer west of the pipeline lateral ROW centerline. This area covers approximately 4,152 ha. In addition, the spatial boundaries for the Avifauna include the marine habitats located within Emsley and Bish Coves (with an emphasis on the marine environment in the immediate vicinity of the marine receiving terminal).

Potential Effects and Evaluation

The primary Project activities that could potentially interact directly or indirectly with wildlife and wildlife habitat (including avifauna) and cause a change in seasonal habitat suitability and/or populations include the construction, operation and decommissioning of the LNG terminal (including marine construction activities), pipeline lateral and hydro transmission ROWs as well as construction and operation of the new access road, including upgrading of the existing Bish FSR (increased vehicular traffic).

Specifically, the environmental effects of these primary Project activities could result in the alteration or permanent habitat loss, habitat avoidance (i.e. sensory disturbance and reduced effectiveness), changes to wildlife movement patterns, and direct (e.g. vehicular collisions) or direct and indirect (e.g. bear-human conflict) mortality.

These potential effects were applicable to both Emsley Cove and Bish Cove locations for the LNG terminal.

The main Project activities that have the potential to affect wildlife and wildlife habitat include the construction of the pipeline lateral and aerial transmission ROWs as well as onshore site preparation activities required to construct the LNG terminal at Emsley Cove. To a lesser extent, construction of the new access road extension to either Emsley or Bish Coves as well as upgrades to the existing Bish FSR also have the potential to interact with wildlife in the area. Construction of the pipeline lateral and aerial transmission ROWs will require clearing of vegetation and grading, which has the

potential to result in habitat alteration, sensory disturbance, changes to movement patterns as well as indirect mortality (e.g., bear-human conflict). The clearing and subsequent construction activities within the 30 m pipeline lateral and 20 m transmission ROWs will widen the existing linear corridor (road) increasing the magnitude of the habitat alteration. The trenching and pipeline installation activities will produce temporary barriers to wildlife movement. In addition, temporary workspaces will be required to be cleared but these will be permitted to regenerate following construction. Direct loss of wildlife habitat could result from a number of construction activities such as vegetation clearing, grubbing of root systems or surface organic materials stripping within the LNG terminal footprint, construction of the new access road extension and upgrading the existing Bish FSR. In addition, onshore site preparation for the LNG terminal as well as off-shore site preparation will require blasting which can adversely affect wildlife due to potential sensory disturbance. Vehicular traffic also has the potential to result in sensory disturbance and habitat avoidance as well as direct mortality (i.e., collisions). Site waste management, especially food and garbage, have the potential to result in bear-human conflicts (i.e., indirect mortality).

For avifauna, marine construction activities such as vessel transportation and construction of the berth, including noise and human presence, have the potential to result in habitat avoidance and changes in movement patterns and ultimately the loss and/or alteration of habitat. Site lighting and lights from vehicles and heavy equipment may attract migrating birds to the construction area. Site preparation work for the onshore LNG infrastructure, storage tanks and the pipeline laterals will include clearing and grubbing of the ROW. It will also require temporary workspaces to be cleared but these will be permitted to regenerate following construction. Clearing activities could result in direct mortality of avifauna if these activities occur during the breeding bird season. Construction of the LNG terminal could potentially cause sedimentation of marine habitats of waterfowl and seabirds, leading to a loss or alteration of habitat. Construction will convert some habitat from edge forest and shrub, to more open habitat along the pipeline lateral ROW, and permanently remove some mature forest and other habitats within the LNG terminal footprint. Increased vehicular traffic on the access road and traffic along the pipeline lateral ROW could increase the avoidance by birds in adjacent terrestrial habitat as well as increase the chance of collisions with bird species. The clearing and subsequent construction activities within the pipeline lateral ROW, the access road upgrade, and extension and the transmission line ROW will widen the existing linear corridors, and in some places create new linear corridors, increasing the magnitude of the existing habitat fragmentation. The pipeline installation activities could result in avoidance of adjacent habitat by some breeding birds.

Operational activities that may result in environmental effects on wildlife and wildlife habitat are limited to vehicular traffic as well as maintenance and repairs. Specifically, vegetation maintenance or repairs to the pipeline lateral and transmission ROWs, LNG terminal and access road could result in reduced habitat effectiveness (i.e., sensory disturbance and habitat avoidance) or cause direct mortality. Vehicular traffic on the existing road during operation could also result in avoidance of terrestrial habitat along the road edges, and further restrict wildlife from crossing the road (i.e., changes to movement patterns).

Operational activities that may result in an environmental effect on avifauna include marine vessel traffic, unloading of vessels at the berth, vehicular traffic, facility lighting, ROW vegetation maintenance or repairs to the pipeline laterals. Vehicular traffic during operation could result in avoidance of terrestrial habitat along the road edges as well as increase the chance of collisions with bird species. ROW maintenance activities could disturb terrestrial avifauna inhabiting the ROW habitats and may result in direct mortality. Environmental effects of pipeline maintenance repairs could be similar to construction activities, such as clearing and grubbing, and pipeline lateral installation.

Project decommissioning and abandonment associated activities are similar to those associated with construction and operation. However, following reclamation of the land, there is potential for habitat loss, alteration and fragmentation associated with the initial Project development to be reversed over the long term, should the area be reforested or habitat regenerate.

Description of Proposed Mitigation

The Proponent committed in the Application to undertake mitigative measures to address potential effects on wildlife and wildlife habitat (and avifauna), including:

- Minimizing the size of temporary work spaces, locating them beyond 30 m of wetlands and riparian areas, and locating them beyond 100m of critical bear foraging areas;
- Confining clearing and grubbing to ROWs;
- Scheduling blasting activities to avoid mountain goat critical periods (winter/lambing) and critical bear feeding periods (Spring and Fall) and peak spring bird migration;
- Scheduling construction and decommissioning activities to avoid peak grizzly and black bear foraging activities at the LNG facility location;
- Facilitating wildlife movement across construction areas by installing trench plugs and gaps as required;
- During construction, providing visual screen buffers for bears, moose and deer where possible;
- Avoiding the re-seeding of roadsides with preferred bear or ungulate forage plants;
- Minimizing the removal of shrubs within 30 m of all streams, and grubbing the pipeline lateral trench within 10 m of stream banks;
- During the physical excavation of the pipeline lateral trench, isolation and inspection of instream areas for absence of tailed frogs before commencing work, and inspection of trenches for tailed frog prior to backfilling;
- Scheduling construction activities outside the peak spring migration period for migratory birds;
- Scheduling vegetation clearing outside of the bird breeding season, and grubbing as soon as possible;
- Ensuring a maximum distance of <200 m is left between forest patches after harvesting;
- Conducting a field survey to confirm the presence of nesting attributes for Marbled Murrelets, and site clearing outside of the breeding season;
- Designing site security lighting to be down-shielded and similar to street lighting;
- Implementing a bear safety and site management plan as part of the EPP;
- Prohibiting All Terrain Vehicle use by industrial personnel outside the ROWs and LNG terminal;
- Implementing a coordinated access management plan;
- Considering public access control points using berms, doglegs, slash rollback;
- During operations, maintaining low speed limits on access roads and where appropriate, posting of wildlife crossing signs;
- During operation, minimizing the time required for tanker unloading;
- During operation, maintaining adequate hiding cover buffers (50 m) between access roads and important bear and ungulate habitat;
- Where possible, minimizing high snow berms during winter road plowing, and creating gaps to allow ungulate movement;
- Ensuring the EPP addresses avifauna effects mitigation measures associated with repair work on pipelines;
- Scheduling decommissioning work outside the bird breeding season or peak migration period, and outside peak grizzly and black bear foraging periods (Spring and Fall);
- Revegetation of decommissioned areas with native species;
- Minimizing the LNG terminal footprint;
- Locating where feasible ROW adjacent to other linear disturbances (i.e. roads and other ROW);

- Minimizing ROW width and clearing to greatest extent possible;
- During operations, maintaining low speed limits on access roads and where appropriate, posting of wildlife crossing signs;
- Maintaining screening buffers along road ROWs for decommissioning;and
- Ensuring safe handling, storage and disposal of food and food wastes as part of EPP.

2.3.3 Issues Raised and Proponent Response

The following key issues concerning potential effects of the Project on wildlife and wildlife habitat were raised by the public, some government agencies and the Haisla during the EA:

1. **Lack of information on potential effects of Project on avifauna, and avifauna protection, particularly the adequacy of seasonal information, identification of potential Marbled Murrelet nest trees prior to commencement of vegetation clearing; a standardized heron stick nest survey; planned follow-up program; and participation in the Coastal Waterbird Survey program to develop more comprehensive baseline data for emergency response preparedness.**

   Proponent Response: The Proponent has offered to participate in the Coastal Watershed Survey Program for a ten year period. The BC Coastal Waterbird Survey is a not-for profit program which is primarily volunteer driven. The program gathers long-term data on the abundance and distribution of waterbird species. This data is used to monitor and track changes in waterbird populations and habitat use, with the end goal of conserving the coastal waterbird populations in British Columbia. The Proponent has also committed to include in its EPP a survey for Great Blue Heron nests and other significant wildlife features during on-site environmental monitoring, prior to any forest harvesting activities. If vegetation clearing overlaps the breeding bird season (April-July), the Great Blue Heron nest survey would be conducted as required by Environment Canada. The Proponent will conduct reconnaissance surveys prior to vegetation clearing along proposed ROWs to confirm habitat suitability ratings as well as identify any special habitat features (dens, wildlife trees, etc.) that may be affected. The Proponent will, prior to construction, develop and implement management and mitigation strategies for construction and operations, to meet the requirements of the *Migratory Birds Convention Act* and the BC *Wildlife Act*. This includes: undertaking nest surveys in advance of any vegetation clearing proposed during the migratory bird breeding season (April 1 to July 31), and where nests are found, providing nest survey results to specified agencies to determine appropriateness of clearing and dimensions of any required nest buffer zones; and survey of Great Blue Heron foraging activity in the marine terminal area during the Spring 2006 breeding season, to be followed up with a nest search prior to any proposed clearing of mature trees should Heron activity be observed. For a Bish Cove location, the Proponent has also committed to complete a Marbled Murrelet survey to confirm absence of these birds in forested areas to be affected by an LNG terminal footprint.

2. **Lack of information on potential effects of Project on coastal tailed frogs (SARA listed species).**

   Proponent Response: The potential for loss of tailed frog habitat and individuals can be mitigated through measures similar to those used to address environmental effects on fish habitat. The Proponent has made a new commitment to specifically include measures to protect the coastal tailed frog and its habitat in its EPP. The Proponent has also committed to completing a tailed frog survey to confirm predicted absence in streams that would be affected by the LNG

facility site if located at Bish Cove. If found, mitigation measures will be applied, as proposed in the Application and in accordance with subsequent commitments found elsewhere in this Report.

A complete list of issues concerning potential effects of the Project on wildlife and wildlife habitat (including avifauna) identified by the public, government agencies and the Haisla during the Application review stage of the Project's environmental assessment, and the Proponent's response to these issues, is contained in each of **Appendices C and D** of this Report.

2.3.4 Conclusion of Effects and Mitigation

During the harmonized environmental assessment, the EAO and the RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments on the potential effects of the Project; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** (particularly section 4), the EAO and the federal RAs are satisfied that the Project is not likely to result in significant adverse effects on wildlife and wildlife habitat, taking into account the location of the LNG facility and marine terminal at either Emsley Cove or Bish Cove.

2.4 FRESHWATER ENVIRONMENT AND FISHERIES

2.4.1 Background

Watershed areas for the 15 major drainages potentially affected by the Project range from 10.5 ha (unnamed tributary to Douglas Channel) to 12,500 ha (Bish Creek watershed). Mean daily discharges for each major watershed within the Project assessment area were calculated, and range from 0.007 m^3/s to 7.9 m^3/s. Hydrometric stations in the Kitimat area indicate discharges that peak during fall (October and November) and spring/early summer (June and July) and are generally lowest between December and March.

Emsley Creek and the smaller Emsley Cove Creek both drain into the western side of Emsley Cove. Bish Creek drains into Douglas Channel at a point east and outside of Bish Cove.

A variety of fish species are found in the watersheds and streams potentially affected by the Project. Regionally important (cultural, recreational and/or commercial) populations of chinook salmon, chum salmon, coho salmon, pink salmon, and sockeye salmon, Dolly Varden char, cutthroat trout, rainbow trout and steelhead trout occur in the Kitimat River watershed, including the lower reaches of tributaries to Anderson and Moore creeks.

Bish Creek contains chinook, chum, coho, pink, cutthroat, rainbow, steelhead and Dolly Varden populations. Smaller fish bearing watercourses potentially affected by the Project support coho salmon and resident and/or anadromous forms of Dolly Varden char and cutthroat trout. Mountain whitefish and eulachon are also known to occur in Kitimat River and lower Bish Creek mainstems. Several non-salmonid species, including sculpins, threespine stickleback and Pacific lamprey, also occur or are suspected to occur in the larger watersheds. Freshwater species of special conservation status identified by the province include cutthroat trout, bull trout and Dolly Varden.

Juvenile salmonid rearing and overwintering survival, egg incubation and alevin development, adult migration and spawning success are susceptible to alterations or losses of riparian habitat function and water quality degradation. Anderson, Moore, Bish, Emsley Cove, Skoda, Reliant and Renegade creeks provide high quality overwintering, rearing and spawning habitat for salmonids attributable to low-moderate gradient reaches with abundant fish cover (e.g. large woody debris, boulders, undercut banks, etc.), riffle-pool morphology, stable flow regimes and clean spawning substrates.

The majority of the smaller fish bearing watercourses provide perennial fish habitat and similar species assemblages to those found in the major watersheds. Although the majority of small non-fish bearing drainages are ephemeral (e.g. periodic flow), their seasonal contributions (flow, nutrients, woody debris and spawning gravels) to downstream fish bearing habitats are important.

Groundwater resources in the Project area are instrumental in maintaining the base flow of local streams during low flow periods. Groundwater occurs in both the bedrock masses and in the granular deposits along valleys. Groundwater flow direction is dominated by topography, but is also influenced by permeability and bedrock fractures. Springs often occur in the area as a result of limited fractures and permeability. The sand and gravel deposits common in valleys provide suitable conditions for groundwater storage and extraction.

2.4.2 Project Effects and Proposed Mitigation

In the Application and supplemental materials, the Proponent assessed the potential for environmental effects of the Project on the freshwater environment and fisheries and proposed measures to mitigate these potential effects.

Key aspects of the freshwater fish and fish habitat VC include the potential of Project activities during construction, operation, and decommissioning to affect a number of fish bearing and non-fish bearing streams that flow into Douglas Channel. This VC was chosen since quality fish habitat, as determined collectively by water chemistry, channel biophysical and riparian attributes, is vital to the integrity of sustainable fish populations.

Assessment Boundaries

The assessment of potential environmental effects on the freshwater fish and fish habitat VC encompasses all watercourses located within 50 m of the plant infrastructure and terminal footprint at Emsley Cove, all watercourses located within Bees IR No. 6 for Bish Cove, and all watercourses crossed by the pipeline laterals or the existing Bish Creek Forest Service Road (Bish FSR). Spatial boundaries for the environmental effects assessment includes all aquatic and riparian habitats from approximately 100 m upstream from the disturbance area, downstream to tidewater (Douglas Channel), or to confluence of another watercourse where the environmental effects area has been established.

Potential Effects and Evaluation
The Project, whether located at Emsley Cove or Bish Cove, has the potential to affect a number of watersheds, streams and their riparian habitats through the routing of ROWs for pipelines, a hydro transmission line and roads from Kitimat to the LNG terminal. The Project design does not impinge upon any lakes or fish habitat wetlands, and therefore it is unlikely that the Project would have any potential effects on them.

Project construction and commissioning activities such as site preparation (grubbing, clearing and grading, construction of on-shore facilities, watercourse crossings (pipeline lateral and road/transmission line) and pipeline access may affect fish and fish habitat through loss and alteration of riparian vegetation communities, alteration of instream habitat (culvert and bridge upgrading) and direct mortality of fish and/or fish ova.

Integrity and Function of Riparian Habitat
Clearing and grubbing of vegetation adjacent to watercourses may directly affect the quality, integrity and function of riparian habitat. Loss of riparian vegetation due to clearing for road construction or alteration of the native species assemblage (e.g. change of vegetation type from forest or shrub to grassland on the pipeline lateral ROW) can adversely affect habitat productive capacity of fish habitat through:

- Reduction in stream bank integrity typically reinforced by riparian vegetation root systems;
- Reduction of shading which may result in increased stream temperature;
- Increase in instantaneous event-related discharge rates which can result in torrents and erosion, increased sedimentation, habitat infilling, channel lateral movement and realignment;
- Reduction of effective overstream fish cover (predator avoidance and stream temperature regulation); and
- Reduction in allochthonous nutrient inputs to the stream originating from upstream insect and woody debris recruitment.

Project operational activities associated with maintenance of vegetation along the pipeline lateral and transmission line ROWs, such as mechanical vegetation control of trees and shrubs growing adjacent to watercourses, may reduce the functional value of the riparian vegetation and adversely affect fish habitat. Measures to mitigate the effects of riparian vegetation loss will be addressed in the EPP and adherence to best management practices recommendation for vegetation management. Vegetation Control and Management will include recommendations for shrub re-planting as well as willow planting and/or staking to restore the riparian vegetation and function at each crossing of a fish bearing watercourse. Past experience on stream restoration projects has shown that these efforts can successfully mitigate the environmental effects of clearing. Over a relatively short period of time (two to three years) the vegetation will green-up and mature, resulting in no net loss of riparian habitat.

The Proponent does not plan to remove the pipeline laterals. However, if the Project pipeline laterals and transmission line are to be decommissioned and abandoned, there is the potential for alteration and disruption of fish habitat associated with streams that cross the ROWs or terminal site during the removal of facilities.

The ROWs required for the access road, natural gas and NGL pipelines, and hydro transmission lines associated with an Emsley Cove terminal will result in 8 new crossings of fish bearing streams. These ROWs for a Bish Cove terminal will result in 10 new crossings of fish bearing streams. The total number of streams affected by pipeline and road crossings is 127 for an Emsley-based project and 125 for a Bish-based project.

Streams and riparian habitat within the boundaries of the LNG plant will also be affected. If the LNG plant and marine terminal are located at Emsley Cove, KLNG estimates that 2,250 m^2 of riparian vegetation would be altered and 67.5 m^2 of instream habitat would be lost. Within the proposed Bish Cove plant site, it is estimated that 58,058 m^2 of riparian vegetation would be altered and 513 m^2 of instream habitat would be lost.

Site preparation, construction, pipeline installation, ROW access and road upgrading/culvert replacement activities may result in riparian soils disturbance and exposure that can increase channel bank susceptibility to erosion. During persistent precipitation or snowmelt, surface runoff can cause soil erosion in exposed work areas and transport suspended sand, silt and clay into fish habitat.

Increased sediment loads entering a watercourse or waterbody may adversely affect fish and fish habitat. High concentrations of sediment are detrimental to benthic organisms, fish ova and alevin survival and habitat productive capacity. Increased suspended sediments may also interfere with production of macroinvertebrates and other aquatic fish food organisms.

The extent of these potential environmental effects depends on the concentration of suspended sediment, event duration, species and life stage of fish present within the increased TSS zone of influence, and sensitivity of the habitat type affected. Exposure of fish and habitats to low levels of suspended sediments and seasonal freshet-related instantaneous increases occurs naturally, particularly in steep coastal watersheds. During increased TSS events, juvenile and adult fish most frequently avoid the zone of influence and return to the affected habitats once TSS levels subside. However, high concentrations of suspended sediments over extended durations of exposure will reduce fish feeding success, reduce growth rates, damage gill membranes, decrease disease resistance, and/or impair ova development and embryonic development.

These effects will be mitigated through riparian restoration activities. Re-vegetation with indigenous shrub and brush species will minimize the environmental effects on stream channel integrity and function. As the pipeline lateral ROW will be located in relatively steep reaches within the upper watersheds (S4-S6) at most crossings, any reduction in stream channel shading associated with replacement of the existing riparian canopy is likely to have a minimal adverse environmental effect on water temperature. The use of shrubs and brush during mitigative riparian re-vegetation of the pipeline lateral ROW will provide effective shading of smaller watercourse crossings.

Potential degradation of water quality caused by deposition of eroded sand, gravel and fines will be mitigated through a number of sediment and erosion control measures which will be installed and maintained as determined appropriate by an environmental inspector during construction. Topsoil stripping and root grubbing will be minimized within stream riparian areas to the extent required to install vehicle access and the pipeline lateral. A comprehensive EPP will be developed for the Project identifying appropriate erosion control techniques to be used and how they will be implemented. Further, Environmental Standard Practice Instructions will be developed which will detail task-specific standard operating procedures for construction, ROW clearing, grading, trenching and watercourse crossing techniques, as well as systems operations for pest and vegetation control (Integrated Vegetation Management), environmental incident responses and remedial action required for environmental damage among other criteria. All personnel/crews associated with the construction will be trained in and supplied with a copy of Environmental Standard Practice Instructions prior to initiation of any on-site work.

Instream Fish Habitats

Project construction and commissioning activities such as site preparation (grubbing, clearing and grading, construction of on-shore facilities, watercourse crossings (pipeline lateral and road/transmission line) and pipeline access may affect fish and fish habitat through the loss of instream habitat (culvert and bridge upgrading).

Project-related construction, culvert upgrade and pipeline installation activities, if not mitigated, could affect critical instream fish habitats through alteration of water quality, pool depths, spawning substrate quality, elimination or re-distribution of instream fish cover attributes (LWD, boulders, cutbanks, *etc.*) and/or creation of partial or permanent migration barriers.

There are a number of mitigative measures that may be implemented to prevent or minimize the effects of Project construction-related activities on instream fish and fish habitat. Mitigative measures detailed in the EPP will address the following construction- related aspects as they relate to alteration of instream fish habitat quality and quantity:

- instream construction timing constraints;
- pipeline watercourse crossing techniques;
- vehicle and equipment crossing techniques; and
- erosion and sedimentation control measures.

Direct Mortality of Fish and/or Fish Ova

Project construction and commissioning activities such as site preparation (grubbing, clearing and grading, construction of on-shore facilities, watercourse crossings (pipeline lateral and road/transmission line) and pipeline access may affect fish and fish habitat through direct mortality of fish and/or fish ova.

Fish mortality could result from direct physical contact with equipment; blasting activities in or near a watercourse; and impingement in water pumps used to isolate stream crossing sites (berm and pump). As well, fish ova mortality could also result from introduction of increased sedimentation into critical spawning habitats (hypoxia) during the incubation period located adjacent to or downstream from pipeline lateral, transmission line and/or road crossings.

Certain activities related to the construction phase of the Project could result in direct and / or indirect fish mortality, including the loss of adult, juvenile and eggs. The release of concrete wash water or storm water that has been in contact with uncured concrete directly into a stream can result in fish kills. The transport of hydrocarbons, metals and sediments from the release of hydrostatic test waters of the new pipeline lateral into fish-bearing streams can result in the degradation of water quality and lead to subsequent fish kills. Blasting work also has the potential to kill fish and eggs.

Water and Wastewater Management

Streams will not be affected by requirements for freshwater during construction and operation, as groundwater wells are proposed to provide water for drinking supply and sanitary purposes, as well as for closed loop cooling systems in the plant. Until the wells are drilled, water will be trucked in from Kitimat. During construction, however, non-potable water required for hydrostatic testing of the LNG tanks and pipeline laterals would be imported by truck from an appropriate stream source, subject to relevant permits.

During construction, waste water discharges as well as natural storm water runoff may affect the chemistry and sediment loading of receiving streams, thereby affecting fish and fish habitat through changes in pH, increased suspended sediment, and sedimentation of stream beds.

Description of Proposed Mitigation

The Proponent committed in the Application to undertake mitigative measures to address potential loss or alteration of riparian vegetation, including:

- Preparing an EPP that provides more detailed mitigative measures to be implemented during Project construction and operation.
- Minimizing vegetation removal and soils loss within Riparian Management Areas of all streams;
- Re-vegetating stream banks with native plants, grasses, shrubs and trees; and
- Locating Project facilities outside of established Riparian Management Areas.

The Proponent committed in the Application to undertake mitigative measures to address potential alteration of fish habitat, including:

- Implementing sediment control measures as outlined in a sediment control plan;
- Implementing necessary erosion control measures as outlined in an erosion control plan (ECP) for each stream class, crossing type, and type of water body that will be crossed during construction;
- Use of aerial pipeline crossings and open bottom arch or oversized/countersunk road culverts;
- Use of bridges for road crossings and horizontal directional drilling or aerial methods for pipelines for all fish bearing stream crossings for S1 and S2 class streams;
- Conducting stream crossings during the period of least risk to fish and fish habitat;
- Restoration of streambeds to pre-construction status and by incorporating large woody debris (LWD) and boulders into stream channel restoration;
- Adhering to the *Forests and Range Protection Act*, Stream Crossing Guidebook (FRPA 2002); and
- Adhering to MOE's Standards and Best Practices for Instream Works.

The Proponent committed in the Application to undertake mitigative measures to address potential fish/ova mortality including:

- Isolating work area and salvage fish before commencing crossing work (a permit for fish salvage may be required from DFO);
- Implementing sediment control measures as outlined in a sediment and erosion control plan;
- Conducting crossings in the dry between July 15 and September 1;
- Use of guidelines for treatment and disposal of concrete wash water, and storm water that comes into contact with uncured concrete and hydrostatic test water, to be included in the EPP;
- Collecting and neutralizing all high pH waters prior to disposal;
- Screen by-pass and water intake pumps as per Freshwater Intake End-of-Pipe Fish Screen Guidelines;
- Site-specific use of water interception and control facilities, including a settling pond; and
- Conducting blasting in accordance with Guidelines for Use of Explosives in Canadian Fisheries Waters.

Potential environmental effects will be mitigated such that the proposed Project will not: result in a reduction in the ecological function of that habitat such that fish and invertebrate use of the habitat does not return to baseline conditions within five years of the environmental effect; result in a reduction in the abundance of a fish community that is dependent upon that habitat, such that natural recruitment and reproduction would not re-establish the community to its original level in one generation (typically three to four years); result in an unmitigated or non-compensated net loss of fish habitat as defined in the *Fisheries Act* and associated no-net-loss policy; and/or result in long-term Project-related exceedances of water quality guidelines.

2.4.3 Issues Raised and Proponent Response

The following key issues concerning potential effects of the Project on the freshwater environment and fisheries were raised by the public, some government agencies and the Haisla during the EA:

1. **Protection of fish and fish habitat at streams to be crossed by the upgraded Bish FSR, the new access road and the pipelines.**

   Proponent Response: For stream crossings associated with the Bish Creek FSR upgrade, new access roads to the LNG facilities, and pipeline crossings, DFO would determine whether a particular crossing would require an Authorization. In addition, stream crossing methods must comply with the OGC's Stream Crossing Planning Guide (Northeast BC), and associated Best Management Practices, and other standards negotiated with federal and provincial regulatory agencies such as Transport Canada. The Proponent made a new commitment to ensure that designs for all stream crossings are reviewed and, where necessary, require an Authorization by DFO or approval by MOE and the OGC, and are in accordance with the federal *Fisheries Act*, the BC *Water Act* and regulations, and the BC *Oil and Gas Commission Act*. The Haisla will be given an opportunity to review and comment on the design prior to finalization. For a Bish Cove terminal, the Proponent has committed to give the Haisla an opportunity to review and comment on the design prior to finalization. For a Bish Cove terminal, and as required by the DFO Authorization, the Proponent also committed to conduct a habitat assessment on the final road and plant footprint with DFO area staff to finalize habitat compensation requirements, and incorporate DFO advice into final design and stream crossing locations.

2. **Effects of Bish FSR proposed upgrades on water and fisheries.**

   Proponent Response: The existing Bish FSR was designed in accordance with a MFR Road Use Permit as a low speed (30 km/hr), narrow (5 m) FSR, with steep pitches allowed (up to 21%). The Proponent has made a new commitment to design the proposed upgrades in accordance with the Ministry of Transportation (MOT) Low Volume Rural standard for Category C (Industrial Resource Roads), and to enter into a road use agreement with West Fraser Mills Ltd. that incorporates this standard using the enhanced design criteria contained in the supplementary Road Report A new commitment was made to incorporate design input and recommendations on the proposed upgrades from a geotechnical engineer and environmental consultant, and to provide opportunities for the MFR, the Haisla and relevant stakeholders to review and comment on the design prior to finalization.

   The Proponent also made a new commitment to ensure that designs for all culverts and bridges are reviewed and, where necessary, approved by MOE, TC, and receive an Authorization from DFO in accordance with the BC *Water Act* and regulations, the federal NWPA and the federal *Fisheries Act*. The Haisla will be given an opportunity to review and comment on all culvert and bridge designs prior to finalization.

3. **Minimizing impact of Right of Way footprint on water and fisheries.**

   Proponent Response: Three individual ROWs are required for the access road, the hydro transmission line, and the pipelines. The FSR will remain with in its existing approved corridor of 75 m. The pipeline ROW will be 30 m in width and the powerline ROW will be 20 m in width. For the entire length of pipeline and powerline, these ROW will be located beside each other, and have a width of 50 m. Where practicable, the Proponent has committed to establish the road, pipeline and powerline ROWs side-by-side in one corridor. In these areas, the total corridor width

will be 70 m to 80 m. An access road into either Emsley Cove or Bish Cove will have similar width to the Bish FSR and will parallel the pipeline and powerline ROW.

4. Effects of access road extension on water and fisheries.

Proponent Response: Preliminary plans for the access road connecting the Bish FSR to the Project terminal call for an 8 m wide gravel road designed to the MOT's Low Volume Rural standard for Category C (Industrial Resource Roads), as described above. This new road will parallel the pipeline and powerline ROWs. The access road to an Emsley Cove facility from the Bish FSR would require two new crossings of fish-bearing streams: Emsley Cove Creek and an unnamed tributary of Emsley Cove Creek. Emsley Cove Creek would be crossed by a bridge, and the unnamed tributary crossed with an open bottom arch culvert, consistent with the OGC's *Stream Crossing Planning Guide (Northeast BC),* or other standards negotiated with federal and provincial regulatory agencies. The access road to a Bish Cove facility from the point of departure from the Bish FSR would require twenty two new crossings of fish bearing streams.

The Proponent made a new commitment to ensure that designs for all culverts and bridges for the road extension are reviewed and, where necessary, approved by the MOE, TC and receive an Authorization from DFO in accordance with the BC *Water Act* and regulations, federal NWPA and the federal *Fisheries Act*. The Haisla will be given an opportunity to review and comment on all culvert and bridge designs prior to finalization.

5. Prevention of effects of accidental road spills on water and fisheries resources in Emsley Cove or Bish Creek.

Proponent Response: The potential effects of an accidental spill from the Bish FSR or the facility access road from entering Emsley Creek or Bish Creek will depend on the material spilled, volume spilled, specific location of spill, precipitation conditions, and spill response measures. The Proponent has committed to a number of measures to prevent spills and to ensure a rapid response to any spills that may occur. The Proponent has committed to include in its EPP spill prevention and spill response provisions for the construction and operation phases which are in accordance with all applicable provincial and federal legislation and regulations. The EPP will also include an Emergency Response Plan (ERP) which will detail requirements for addressing potential effects on streams and measures to prevent road based spills from entering intertidal wetlands and/or the marine environment. The ERP will include spill response kits (including requirements for absorbent booms), location of the kits for road-based spills, and provision for spill response training.

6. Road maintenance requirements to minimize erosion and water and fisheries impacts.

Proponent Response: The Proponent made a new commitment to enter into road maintenance agreements with West Fraser Mills Ltd. and Alcan for ongoing maintenance of the upgraded access road. At a minimum, the Proponent will comply with any existing road maintenance standards established in the existing road use permit for the Bish FSR, and will also maintain the new access road extension to either Emsley or Bish Cove to the same standard as the FSR. The Proponent also made a new commitment to develop a road maintenance plan for the existing FSR and the new access road extension that will include the existing requirements as well as requirements for minimizing water and fisheries effects, such as: roadside maintenance; road signage; surface drainage; surface and bridge/structure maintenance; and winter maintenance. The Proponent has also committed to ensure that the Haisla are provided an opportunity to review and comment on the road maintenance plan prior to finalization. The plant facility road and infrastructure maintenance will also be included in the EPP.

7. **Need for further information on water management requirements to minimize water and fisheries impacts, such as water use requirements, storage, treatment and disposal, and method of extraction associated with Project construction and operation.**

   Proponent Response: Existing Proponent commitments include development of an EPP that contains: water management provisions; monitoring of water quality at the plant site; discharge of hydrostatic test water in accordance with provincial and federal regulations; adherence to DFO guidelines for treatment and disposal of concrete water wash; management of stormwater affected by uncured concrete; and collection and neutralization of high pH water. However, to address concerns, the Proponent prepared a Water Management Summary Report to the WG, consolidating the water management issues and mitigation strategies outlined in the Application with additional information requested during the EA review. In addition, the Proponent has committed to continue working with the District of Kitimat to address issues related to long-term wastewater treatment and use of community infrastructure prior to construction.

   The Proponent also made new commitments to: develop a Stormwater Management Plan prior to facility construction, with drafts to be reviewed and accepted by Environment Canada and the Haisla; to negotiate a service agreement with the District of Kitimat for short term potable water supply; to apply for a *Water Act* approval for the short term use of water for hydrostatic testing, and to screen water intakes as per DFO guidelines; to implement an automatic neutralization process for settling pond effluent; and to work with Fisheries and Oceans Canada and the Ministry of Environment to determine an appropriate location for discharge of process water, as well as acceptable water quality and discharge infrastructure requirements.

8. **Impact of facility footprint on freshwater riparian habitat and marine foreshore and estuarine habitat.**

   Proponent Response: The Proponent has made a commitment to locate all facilities and infrastructure at an Emsley Cove terminal site outside a 30 m setback from the stream top of bank or 20 m setback from the marine high water mark as per an Environmental Setbacks diagram provided to the WG for Emsley Cove (with the exception of the segment of the road to the jetties, the spill impoundment, the vent stack and part of the pipe rack). All facilities and infrastructure at a Bish Cove terminal will be located outside a 30 m setback from the stream top of bank (with the exception of the road and pipe rack crossings), or 20 m setback from the marine high water mark as per the diagram provided in the Bish Cove Addendum Report.

   For either terminal location, the Proponent made a new commitment to work with DFO and relevant agencies to develop a riparian management plan for areas within the terminal fence line, and to provide the Haisla with an opportunity to comment on the plan prior to finalization.

   A complete list of issues concerning potential effects of the Project on the freshwater environment and fisheries (including water quality, hydrology, freshwater fish and fish habitat) identified by the public, government agencies and the Haisla during the Application review stage of the Project's environmental assessment, and the Proponent's response to these issues, is contained in each of **Appendices C and D** of this Report.

2.4.4 Conclusion of Effects and Mitigation

During the harmonized environmental assessment, EAO and the RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and

Haisla comments on the potential effects of the Project; responses by the Proponent; and the discussions of the WG.

Based on the information provided in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** (particularly section 5), the EAO and the federal RAs are satisfied that the Project is not likely to result in significant adverse effects on the freshwater environment and fisheries, taking into account the location of the LNG terminal at either Emsley Cove or Bish Cove.

2.5 MARINE ENVIRONMENT AND MARINE MAMMALS

2.5.1 Background

The Project is proposed for a location on the northwest shore of the Kitimat Arm, located at the northern end of Douglas Channel. The Kitimat Arm/Douglas Channel area is part of the North Coast Fjord ecosystem.

The oceanography (currents, tides, mixing) of the proposed marine terminal sites is largely governed by conditions in Kitimat Arm/Douglas Channel. The mixed semidiurnal tides range from 4 to 7m in height. The circulation of water is driven primarily by a combination of hydraulic gradient, wind stress and tides. Low surface water salinity is typical, due to freshwater inflow from the Kitimat River, and lack of vertical mixing. Wind-generated surface movement can induce motion of deeper water through up or down-welling particularly at the head of the inlet. Predominant wind directions are from the northeast and southwest, with strong northeasterly “outflow” winds in the winter.

The Emsley and Bish Cove sites are rocky, sheltered marine areas with shorelines characterized by rock faces, bedrock outcroppings, boulder fields, cobbles, pebbles, and coarse sand intertidal areas. Sediments from deeper water are characterized by finer-grained sand, silt and clay. High water shoreline areas are characterized by log debris (root systems and branches) and beach grass, while rockweed dominates lower water shorelines. The southern half of Emsley Cove contains an estuary of fine grained sediments deposited by Emsley Creek.

Emsley Cove and Bish Cove are both well protected from winds from the northeast, and only a narrow portion of their eastern shorelines is exposed to predominant south winds, weather and sea.

Emsley Cove is approximately 1200 m across the mouth and 700 to 900 m wide (north-south), while Bish Cove is approximately 850 m across the mouth and 400 to 600 m wide (north-south). Water depths within the coves vary considerably. Emsley Cove ranges from shoaling depths on the Emsley Creek delta, to over 120 m deep at the Cove entrance. The delta area shows a distinct transition from the relatively flat-lying top set sediment deposits to the delta front with steeper slopes descending to the bottom of the cove more than 100 m below. Bathymetry along the eastern part of Emsley Cove is much steeper, with a number of bedrock ridges extending from above the tidal zone to depths of 30m and more. Bish Cove ranges from shoaling depths to over 80 m deep at the Cove entrance. Unlike Emsley Cove, the Bish Creek delta does not end in Bish Cove, but rather extends into Douglas Channel. Sediments from the creek are deposited outside of the Cove on the eastern edge. The western edge of Bish Cove is steep, with depths quickly dropping off to more than 40 m, while the centre and eastern portions of the Cove gradually decrease in comparison.

Water quality studies show that total dissolved solids, salinity, temperature, dissolved oxygen and pH differ between surface and deeper regions, and suggest natural seasonal and temporal variation. Stratification of fresh to marine water occurs throughout much of the year but during winter may

become neutral to unstable. Turbidity stratification may be observed following large rainfall events. Relatively distinct bodies of water are tidally transported throughout this area. A region-wide plankton bloom usually occurs along the northern BC coast during the spring month(s), followed by a smaller bloom in the fall.

The more shallow northwest regions provide favourable habitat for Dungeness crab, flatfish and eelgrass. Deeper eastern regions provide hard substrate for sessile benthic invertebrates, crabs, octopodes and fish. Notable species in the Assessment Area include Pacific herring, coho, chum, pink, sockeye, chinook salmon, Dolly Varden, English sole, and Pacific staghorn sculpin.

Species diversity within the intertidal zone is limited to those species able to withstand wide fluctuations in salinity. Species include mussels, barnacles and limpets. Communities on rock substrates such as rockweed, the acorn barnacle and the purple seastar generally characterize the deeper subtidal zone. However, bivalve species, such as the butter clam the heart cockle and the bent nose clam, are also found along with crabs and sea cucumbers. The subtidal zone in both Emsley Cove and Bish Cove also contains several plant species, including eelgrass beds in sandy areas. Eelgrass beds provide important fish habitat. The benthic (or bottom) environment (i.e. areas deeper than 20m) commonly contains a great diversity of species, including the polychaete worms, bivalves, gastropods, amphipods and cumaceids. The intertidal and subtidal zones are used for spawning, rearing and feeding by several fish species. The higher productivity and structural characteristics of these zones provide both food resources and protective cover for vulnerable early life stages. The near shore zone also provides a migratory corridor for out migrating fry and returning adults, as well as, a holding area for adults returning to spawn in local streams. As a result, these zones also provide a rich feeding area for older, larger adult fish.

A total of 42 marine fish species are known to occur in Douglas Channel near Emsley and Bish coves. Notable species include: Pacific herring, coho, chum, pink, sockeye, chinook salmon, Dolly Varden, English sole, and Pacific staghorn sculpin. Bish and Emsley coves are utilized extensively in late spring to early summer by rearing juvenile salmonids, particularly, coho, chum, chinook as well as rainbow (steelhead) and cutthroat trout and Dolly Varden. During mid to late summer and early fall, mature adults including chinook, chum and coho (respectively) return to Bish and Emsley coves, to stage prior to migrating upstream to respective natal streams. Fish species recently observed in the Emsley and Bish cove area are listed in **Table 4**. Shallow, estuarine, brackish foreshore areas provide critical life stage habitat for most anadromous salmonid species present in Douglas Channel watersheds.

Kitimat Arm supports a resident Pacific herring population that is primarily a resident population that most likely undertakes a post-spawning migration to the mouth of the inlet. Adults spawn during February, March and April in the foreshore areas of coastal inlets and bays over intertidal, and subtidal vegetation, especially eelgrass and kelp. The eggs adhere to vegetation where they are fertilized, and hatch simultaneously in 20 to 21 days. Pacific herring are an ecologically important species and comprise 30 to 70 percent of chinook salmon summer diets. They are also a major food source for coho salmon, waterfowl, lingcod dogfish, sea lions and grey whales.

Of fish reported as present in the vicinity of the Assessment Area, twelve are designated as being of conservation concern by COSEWIC, SARA and/or the CDC. The majority of species listed by the CDC fall into the Yellow (regional concern) category: chinook, chum, coho, pink, sockeye salmon, Pacific staghorn sculpin, and the three spined stickleback.

A wide variety of marine mammals occur in Kitimat Arm/Douglas Channel, primarily during the summer months while following and feeding on anadromous fish spawning runs. Many of the mammal species occur irregularly, while others migrate along traditional routes. Killer whales, Dall's

porpoises, Pacific harbour seals, humpback whales, grey whales and Pacific harbour seals are the species most likely to occur in shallow water habitats near the proposed marine facility. The presence of northern sea lions near the mouth of the Kitimat River during the spring eulachon run has also been reported.

Of these seven marine mammals likely to frequent the Assessment Area, all but one (harbour seal) are considered species of special conservation concern (COSEWIC, SARA and/or CDC). The Killer whale, sea lion and sea otter are CDC Red listed species.

Table 4: Marine Fish Species in Emsley / Bish Cove Area

Common Name	Common Name
sand lance	coastal cutthroat trout
tubesnout	rainbow/steelhead trout
sanddab	pink salmon
starry flounder	chum salmon
Pacific halibut	coho salmon
Pacific sanddab	sockeye salmon
butter sole	chinook salmon
English sole	Dolly Varden
bay pipefish	three spined stickleback
Pacific herring	dogfish shark
lamprey	skates
eulachon	sablefish
Pacific cod	capelin
Pacific staghorn sculpin	lingcod
threadfin sculpin	rockfish
padded sculpin	greenstriped rockfish
tidepool sculpin	eelpout
rough spine sculpin	blackbelly eelpout
northern sculpin	prickleback
spotfin sculpin	gunnell
sailfin sculpin	ratfish
Pacific spiny lumpsucker	walleye pollock
shiner perch	surf smelt

Marine resources are important for recreational, commercial, and Haisla (subsistence, cultural and commercial) purposes. Recreational fisheries in the area include salmon, trout, halibut, lingcod and various rockcod species. Recreational freshwater and marine angling generally occurs from March (steelhead and cutthroat) through October (coho). Recreational coho salmon fishing is open year-round in Douglas Channel. Recreational fishing for herring is open all year in Douglas Channel with jigging and a variety of netting gear allowed.

Species harvested by the Haisla from the Bish and Emsley Cove areas include crabs, barnacles, clams, sea cucumbers, various fish species (particularly salmon, rock cod, halibut and sea-run trout), octopus and seals.

The salmonid fishery in the area is greatly enhanced by the operation of the Kitimat Hatchery on the lower Kitimat River. The hatchery produces steelhead, cutthroat trout and chinook, coho and chum salmon.

Commercial fishing is currently limited to a few local boats within Kitimat Arm (DFO Statistical Sub-Area 6-1). However, considerable commercial fishing has occurred historically throughout the approaches to Kitimat Arm and Douglas Channel (Area 6). The most important fisheries are for salmon and herring. DFO catch statistics indicate that in 1995, 15 tonnes of chinook, 18 tonnes of sockeye, 42 tonnes of coho, 53 tonnes of pink, and 183 tonnes of chum salmon landings were recorded for Area 6.

The herring fishery is commercially and economically significant. Both herring and herring roe is commercially and recreationally harvested. Herring commercial fisheries have been historically important in the North Coast, including herring spawn-on-kelp.

Commercial bivalve harvesting in DFO Statistical Area 6 is presently closed due to paralytic shellfish poisoning.

2.5.2 Project Effects and Proposed Mitigation

In the Application and supplemental materials, the Proponent assessed the potential for environmental effects of the Project on the marine environment and marine mammals and proposed measures to mitigate these potential effects.

The marine environment is considered a VC due to:
- Its ecological, aesthetic, recreational, and economic importance to the public, First Nations, and commercial fisheries;
- The direct interaction with Project activities such as the construction and operation of the berth, tanker and other Project related marine traffic, and
- Specific regulatory requirements of the *Fisheries Act*.

The EA focuses on key aspects of the marine environment, namely:
- Environmental effects of the Project on marine water quality due to discharges;
- Environmental effects of the Project on the benthic environment due to discharges and physical disturbance(s);
- Environmental effects of the Project on the marine environment caused by tanker traffic between the shipping lane and the terminal facilities; and
- Environmental effects of the Project on marine fish due to discharges and physical disturbance(s).

Assessment Boundaries
The spatial boundaries for the assessment of potential environmental effects on the marine environment VC will include Emsley Cove and Bish Cove as well as the Bish Cove estuary, with an emphasis on the marine environment in the immediate vicinity of the marine receiving terminal, and the shipping route between the terminal and the shipping lane. This area is referred to as the 'Assessment Area' because it is the area where the Project will interact with the marine environment.

Potential Effects and Evaluation

The principal Project activities that could potentially interact directly or indirectly with the marine environment are:

- The construction of the LNG tanker berth;
- The construction of the tug and barge docking facility;
- Marine vessel (tug, LNG tanker) traffic;

- Accidental release of LNG during transportation and unloading;
- Site water management and run-off;
- The discharge of freshwater; and
- The intake of marine water.

The environmental effects of these principal Project activities could potentially cause direct mortality, loss of habitat, change in habitat and/or change in use of habitat.

Marine **construction and commissioning** activities may affect the marine environment through direct fish and mammal mortality, habitat loss and gain, habitat change and changes in the use of habitat. Construction barge anchoring, construction vessel traffic, the installation of fixed piles and marine discharge pipes, and terrestrially based construction activities could all act to resuspend fine sediment into the water column, causing degradation of water quality and bottom habitat. These activities may result in eelgrass and other habitat loss, and noise production over a specific period of time. Construction vessel traffic may cause an increase in the risk of vessel-marine mammal collisions or may alter marine mammal movements. The discharge of freshwater during commissioning may cause mortality of sessile species (those that fix onto a location, such as barnacles) and avoidance of the area by mobile species.

Dredging activities (at Emsley Cove) may lead to the suffocation of eelgrass shoots within the localized area or may deter fish, direct mortality of benthic invertebrates and dispersion of potentially contaminated sediments. These activities will also increase the suspended sediment load in the water column, and thus deteriorate the marine water quality and transparency for phytoplankton production.

The detonation of explosives in water (likely at Emsley Cove) or near water may cause direct mortality of organisms, destroy adjacent inshore fish habitat and may cause temporary avoidance of the adjacent waters by fish and marine mammals. The detonation of explosives can be lethal to marine mammals and may cause auditory damage under certain conditions or induce changes in behaviour.

Under the *Canadian Environmental Protection Act,* 1999 (*CEPA,* 1999), disposal of any substance at sea and/or loading for the purpose of disposal at sea requires a Disposal at Sea Permit from Environment Canada. Materials drilled and dredged from Emsley or Bish Cove will need to be disposed in accordance with this permitting process.

Berth piles within the water column and the substrate may result in changes to current circulation and sediment transport within the Coves, which could affect marine fish through degraded water quality, substrate grain size shifts or by smothering due to accumulated sediment. The presence of these piles within the water column also represents obstructions, causing deterrents or alterations, to fish movements within the cove. Such an alteration may alter natural migration and/or spawning behaviour of marine fish, resulting in effects to dynamics of local populations.

Installation of berth equipment may result in temporary habitat change (increased acoustic emissions) and changes in the use of the habitat (deterring/attracting marine mammals). Artificial night-lighting during berth or tug/barge loading structure construction may affect salmonid, and other fish migration and distribution. Night lighting has also been found to increase natural herring predation. Potential changes in species abundance, dominance and distribution resulting from artificial night lighting are not known.

The vibro-densification process proposed to strengthen the foundations for construction of the Bish Cove marine facilities will reduce or negate the need for blasting and pile drilling and dredging, but may increase fine sediment suspension and will affect benthic species and habitat.

Approximately 100,000 m^3 of freshwater to be used in the hydrostatic testing process will be discharged into the marine environment. Discharge of this water into Emsley Cove or Bish Cove may temporarily affect the horizontal and vertical mixing of freshwater with saltwater and therefore may temporarily alter the habitat and changes in the use of the habitat.

The acoustic environment at Emsley and Bish Coves may be affected by vessel generated noise, blasting, drilling and dredging. Noises generated by these activities may attract or deter marine mammals (and marine fish) and hence deter marine mammals from traditional migratory or travel routes. This potential effect may be compounded for the killer whale and other marine mammals that rely on migrations of marine fish for food. Intense acoustic events (blasting) may result in marine mammal stranding. Construction activities will increase vessel traffic in the coves and therefore marine mammal collision potential.

During Project **operation**, vessel traffic (tug and LNG tanker) creates the risk of exotic species introduction through bilge and ballast discharges into the marine environment, and disturbance of finer-grained bottom sediments through propeller wash effects. Alterations to the flow of water and sediment suspension may potentially affect eelgrass beds, which provide refuge and feeding habitat for a vast array of organisms, and is one of the most important substrates for the attachment of herring eggs. Regular tug and tanker traffic may increase the risk of vessel-marine mammal collisions or the noise of operation may alter typical marine mammal and fish movements and behaviour. Maintenance activities on the berth in the marine environment are not expected to occur due to the long maintenance-free design life of these structures.

Arrival of international marine vessels in the Kitimat Arm/Douglas Channel potentially exposes native marine organisms to exotic/invasive species through ballast water exchange, hull fouling and direct transport.

Potential environmental effects related to tug and barge operations are similar to those for LNG tankers and include direct mortality, habitat change and changes in the use of habitat.

During operation of the LNG facility, site drainage may contain suspended sediment that could be introduced to the marine water column, degrading water quality, increasing the suspended sediment load, and potentially accumulating on the substrate. Interactions of site run-off with marine benthic organisms and pelagic fish may occur through water quality degradation, ingestion of suspended sediments, substrate alterations due to grain size shifts or by smothering due to accumulated sediment. Potential effects on water quality and accumulation of suspended sediments on the substrate are projected to occur in pulses associated with peak precipitation events or through regular discharge of process water.

Project **decommissioning** activities that may interact with the marine environment will be pile cutting (at seabed contact; sediment resuspension) and increased vessel activity (sediment resuspension, marine mammal collision potential, increased underwater acoustics, and anchoring effects). Removal of the berth and piles will likely result in direct mortality of benthic organisms associated with colonized piles, loss of fish habitat and changes in the use of fish habitat. Potential effects associated with pile and berth removal will be one time events, directed on the footprint of the berth, short in duration, and irreversible as habitat will be removed.

Potential effects of the abandonment of the tug/barge loading facility would depend on the final design of the facility, and the degree of use of fill and pilings.

Description of Proposed Mitigation
The Proponent committed in the Application to undertake mitigative measures to address potential effects on the marine environment and marine mammals, including:

- Requiring construction vessels to operate outside of biologically sensitive areas and outside of periods of critical fish life stages;
- Including in the EPP a marine mammal monitoring program for construction;
- Construction timing outside of biologically sensitive areas and periods and critical fish stages;
- Implementing acoustic restrictions during construction, and planning of construction timing outside of biologically sensitive areas and periods and critical fish life stages;
- Including requirement for a construction sediment control plan (silt curtains) in the EPP;
- Timing of dredging to avoid key biological processes (migration, spawning, etc.), and to minimize sediment transport and mixing;
- Reducing the amount of blasting necessary through use of specialized drilling equipment;
- Detailed designing of blasting to minimize pressure waves, and avoidance of biologically sensitive areas;
- Use of a grab dredge to minimize marine sedimentation;
- Including in the EPP a marine water quality monitoring program for construction;
- Minimizing the use of night lighting;
- Berth orientation and design to minimize potential shade effects of decking and effects on eelgrass habitat;
- Utilization of admixtures with underwater concrete to avoid increased sedimentation and pH levels during construction;
- Inclusion in the EPP of a site run-off control program for construction;
- Provision for the discharge of fresh water during construction only during high-tides;
- Developing operational procedures for tug traffic;
- Implementing a vessel speed/thrust management program;
- Implementing ballast control measures;
- Inclusion in the EPP of prevention and design considerations regarding hazardous materials spills, and hydrocarbon spill preparedness and emergency response plan;
- Inclusion in the EPP of an LNG spill preparedness and emergency response plan;
- Screening of marine intake pipes required for fire control, as required by DFO;
- Development of a fish habitat compensation plan for DFO approval, within an agreed upon time frame; and
- Adherence to federal and provincial regulatory processes and environmental codes of practice for decommissioning.

2.5.3 Issues Raised and Proponent Response

The following key issues concerning potential effects of the Project on the marine environment and marine mammals were raised by the public, some government agencies and the Haisla during the environmental assessment:

1. Construction barge jetty / tug berth rationale, installation, location and potential environmental effects on Emsley Cove and Bish Cove.

Proponent Response: The construction barge jetty is required to provide for barge unloading of heavy equipment and materials for construction that cannot be readily moved by road. It may also be used for removal of any blasted materials for disposal, and for occasional maintenance

requirements. It would also serve to remove materials and equipment during decommissioning, and would be constructed at the same time that access road construction is underway. The tug berth is required to maintain on site tugs for emergency purposes as well as for tanker assistance in accessing and departing the marine terminal, and will be attached to the construction barge jetty in deeper water. The size of the tug berth will be dependent on the number of tugs required, which will be confirmed in the Technical Review Process of Marine Terminal Systems and Transhipment Sites (TERMPOL) process that has been initiated by Transport Canada to address marine navigational and shipping issues associated with the Project.

The Proponent submitted a number of design concepts and locations for the barge jetty and tug berth to minimize environmental effects, such as loss of eelgrass habitat and potential sedimentation and erosion. These apply to both Emsley Cove and Bish Cove. The Proponent has committed to continue working with DFO in subsequent authorization processes to minimize the potential effects of the tug berth on the marine environment. Final design will be contingent on a Harmful Alteration, Disruption and Destruction of Habitat (HADD) acceptable to DFO. The Proponent has also committed to work with the TERMPOL committee to confirm the number of tugs required. The Haisla will be provided an opportunity to review and comment on the design prior to authorization.

2. **Potential effects on marine habitat from location, design and operation of ship berth and construction jetty/tug berth in Bish Cove, especially the potential interaction between Bish Cove marine facilities and the adjacent Bish Cove estuary.**

   Proponent Response: The Proponent revised its initial proposals for location of these facilities on the east side of Bish Cove, due to issues raised by DFO and other members of the WG. The Proponent submitted new designs to locate the facilities in the centre of the Cove, thereby avoiding loss of eelgrass beds. The Proponent made a new commitment to design and locate the structure as generally depicted in the February 2, 2006 supplement to the Bish Cove Addendum Report. The Proponent also made a new commitment to use a vibro-densification process to compact and stabilize marine sediments for marine facility construction, thereby eliminating the requirement for dredging and blasting. The Proponent also committed to put procedures in place to ensure capture and control of silt and other fine sediments displaced by this process. Marine bottom surface areas altered by this process will be covered with a soft sediment substrate to a thickness to be determined by DFO.

   The Proponent also committed to conducting a habitat assessment within the jetty and marine terminal footprint to determine habitat loss and establish habitat compensation requirements, and also committed to negotiate and implement a habitat compensation program for the Bish Cove site that would include compensation within the Cove and possibly elsewhere within Kitimat Arm. The commitment provides for the potential involvement of the Haisla and local experts (such as the Kitimat Valley Naturalists) as appropriate.

3. **Potential effects of tanker and tug operations in Bish and Emsley Coves, particularly the effects of potential physical disturbance from propeller wash given the cove's geometry and the size of the tankers for all phases of the Project.**

   Proponent Response: The Proponent has prepared propeller wash studies for operations in both Emsley Cove and Bish Cove. These studies calculated disturbance to bottom sediments and eelgrass beds from tug and tanker operations, considering speed, thrust, vessel size, water depth and turning radius. The Proponent used these studies to submit tug and tanker vessel "No-Go" Zone maps for both Coves that will be used to identify areas to be marked as off-limits for vessel movements to minimize effects on marine habitat, as well as speed limits and thrust

management recommendations (see **Figures 5 and 6**). The Proponent has committed to develop a marine terminal manual that will include a speed/thrust management plan for tugs and tankers, identification of operating areas for tugs and tankers, identification and physical marking of environmentally sensitive areas for restricted operation using the vessel manoeuvrability mapping, and any additional recommendations from the TERMPOL committee.

4. **Mitigation of potential effects on the marine environment, intertidal wetlands and tributary creeks due to accidental releases during all phases of the Project.**

   Proponent Response: The LNG terminal has been designed to minimize land-based spills and ensure their containment before reaching the marine environment. A potential LNG spill on the water is unlikely and not predicted to have adverse effects since LNG will not mix with water, and will evaporate without leaving any residues. Spill response will also be addressed in the TERMPOL review and will include opportunities for the Haisla to review and comment. The Proponent has committed to preparing an EPP that includes spill prevention and response provisions for construction and operation in accordance with applicable federal and provincial requirements. An ERP in the EPP will detail requirements to address potential effects on the marine environment and intertidal wetlands and streams that intersect the shoreline.

5. **Additional information on management of vessel ballast and bilge water discharges to prevent introduction of exotic species through the discharge and/or intake of ballast or bilge water.**

   Proponent Response: Regulations governing discharge of ballast water are being formulated that will make Canadian regulations consistent with current international standards. LNG vessels will not have to make many operational changes to conform to the new Canadian standards. Any ballast water exchanges are required to occur at sea, and any LNG ships unloading at the terminal will be taking up water, and not discharging it. Any water escapement would be free of exotic species due to offshore ballast exchanges. Bilge water is required to be processed through oil filtering equipment, with requirements to halt discharge if effluent exceeds *Canada Shipping Act* standards in inland waters. LNG tankers have fewer bilge water problems than other tankers due to the relatively young age of the tanker fleet, and all ships have the filtering equipment that meets *Canada Shipping Act* standards.

   The Proponent has committed to requiring in its shipping contracts that ships include and adhere to Transport Canada's National Ballast Water Management Guidelines, and the Oil Pollution Prevention Regulation for bilge water management. This issue will be further reviewed in the TERMPOL process. The Proponent has committed to modifying the Port of Vancouver's ballast water management guidance package for the LNG terminal and provide it to contracted LNG carriers prior to delivery of the LNG. The Proponent will ensure in its shipping contracts that no bilge water is released while LNG tankers are at berth. Current practices for tanker and bilge management will be investigated through the Chamber of Shipping and Kitimat-area industries and local government.

6. **Mitigation of potential effects of marine facility construction on marine mammals and fish, particularly the effects of pile driving and blasting on mobile marine mammals and fish.**

   Proponent Response: Pile driving and blasting effects can harass, if not prove lethal to fish and mammals, particularly in near-surface waters. Blasting has the greatest possible effects. Blasting is not anticipated for marine facilities located at Bish Cove. The Proponent made a number of commitments in the Application to address the possible effects on marine mammals and fish. These include: the establishment of a marine monitoring program; the implementation of acoustic

restrictions, with timing of construction outside of biologically sensitive areas and periods and critical fish life stages; the reduction of blasting through use of specialized drilling equipment, with blasting design to be detailed to minimize pressure waves and the restriction of blasting in biologically sensitive areas; and the adherence to current DFO guidelines for blasting and pile drilling, and the review of plans with DFO prior to construction. The Haisla will also be provided with review opportunities. The Proponent also made a new commitment to ensure drilling and not driving of pilings into underlying bedrock, so as to minimize sound effects from this activity.

7. **Potential effects of process water from LNG operation on marine environment.**

   Proponent Response: The Proponent will address stormwater runoff control into the marine environment through its Environmental Protection Plan (EPP). The Proponent has made a new commitment to collect all process water in a containment pond that will provide an opportunity for sediments to settle out of the water, and for reduction of water temperatures before water is discharged into the marine environment. The Proponent made a new commitment to work with Fisheries and Oceans Canada and the Ministry of Environment to determine an appropriate location for the discharge of process water into the marine environment during operations, and to confirm acceptable water quality (pH and temperature) and discharge infrastructure. The Haisla will be provided an opportunity to review and comment on this matter.

8. **Potential effects of LNG vessel traffic on marine mammals, and need for additional information on the movement of marine mammals in Douglas Channel and potential for vessel collisions with marine mammals.**

   Proponent Response: The Proponent has provided additional material to the WG for cetacean sightings in the Kitimat area. The DFO database indicates only one marine mammal strike in a broad area that includes Kitimat Arm and Douglas Channel. The EPP will contain a marine mammal monitoring program for the Project construction phase. The Proponent made a new commitment to investigate current practices of marine pilots respecting marine mammal reporting and strike avoidance, and committed to develop a brochure for LNG shipping contractors that include information on seasonal marine mammal activity and critical avoidance areas.

9. Potential for acid rock drainage effects on the marine environment and how it would be managed.

Proponent Response: The potential exists for acid rock that would be disposed at sea under federal permit, or used for fill in marine facility construction. The Proponent committed to investigate the presence of acid generating rock during geotechnical surveys, and if found, to adhere to any federal or provincial legislation or guidelines applicable to the management and disposal of acid generating rock into the marine environment.

10. Dredging effects and ocean disposal of dredged and blasted materials.

Proponent Response: Should dredging be required, the Proponent has committed that any dredging will be scheduled within DFO's marine fisheries work window to avoid key biological processes (migration, spawning, etc.). As well, positioning of any dredge barge will be stable for accurate sediment removal and anchoring. The Proponent will submit a permit application to Environment Canada for any proposed ocean disposal after an EA certificate and a federal EA decision has been made. The dredging for the barge and tug berth will be minimized to the greatest extent practicable. Dredged material will be removed from site as required.

A complete list of issues concerning potential effects of the Project on the marine environment (including marine vegetation, fish and mammals and marine habitat) identified by the public, government agencies and the Haisla during the Application review stage of the Project's environmental assessment, and the Proponent's response to these issues, is contained in each of **Appendices C and D** of this Report.

2.5.4 Conclusion of Effects and Mitigation

During the harmonized environmental assessment, EAO and the RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments on the potential effects of the Project; responses by the Proponent; and the discussions of the WG.

Based on the information provided in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** (particularly section 6), the EAO and the federal RAs are satisfied that the Project is not likely to result in significant adverse effects on the marine environment and marine mammals, taking into account the location of the LNG terminal at either Emsley Cove or Bish Cove.

Figure 5. Tug and Tanker "No-Go" Zones for Emsley Cove Terminal

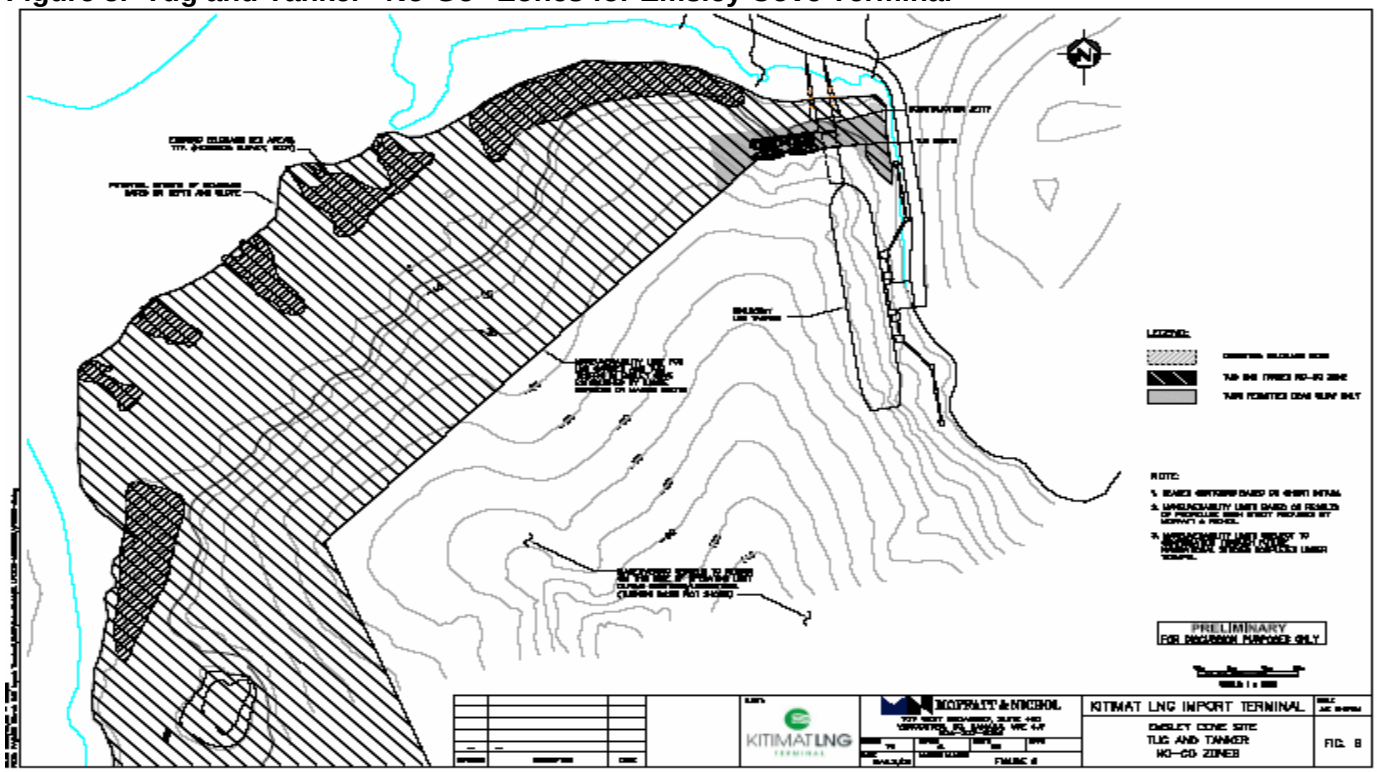
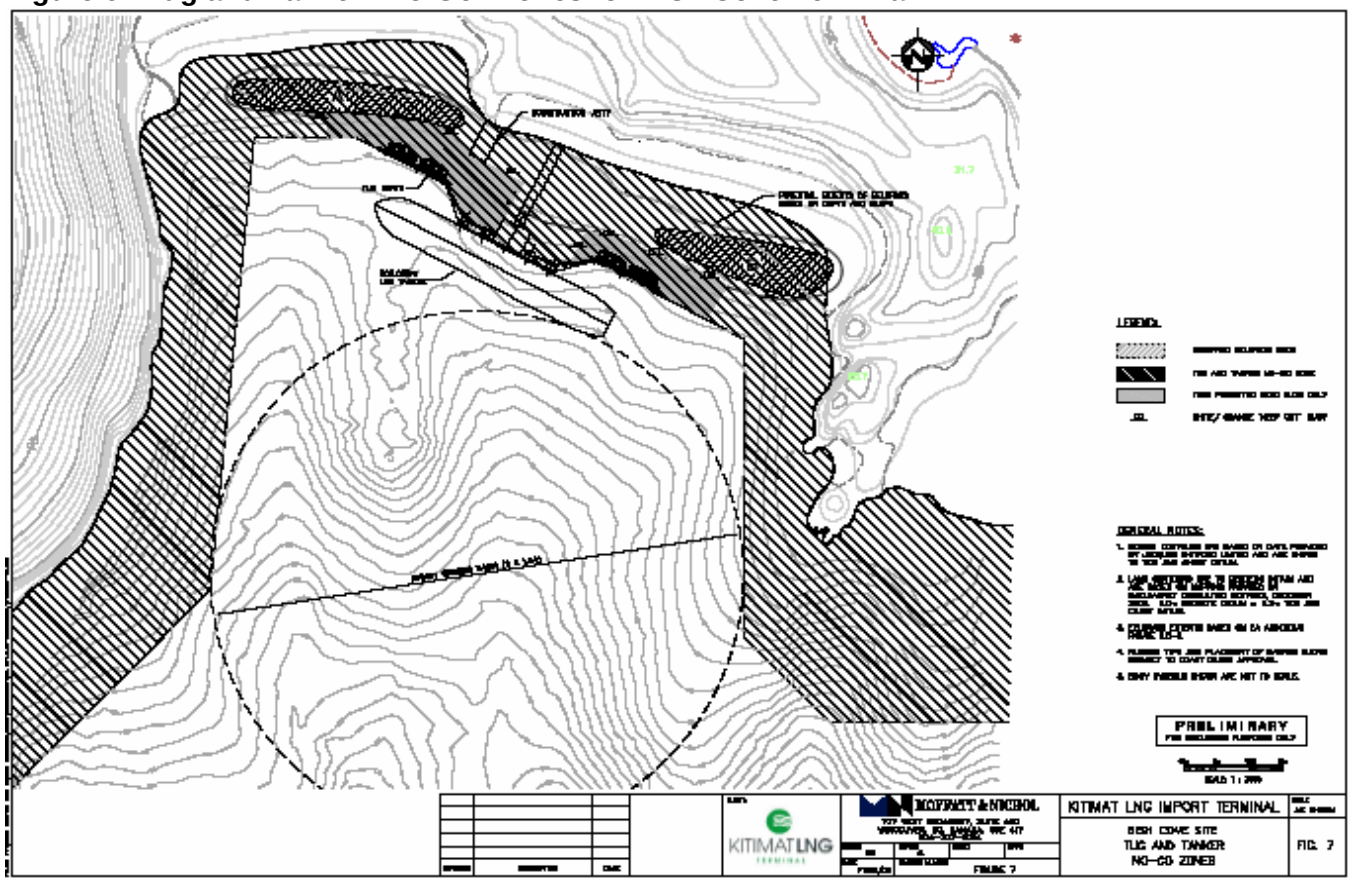


Figure 6. Tug and Tanker "No-Go" Zones for Bish Cove Terminal



2.6. HERITAGE AND ARCHAEOLOGICAL RESOURCES

2.6.1 Background

Heritage property is protected in British Columbia under the *Heritage Conservation Act* (HCA). Heritage property includes heritage sites or objects that are of historical, cultural, aesthetic, scientific or educational worth or usefulness as a site or object of value to British Columbia, a community, or Aboriginal people. Heritage property also includes archaeological sites, which are physical evidence of human use or occupation, such as, burial sites, rock art, ancient stone carvings, remains of ancient houses and campsites, shell middens, Culturally Modified Trees (CMT), early trading posts and gold mining sites. Archaeological sites pre-dating 1846 (the assertion of British sovereignty in the territory of British Columbia), whether recorded or otherwise, may not be altered or disturbed except as authorized under that Act. In some circumstances archaeological sites post-dating1846 are also protected from disturbance under the HCA.

Parks Canada Agency is the designated federal department to provide expert advice on heritage and archaeological matters within the Government of Canada. In accord with the *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements* (Federal Coordination Regulations) pursuant to CEAA, Parks Canada (PC) provides specialist advice with respect to environmental assessments as specified in Section 12(3) of CEAA regarding heritage and archaeological matters.

When heritage resources are known or suspected to be at a project site, Parks Canada highly recommends that a professional archaeological consultant be engaged to undertake an archaeological impact assessment prior to construction activities being initiated. It recommends that the archaeological assessment proceed so as to meet the standards of the Archaeological Impact Assessment Process of the BC government, administered by the Archaeology and Registry Services Branch of the BC Ministry of Tourism, Sport and the Arts, or MTSA (see http://srmwww.gov.bc.ca/arch/index.html), although a permit from this Branch is not necessary when the work is to be undertaken on an Indian Reserve.

The Project area is associated with the northern sub-area of the North West Coast culture area which is characterized by archaeological shell middens, burial sites, and rock art. To demonstrate this point, a regional study area, encompassing the near shore terrain area adjacent to Douglas Channel between Hartley Bay and Kitimat, contains 369 recorded sites with both historic and pre-contact components. Pre-contact components in the area include lithic finds, rock art, burial sites, fish weirs/traps, habitation features and shell middens. Historic components include villages (some with associated cemeteries) and other habitation features including cabins, midden deposits, depressions, and camp sites as well as roads and bridges. The majority of sites are represented by culturally modified tree sites.

A Heritage Impact Assessment (HIA) was undertaken to identify and record heritage and archaeological sites within the Project footprint, assuming an LNG facility located at Emsley Cove. The HIA included the ROW corridors for the pipeline lateral, transmission line and access road. The assessment identified 6 archaeological sites and a number of heritage sites in proximity to the Project footprint, including a lithic find, a lithic scatter, a shell midden and a post 1846 campsite and pre-and post 1846 Culturally Modified Trees (CMTs). Although not found, the Haisla provided reports of a burial site and a village in the general area of the Project footprint at Emsley Cove.

Three archaeological overview assessments (AOA), as well as an Archaeological Impact Assessment (AIA) of limited scope have been completed for Bish Cove, as part of the studies performed to designate the Bees IR No. 6 as an industrial park at the Haisla's request. Six archaeological sites have been previously recorded, including four CMT sites, and sites with historic building remains and lithic precontact materials. There is also a reported presence of a village site whose exact location is unknown, but is described as extending eastward for some 300 m from the southwest corner of the IR. Rock art sites are also located along the shoreline in the surrounding region.

2.6.2 Project Effects and Proposed Mitigation

In the Application and supplemental materials, the Proponent assessed the potential for environmental effects of the Project on heritage and archaeological resources and proposed measures to mitigate these potential effects.

Heritage and archaeological resources are considered as a VC given the potential for changes in the environment during surface and subsurface altering activities related to the Project to disturb archaeological, historical materials and traditional sites and materials.

Assessment Boundaries
The proposed Project footprint is identified as the local study area and corresponds to the area that is identified for surface and subsurface ground-breaking phases of the construction of the Project. It includes the Project site at both Emsley and Bish Coves, as well as the right-of-way corridor for the pipeline lateral, access road and transmission line. A secondary Project boundary is defined for the purpose of assessing effects to archaeological and heritage resources relative to a broader cultural and environmental area. For this purpose, the regional study boundary includes the terrain adjacent to Douglas Channel between Hartley Bay to Kitimat.

Potential Effects and Evaluation
If located at Emsley Cove, the Project development and construction activities such as drilling of bore holes, transportation of machinery and materials, forest and vegetation clearing, soil removal, blasting, grading and cut/fill operations, stream crossings, and quarrying will result in the destruction of the lithic find, the lithic scatter and shell midden, a potentially pre-1846 CMT, and the post 1846 campsite and 5 post-1846 CMT. In addition, the burial site and village identified by the Haisla may also be affected by construction activities.

Operation phase activities, such as road and facility maintenance, as well as natural processes, such as wind, water, wave or ice action on exposed terrain, could affect unidentified archaeological and heritage sites. There is also the potential for shoreline physical disturbances as a result of the wake of ships travelling to and from the KLNG terminal and resulting effects on archaeological and heritage sites.

If located at Bish Cove, the additional potential effects are anticipated to be generally comparable to those identified at Emsley Cove, but need to be confirmed after a detailed AIA is conducted.

Description of Proposed Mitigation
The Proponent committed in the Application to undertake mitigative measures to address potential effects on heritage and archaeological resources during all phases of the Project, including:

- Designing the Project to avoid disturbance of known archaeological sites wherever possible;
- Documentation of sites identified in the Project area;
- Undertaking of mitigative studies in consultation with the Haisla and as approved by the AB of the MTSA (or PC), should site disturbance be required;
- Avoidance of known resources if possible; and
- Excavation of identified resource where disturbance is unavoidable, in consultation with the Haisla and as approved by the AB (or PC).

2.6.3 Issues Raised and Proponent Response

The following key issues concerning potential effects of the Project on heritage and archaeological resources were raised by the public, some government agencies and the Haisla during the EA:

1. **Need for further information on designing of Project to protect heritage and archaeological resources, including information on required field work to identify and protect archaeological resources, on how construction will occur and be monitored, and how any archaeological finds will be preserved.**

   Proponent Response: The Proponent has committed to design the Project to avoid disturbance of known archaeological sites wherever possible. Where this is not possible, the Proponent will apply to the AB for a Site Alteration Permit for sites on provincial land, and will consult with Parks Canada's Archaeological Services Branch and the Haisla for sites on the Bees IR No. 6. No permit is necessary for federal lands. The Proponent committed to carry out (under permit) mitigative excavations of shell midden site (FlTe 30) if Project disturbance of this site cannot be avoided. The Proponent also made a new commitment that any Project refinements, facilities additions or location changes that may require land-altering activity will be referred by KLNG to the Project archaeologist, along with updated Project mapping as it becomes available, for referral to the AB on provincial land and to PC on the IR.

2. **Adequacy of measures for further identification of heritage and archaeological resources.**

   Proponent Response: The Proponent made a new commitment to undertake archival research on the location of the early village in Emsley Cove, if Emsley Cove is authorized as the terminal location. This will be completed prior to Project construction to determine whether the village lies within the Project boundaries, and if so, further field investigation will be undertaken prior to Project construction. The Proponent made a commitment that, prior to disturbance; it will undertake additional inventory and assessment for any areas affected by facility sites or road, power and pipeline route alterations that were not within the study area of the initial HIA report, and for any substantial changes to Project design. A post-disturbance inventory of the bedrock areas located above the proposed ship berth site in Emsley Cove will also be undertaken. The Proponent made a new commitment to undertake additional Haisla interviews regarding the burial site of a 'giant' individual as reported in the Emsley Cove AIA. For a Bish Cove terminal, the Proponent also made a commitment to conduct an AIA for unsurveyed portions of the road, ROW and terminal site to document archaeological resources. This will be done for provincially administered lands under Site Inspection Permit, and for federally administered land in consultation with Parks Canada's Archaeological Services Branch. The Proponent is also committed to assess the impact of tanker traffic on the rock art sites on bedrock exposures flanking Douglas Channel in the vicinity of the marine terminal and implement mitigative measures if required.

3. **Potentially adverse effect of site preparation, construction and operation on heritage and archaeological resources.**

   Proponent Response: The Proponent made a commitment to retain an independent Project archaeologist for site preparation and construction work. The Proponent made a new commitment to ensure that all staff and contractors are advised of legal requirements and protocols for discovery, notification and management of archaeological finds that may be made during site preparation, construction and maintenance. The Proponent made a new commitment to develop a protocol for consultation with the Haisla on heritage and archaeological resource assessment, monitoring and disturbance mitigation activities to complement the consultation efforts undertaken by the AB on provincial land and Parks Canada's Archaeological Services Branch on federal land. The Proponent also made a new commitment to ensure that a Haisla representative is present at all future heritage assessment work completed at the site and during construction monitoring (post disturbance audits).

A complete list of issues concerning potential effects of the Project on heritage and archaeological resources identified by the public, government agencies and the Haisla during the Application review stage of the Project's EA, and the Proponent's response to these issues, is contained in each of **Appendices C and D** of this Report.

2.6.4 Conclusion on Effects and Mitigation

During the harmonized environmental assessment, EAO and the RAs have considered: the Application; additional Project review material listed in Appendix A; public, government agency and Haisla comments on the potential effects of the Project; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** (particularly section 8), the EAO and the federal RAs are satisfied that the Project is not likely to result in significant adverse effects on heritage and archaeological resources.

3. SOCIO-ECONOMIC EFFECTS

3.1 COMMUNITIES AND ECONOMY

3.1.1 Background

There are approximately 34,200 people in the Regional District of Kitimat Stikine (Area C), in which the Project is located. In this area, the District of Kitimat and Terrace Census Agglomeration (CA) account for 30,265 people or 88 percent of the area's population. Between 1996 and 2001, there has been a trend towards population decline in the Kitimat area of approximately 7.6 percent, compared to Terrace which experienced a 4.1 percent decline in population. In 2004, the population estimates for Kitimat and Terrace were 10,449 and 12,565 respectively.

In contrast to British Columbia as a whole, the area's population is characterized by a higher proportion of males to females compared to the rest of BC, which is a reflection of the focus on natural resource industries and industrial operations in the area.

The Terrace-Kitimat-Kitamaat Village area has an estimated labour force of approximately 12,250 persons. Kitimat has the lowest unemployment rate in the region. Median incomes are highest in

Kitimat, with the majority of the income (80 percent or more) being obtained from earnings income as opposed to income from benefits. The situation is similar for median household incomes, which range from $66,799 in Kitimat to $49,887 in Terrace. The majority of the population over age 20 in Kitimat and Terrace are most likely to have a trades certificate or college diploma level education.

Kitimat and Terrace have active economies, with a number of industrial operations based in the communities. Terrace serves as the regional supply and service centre for the region. Kitimat's economy is centred on natural resource processing, specifically Alcan Smelters and Chemicals Limited's aluminum processing facility, Methanex Corporation's petrochemical facility (recently closed) and Eurocan Pulp and Paper's mill (operated by West Fraser Timber Co. Ltd.). The forestry industry is also important to the local economy. Kitimat's share of the provincial manufacturing Gross Domestic Product (GDP) has declined from 11.0 percent ($1.0146 billion) in 1997 to 7.8 percent ($710 million) in 2000. Kitimat's contribution of provincial exports has also declined (from 4.2 percent in 1997 to 2.5 percent in 2000).

However, the overall annual value of the commodities exported from Kitimat has remained at approximately $1 billion (having dropped from $1.113 billion in 1997 to $1.032 billion in 2000).

Overall, manufacturing industries in Kitimat in 2000 were responsible for employing 2,547 workers (or 1.3 percent of the province's workforce in the sector) and producing 7.8 percent ($719 million) of the province's manufacturing GDP. In Kitimat, the largest institutional employers are Kitimat General Hospital, School District No. 82, and the DOK. In 2002, there were 82 new registered business licences in Kitimat, giving an overall total of 592 business licences in the town.

Both Kitimat and Terrace are well-established communities with a range of municipal infrastructure and services, including water and sewer systems with treatment, and municipal landfills. There is a range of social and recreational infrastructure and opportunities in the Kitimat and Terrace area, including churches, libraries and museums, a performing arts theatre in Kitimat, shopping plazas, grocery stores, day care facilities, and entertainment facilities. There are also several hotels/motels and bed and breakfasts in the area. Terrace is home to the main campus of the Northwest Community College, with a second campus located in Kitimat. There are a number of schools in Kitimat and Terrace providing primary to high school level education.

Medical services are available through the Kitimat General Hospital and Health Centre and the Mills Memorial Hospital in Terrace. Terrace has a significant cluster of medical specialists and equipment, and one of the best arrays of health care services in British Columbia on a per capita basis.

The area also has Royal Canadian Mounted Police detachments in Kitimat and Terrace. The number of violent crimes and spousal assaults in the area are higher, in particular in Terrace, than for the province. Both Kitimat and Terrace have fire fighting services and three major industrial operations have their own fire response units. Marine vessel traffic movements in Kitimat Arm and Douglas Channel are controlled by the Canadian Coast Guard's Marine Communication Traffic Services in Prince Rupert, with the Joint Rescue Coordination Centre in Victoria being responsible for handling marine emergencies.

The majority of the housing in Kitimat and Terrace is owner-occupied, with most of it having been constructed prior to 1991. Average housing prices in the area are approximately $120,000 with average prices being lower in Kitimat than in Terrace. Rental vacancy rates in the area are high (approximately 40 percent in Kitimat and 36 percent in Terrace), having increased substantially over the last 8 years.

The District of Kitimat (2002) indicates that over 70 percent of the revenue associated with manufacturing and port operations in Kitimat actually remain in the area. Between 1996 and 2002,

there was an investment of $84.4 million in development in the region, spread over industrial ($26.8 million), commercial ($8.1 million), residential ($23.6 million) and institutional ($25.7 million) developments. There was $177.3 million of investment in buildings between 1991 and 2002, and there is an estimated $5 billion worth of future projects proposed for Kitimat. Major projects proposed for the area include developments by Alcan, the new Kitimat General Hospital and Health Centre (estimated to cost $37 million), and several new small businesses and commercial enterprises.

3.1.2 Project Effects and Proposed Mitigation

In the Application and supplemental materials, the Proponent assessed the potential for environmental effects of the Project on communities and economy and proposed measures to mitigate these potential effects.

Potential Effects and Evaluation
In terms of community effects, there are potentially adverse effects of Project construction and operation. During construction and commissioning, Project-related activities will result in a requirement for various infrastructure and services provided at the community and regional level. Both vehicle and vessel traffic associated with the Project will result in increased use of local transportation systems to bring workers, and materials and supplies to the Project site, and Project-related vessel traffic will interact with existing marine transportation. Utilities and communications networks will be required for the Project site. Accommodations will be required for Project workers. The demand for municipal services and waste disposal services will be increased. Workers living in the community will also create demand for municipal water supply and sewer services.

The Project will result in an increased population, in particular during construction and commissioning, or at least help sustain the population at existing levels, which will affect the demand for education, health, emergency and other related infrastructure and services. During decommissioning, there will be a slight increase in activity at the site, with some increase in traffic to/from the site and materials being removed and disposed. However, interactions with other infrastructure and services will be further reduced as the site is fully decommissioned and activities will eventually cease. Depending on the type of situation, accidents, malfunctions and unplanned events may also require local and emergency and social services.

The potential economic effects are considered to be positive. The Project is expected to create approximately 700 jobs during construction and 50 jobs during normal operations. The construction workers will be housed in existing communities. There will also be employment opportunities during Project decommissioning. A variety of expenditures will be made on goods and services over the life of the Project. There will also be indirect and induced economic effects, including new hiring by businesses supplying or serving the LNG facility, and workers spending earned income on goods and services in the region. This will include increased or new business for the service industry.

These potential effects are applicable to both Emsley Cove and Bish Cove terminal locations.

Description of Proposed Mitigation
The Proponent committed in the Application to undertake mitigative measures to address potential effects on communities and the economy, including:

- Hiring of people with appropriate qualifications and skills from local community or region when practical;
- Working with local professional and trade associations to encourage hiring for construction of the terminal and delivery of training programs;

- Providing advance notice to local businesses about goods and services necessary for the Project, and advising the local business community of any changes in operations relating to goods and services required;
- Making arrangements with appropriate parties regarding requirements for use of transportation, utilities, communications and municipal services during Project construction;
- Developing and implementing an accommodation plan for construction workers, working with the local council and other applicable agencies; and
- Use of local education facilities where possible for delivering training programs and working with facilities on developing programs and delivery schedule in the Project construction and operations phases.

3.1.3 Issues Raised and Proponent Response

The following key issues concerning potential effects of the Project on communities and the economy were raised by the public, some government agencies and the Haisla during the EA:

1. Accommodation, employment and business opportunities for Kitimat.

Proponent Response: The Proponent committed to continue working with the District of Kitimat and other agencies to develop a listing of available accommodation options for construction workers. The Proponent made a new commitment to meet with the Chamber of Commerce to discuss the benefits of a Joint Venture Business Program between new Haisla businesses associated with the Project and Kitimat businesses.

2. Provision of services by the District of Kitimat.

Proponent Response: The Proponent committed to continue working with the DOK to address cost-sharing and use of municipal services such as fire, emergency services, garbage/waste treatment and disposal. The Proponent made a new commitment to consult with and obtain input from the DOK in development of the ERP for the LNG facilities.

3. Provision of local jobs and training.

Proponent Response: The Proponent confirmed its commitment to hire people with the appropriate qualifications and skills from the local community or region, wherever practical. The Proponent made new commitments to produce a list of jobs required and required training during construction and operation phases that will be posted on its web site, and to provide appropriate training opportunities to facilitate local hiring, where appropriate. Commitments were also made to develop a strategy for on-the-job training, and to provide on-site LNG specific safety training to all employees.

A complete list of issues concerning potential effects of the Project on communities and the economy identified by the public, government agencies and the Haisla during the Application review stage of the Project's environmental assessment, and the Proponent's response to these issues, is contained in each of **Appendices C and D** of this Report.

3.1.4 Conclusion of Effects and Mitigation

As this Report is intended to meet the purposes of both the provincial and federal environmental assessment requirements, it contains matters relating to all potential socio-economic effects of the project. However, when evaluating the significance of environmental effects pursuant to CEAA, the

RAs and the Minister will take into account environmental effects as defined in the Act (see definition of "environmental effects" in the Act for specific wording), summarized as follows:

"Any change that the project may cause in the environment; any effect of any change to environment caused by the project on health and socio-economic conditions, including physical and cultural heritage; the current use of lands and resources for traditional purposes by aboriginal persons; or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; or any change to the project that may be caused by the environment."

During the harmonized environmental assessment, EAO has considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments on the potential effects of the Project; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** (particularly section 9), the EAO is satisfied that the Project is not likely to result in significant adverse effects on communities and the economy.

3.2 PUBLIC SAFETY AND HEALTH

3.2.1 Background

For the purposes of the proposed assessment, public safety and health includes any environmental effect of the Project that may have an effect on the health and safety of members of the public, as well as workers at the LNG terminal. Safety and health considerations are linked to other parts of this assessment, particularly the assessment of effects on air and water quality, accidents and malfunctions, and on communities including the First Nations communities.

Long-range transport of anthropogenic air contaminants is not an important human health concern in the Assessment Area. The overall air quality is considered good in Kitimat. The existing exposure to air contaminants carries very little potential for deleterious effects on public health or the receiving environment.

The sound quality in the Project area is also considered good. The distance of the proposed LNG facilities from Kitimat and Kitamaat Village (15 km and 8.6 km for Bish Cove and 18 km and 11.6 km for Emsley Cove respectively) is sufficient to suggest that construction and operation effects of the Project on sound quality are anticipated to be neutral, relative to other projects in the area.

Existing services are considered sufficient to provide an appropriate level of health care and emergency services for this size of community.

A description of the freshwater environment in the Kitimat area is presented in Section 2.4 of this Report. Kitimat obtains its water supply from the Kitimat River, and wells used by area residents are relatively remote and upslope of the Project area. The potential health effect of the Project on drinking water supply is not considered to be an issue.

A description of the existing health and emergency services in the Kitimat-Terrace area is provided in Section 3.1 of this Report. Existing services are considered sufficient to provide an appropriate level of health care and emergency services for this size of community.

A description of the Haisla community and conditions is presented in Section 4 of this Report.

Public safety and health effects resulting from the Project are designed and required to be low in magnitude as a result of a variety of local, provincial legislation, regulations and codes (e.g. *Transportation of Dangerous Goods Act* and Regulations, *Workplace Hazardous Materials Information System Regulations*). These requirements necessitate the Project to address public safety and health through such documents as environmental management plans and health and safety plans, to prescribe protective measures to mitigate potential hazards.

3.2.2 Project Effects and Proposed Mitigation

In the Application and supplemental materials, the Proponent assessed the potential for public safety and health effects of the Project and proposed measures to mitigate these potential effects.

Public safety and health is proposed as a VC due to concerns about potential health and safety risks to the public and workers associated with LNG emissions, and accidents (worker and public) involving personal injury. Marine tanker and vehicle traffic-related accidents are also of concern.

Key aspects of the Project on which the EA is focused will be assessed separately for effects on public and worker health and safety. This approach recognizes that the nature of the Project's potential environmental effects would be different for general members of the public as opposed to workers at the terminal.

Assessment Boundaries
The spatial boundary for the assessment of health and safety is based on the area (the "Assessment Area") where routine activities and potential accidents, malfunctions and unplanned events might have an environmental effect on health and safety. The assessment focuses on those members of the public who may be present (from time to time or continuously) within the zone of influence of routine activities and potential accidents that may result in health and safety environmental effects. These members of the public fall into two categories: members of the general public and workers. The assessment of environmental effects of the Project on the general public focuses on those persons who may experience Project-related environmental effects regardless of where they may otherwise live or travel. The assessment of environmental effects of the Project on the workers focuses on those persons who may experience Project-related environmental effects as an employee or contractor for the Project but does not include workers at adjacent facilities or persons in the Assessment Area in the course of their business as visitors. In this case, these workers are considered members of the public.

Potential Effects and Evaluation
Due to the Project's design, management and operating systems, and the legislated public and worker safety and health requirements, the potentially substantive effects on public safety and health are likely to be associated with accidents, malfunctions or unplanned events occurring as a result of construction, operation or decommissioning activity. There is also a potential for increased demand on community health services due to the influx of construction workers, especially if it coincides with the development of other major projects in the Kitimat area.

Routine activities that may affect public health and safety in construction and commissioning are those that generate dust or noise. Construction activities will be conducted entirely within the Project footprint, and members of the public will not have unsupervised access to construction sites. As such, the public will not be exposed to most activities. Traffic increases along the facility access road could

increase the risk of accidents. Noise levels will be greatest during construction, but for both construction and operational phases, local topographical features and wind direction will likely reduce the extent and level of sound outside the plant site. Maximum sound levels at the plant site during operation are estimated to be in the mid-range level of 75 to 85 dBA. At these levels, considerable interference of speech communication can be expected.

Routine activities that have the potential to affect worker health and safety in construction and commissioning relate to increased marine tanker and onshore vehicular traffic and the construction activities on the construction sites. These activities will include potential exposure to noise, dust, and hazardous chemicals, and conventional construction hazards. Environmental effects resulting from routine construction activities are expected to be low in magnitude since the Kitimat LNG Health and Safety Plan, Marine Terminal Manual and EHS management system will prescribe protective measures to mitigate potential hazards (e.g., noise, hazardous chemical handling and conventional construction hazards) and to ensure Kitimat LNG policy and applicable regulations are met met (e.g., *Transportation of Dangerous Goods Act*, *Transportation of Dangerous Goods Regulations*, and *Workplace Hazardous Materials Information System Regulations*).

During operation, air emissions (dust, noise and combustible gases) with the exception of NOx and SO_2 will be emitted at levels that are within regulatory limits (**Section 2.1**) and are not expected to result in environmental effects on **public** safety and health. Given that there would be very limited time spent by any one person close to or within the terminal area, and given the conservative nature of the air model it is likely that any anticipated human health risks from exposure to SO_2 concentrations in the area are not expected to be significant.

The operational activities that have the potential to affect **worker** health and safety will include potential exposure to noise, hazardous chemicals, air emissions and conventional operations hazards related to the offloading of large tankers at dock and the operation of physical processes and pipelines. Environmental effects resulting from routine operation activities are expected to be low in magnitude since the Kitimat LNG Worker Health and Safety Plan and associated procedures will prescribe protective measures from the operational hazards that will ensure Kitimat LNG safety policy and applicable occupational safety regulations are met.

Accidents, malfunctions, unplanned events and environmental effects (such as earthquakes) are more fully describes in **Section 5.2** of this Report. They may lead to adverse effects on air quality that can affect public health and safety. These include possible hazardous materials spills on land and sea, accumulation of gas in a confined area, release of natural gas along the pipeline lateral facilities, accidental releases during unloading and storage, fires, marine vessel accidents, and possible sabotage. These potential interactions may take the form of a vapour cloud of vaporized LNG, or thermal radiation associated with fires at the proposed LNG facility. For vapour clouds, a flammable substance may be released that could result in ignition at some distance from the source, or the exposure of environmental receptors to high concentrations of natural gas that may deplete oxygen, particularly near the source. For fires, the potential for environmental effects is due to the emission of fine particles and unburned natural gas, mainly methane. Process upsets, such as minor power losses, may include minor emissions of particulate matter and combustion gases from the emergency diesel generator, a diesel fire pump, and very small fugitive losses of natural gas from valves and flanges.

Potential failure of one or more of the four lines in the pipeline ROW could result in elevated concentrations of natural gas or gas liquids. The gas liquids include ethane, propane, and butane. In the event of ignition, there is potential for elevated concentrations of gaseous and particulate matter due to hydrocarbon combustion by-products and due to wood combustion generated by a secondary forest fire (wood smoke).

During decommissioning and abandonment, the potential environmental effects are related to the increase in marine tanker and onshore vehicle traffic associated with the transport of material from the site and personnel to the site, and hazards inherent in decommissioning the LNG processes, demolishing equipment and facilities, and restoring the site. The potential environmental effects of decommissioning and abandonment on **public** and **worker** health and safety are low in magnitude and will be mitigated, to a large extent, by the implementation of the Kitimat LNG EHS management system and preparation of a Decommissioning Plan. Only accidental events are assessed further, as routine events have no likelihood of resulting in potentially significant environmental effects

Description of Proposed Mitigation
The Proponent committed in the Application to undertake mitigative measures to address potential effects on public safety and health, including:

- Developing a comprehensive Environment, Health and Safety Management System for all phases of the Project, and conducting periodic audits to ensure full implementation;
- Implementing a comprehensive security program to ensure public safety;
- Incorporating safety features into every aspect of the proposed facility;
- Implementing a design quality assurance system for the LNG terminal;
- Preparation of operational procedures to ensure transport, handling and process systems are operated within the design parameters and with the highest regard for safety;
- Developing and implementing an ERP;
- Developing and implementing a Worker Health and Safety Plan;
- Providing operator training;
- Utilizing "safety by design" e.g. stringent adherence to applicable design codes and standards for the design of LNG equipment and facilities;
- Scheduling of shifts during peak labour force periods to avoid existing peak traffic periods;
- Limiting industrial vehicle movements to times when workers travelling to and from the facility is lowest; and
- Employee awareness training on posted speed limits and any other Project planned mitigation.

3.2.3 Issues Raised and Proponent Response

The following key issues concerning potential effects of the Project on public safety and health were raised by the public, some government agencies and the Haisla during the environmental assessment:

1. Protocols, standards and reliability of ambient air quality information and future monitoring.

Proponent Response: All of the ambient air quality data used in the assessment is derived from continuously monitored hourly data. These instruments are accessed electronically by the Ministry of Water, Land and Air Protection ADAMS application (Air Data Acquisition and Management System) hourly. The Ministry assures the quality of these data through a variety of means including review of daily calibrations, monthly charts and operator records, plus Ministry audits. These protocols are consistent with US Environmental Protection Agency (EPA) and NAPS guidance. KLNG will undertake passive sulphur dioxide SO_2 monitoring at three locations and for an appropriate period of time (as per discussions with Environment Canada and Health Canada). Monitoring will occur at the jetty, and two reference locations to both verify the dispersion modeling results, verify the conclusions of the air quality effects assessment, and verify that SO_2 is not likely to reach levels that may be injurious to worker health.

2. **Concern over potential spills of contaminants or hazardous materials due to accidental releases from vessels.**

   Proponent Response: All LNG tankers are double hulled. Any bunker fuel is protected by the double hull construction and risk of breach is low. LNG vessel fleet is among the newest and advanced in technology and construction and less susceptible to collisions and other mishaps. LNG vessels typically burn natural gas and distillate fuel. On board chemicals are kept in drums and in small quantities. LNG carriers have dry bilge systems which are devoid of water. Grey water is collected and treated on board. The Proponent's commitments include development of a comprehensive EHS management plan, a Hazardous Spill Contingency Plan, and a Marine Terminal manual to address this issue.

3. **Need to include Federal Responders when developing coordinated incident response plans with Local and Provincial Responders.**

   Proponent Response: Federal emergency response agencies are interested in being involved in the development of a plan on response coordination with local and provincial responders, as an incident would likely involve all three levels of government. The DOK would also like its unique resources for emergency response and preparedness to be included in any response plan. The Proponent has made a new commitment to provide relevant federal agency response organizations with a draft of the ERP for comment and acceptance, and to consult with and obtain comment from the DOK in development of the ERP for the Project facilities.

4. **Control of potential releases from LNG storage tanks to minimize potential effects on local communities.**

   Proponent Response: The Proponent has indicated the full containment tanks are designed and constructed so that both inner tank and outer containment walls are capable of independently containing the stored LNG. Full containment tanks offer the highest level of safety, but any unplanned release will be contained by the concrete tank and the vapour released to the atmosphere through pressure relief valves. The Proponent's commitments include ensuring that the Hazardous Spill Contingency Plan includes prevention and mitigation of potential releases from the terminal, and that the EPP will address any potential releases from the storage tanks.

5. **Public safety adjacent to the LNG facilities.**

   Proponent Response: The Canadian Standards Association Code Z276 provides guidance on terminal siting to protect existing users from the effects of fires and vapour clouds associated with accidental events. Current legislation does not provide for exclusion zones, but public access to the terminal will be restricted by terms of the site lease and the fencing of the facilities on the leased area. The road accessing the site from the Bish FSR will also be restricted. The *Marine Transportation Security Act* regulations only provide for public restrictions around an LNG vessel when it is at berth. The Proponent has made new commitments to comply with the *Marine Transportation Security Act* regulations governing security requirements at the jetty and ship berth, to manage public access on the foreshore through provisions of relevant foreshore tenures, to maintain a map of recommended public safety sites on its web site, and to post and regularly update LNG vessel schedules on its web site.

6. **Increased demand for public health services.**

Proponent Response: The Proponent has already held preliminary discussions with the Northern Health Authority (NHA) to discuss potential Project impacts on health services. It is anticipated that much of the construction work force and permanent labour force will be drawn from the local area, which may reduce the potential for a higher level of public health issues. The Proponent committed to continue discussions with the Northern Health Authority to enhance the NHA's ability to plan for increased health service requirements, especially related to drug and alcohol abuse and sexually transmitted diseases.

7. **Concern over road safety for public, construction and operation workers traveling through the area.**

Proponent Response: The Proponent is considering a number of alternatives for worker transportation, including water taxis during construction and bus service or car pools during operations. The Proponent will also limit industrial vehicle movements to times when the lowest number of workers are traveling to and from the terminal, and will schedule shifts during peak labour force periods to minimize traffic peaks. The Proponent made a new commitment to post notices at the start of the access road and along the route, where necessary to inform vehicle operators about construction work.

A complete list of issues concerning potential effects of the Project on public safety and health identified by the public, government agencies and the Haisla during the Application review stage of the Project's environmental assessment, and the Proponent's response to these issues, is contained in each of **Appendices C and D** of this Report.

3.2.4 Conclusion of Effects and Mitigation

During the harmonized environmental assessment, EAO and the RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments on the potential effects of the Project; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** (particularly section 9), the EAO and the federal RAs are satisfied that the Project is not likely to result in significant adverse effects on public safety and health.

3.3. LAND AND RESOURCE USE

3.3.1 Background

The Project is generally located within the Regional District of Kitimat Stikine (RDKS), which includes the Kalum Forest District, City of Terrace, District of Kitimat (DOK), and several First Nation and rural communities. The nearest population centres to the Project are Kitimat at the upper end of the Kitimat Arm, and the Haisla Kitamaat Village on the eastern side of the Kitimat Arm.

The Project area lies within the DOK, which has jurisdiction over planning and development within its boundaries. The district's Official Community Plan (OCP) contains guidelines and regulations governing industrial, residential, commercial and recreational land use within the District.

The Province has legislation and guidelines governing a variety of land and resource use activities, including oil and gas development, mining, forestry, and hunting, trapping and fishing. The Kalum Land and Resource Management Plan (Kalum LRMP), approved in 2002, provides direction for the sustainable use of Crown land and resources within the Kalum Forest District, which includes the Project area.

There is no mineral exploration or mining activity in the area, but Alcan Smelters and Chemicals Limited operates a mineral (aluminum) processing facility in Kitimat. Until 2004, Methanex Corporation operated a petrochemical processing facility in Kitimat. The dominant industries are located at the Port of Kitimat.

Forest harvesting tenure in the Project area is held by West Fraser Mills Ltd., under Tree Farm Licence (TFL) 41. West Fraser is the province's fourth largest forest license holder, and operates a large sawmill in Terrace and the Eurocan Pulp and Paper Mill in Kitimat. West Fraser operates the Bish Creek Forest Service Road (FSR) that currently provides access to the proposed Project Area. Forestry activity is currently occurring near Emsley Cove and along and/or near the proposed ROW area.

The Bish Cove site was logged in 1974 and today consists predominantly of young (pole-sapling) mixed coniferous/deciduous forest dominated by western hemlock, red alder, western red cedar and Sitka spruce. Salmonberry and devil's club dominate the understory.

Hunting, trapping, and recreational and sport fishing are popular activities carried out by area residents, as well as visitors to the area. In 2001, there were 8,214 hunters recorded in the Skeena Region of the MOE. A small number of commercial outfitting companies offer sport fishing and/or big game hunting trips in the Skeena Region. There are three registered traplines in the Kitimat area, one of which covers the Bish Creek area. Martin and beaver account for the large majority of trapping revenue. Species hunted and trapped in the Kitimat area include grizzly and black bears, cougar, deer, elk, moose, as well as various furbearers, small game and waterfowl/migratory game birds. While there are no documented records on hunting in the Kitimat or access road area, it is expected that a small amount of hunting does occur along the access road area and possibly some poaching activity as well. The trapline licence area does not include Bees IR No. 6, but the access road and ROW will pass through the licence area.

Sport and recreational fishing occurs within both freshwater and marine areas, and provides social, cultural and economic benefits. The Kitimat River, which flows into Kitimat Arm, is becoming more well-known as an angling destination due to its large fish, high success rates and easy access. In 2000, there were 34,132 anglers recorded in the Skeena Region. These anglers caught approximately 663,000 fish in 2000, with rainbow trout and freshwater salmon being the most common species caught. Commercial fishing activity is now largely limited to the Kitimat Arm area (DFO Statistical Sub-area 6-1), compared to when commercial fishing activity historically extended into Douglas Channel. Activity has declined from 13 fishing licenses in 1994 to four licenses in 2002. Further information on the marine commercial and recreational fishery is provided in **Section 2.5** of this Report (Marine Environment and Marine Mammals).

There is a range of tourism and recreation opportunities in the area. Recreational boating is popular in the Douglas Channel area, with services provided by the Kitimat Yacht Club, two public marinas (Moon Bay Marina and MK Bay Marina), and two private marinas (Minette Bay Marina and Kitamaat Village Marina).

Seven protected areas located at or in the vicinity of Kitimat Arm are identified in the Kalum LRMP (at the Kitimat Harbour Limit) or along the upper portion of Douglas Channel or inlets off the channel.

The areas are Coste Rocks, Dala/Kildala River Estuary, Eagle Bay, Foch/Giltoyees, Jesse Falls, Sue Channel/Hawkesbury Island and Sue Channel/Loretta Island.

All Project components (with the exception of portions that may be located on the Bees IR No. 6 are located on provincial Crown land within the DOK. The DOK has jurisdiction over planning and development within its boundaries, with the exception of Indian Reserves. Uses of Crown land require tenure from the provincial government.

The Emsley Cove site is currently zoned as Forestry (G5) but is recognized by the DOK as a potential future industrial site in its Official Community Plan (OCP). A re-zoning would be required to allow the District Council to approve an industrial development at the site. The Bish Cove site is largely comprised of the 74 ha Bees IR No. 6, which is not subject to the OCP. The Haisla have designated this reserve for commercial industrial use. The Kalum LRMP also designated Emsley Cove and Bish Beach as potential deep sea port and industrial development sites, subject to more detailed land use studies required to refine the site boundaries.

Emsley and Bish Coves currently have a natural aesthetic, backcountry character, with human use of the cove to date having been largely of low impact. Emsley Cove receives some recreational use by Kitimat area residents who access the area primarily by boat. There are no official recreational trails or sites at Emsley Cove. There is an established MFR recreational site and trail north of Bish Cove, although frequency of public use of the Cove itself is limited. In areas surrounding Emsley and Bish Cove, there is greater evidence of human disturbance. The area of the access road to the Project site has experienced an increasing amount of disturbance due to forest harvesting. However, the area of the Project site is largely undisturbed. Beyond the coves on the marine side, there is a considerable amount of vessel traffic in Kitimat Arm, much of which is currently connected to existing industrial operations within the District.

3.3.2 Project Effects and Proposed Mitigation

In the Application and supplemental materials, the Proponent assessed the potential for land and resource use effects of the Project and proposed measures to mitigate these potential effects.

Land and resource use is considered a VC for the Kitimat LNG Project environmental assessment due to its importance for residential, commercial, industrial and recreational purposes, and the potential for the LNG facility and Project activities to affect land and resource use in the area. Area residents, First Nations and other land and resource users place a high value on the outdoors, subsistence, sporting and recreational activities. Also, land and resources are important for their aesthetic and wilderness values.

Assessment Boundaries

The spatial boundary for land and resource use encompasses lands covered by and immediately adjacent to the Project site and along the corridor for the pipeline laterals, access road and transmission line and any off-site work areas, such as marshalling yards, that are directly connected to the Project. Due to the access potential provided by new ROWs, land and resource use beyond the immediate area, including freshwater and marine areas, is also considered. Therefore, the Assessment Area is defined by Statistics Canada's census sub-division for the District of Kitimat, with consideration given to land/water and resource use activities extending into the sub-division of Kitimat-Stikine C (Part 2) Regional District Electoral Area (RDA). These boundaries are defined by Statistics Canada for its collection and compilation of demographic and economic data.

Potential Effects and Evaluation

The vicinity of Emsley Cove, Bish Cove and Kitimat is subject to a variety of land and resource use activities. The Project, mainly through improvements to the access road and creating one new ROW, will provide improved access to this area and opportunities for new and increased resource use activities and user groups.

The use of Emsley Cove or Bish Cove for the LNG terminal will represent a change in use of these areas. The Project site and the immediate marine area around the terminal will no longer be available to the public, although access will still be available to the surrounding area and the LNG terminal access road will become a public road. There may be interactions between construction and operation activities and related vessel traffic, that are carried out in or adjacent to the marine environment, and fishing activity and other marine users such as recreational boaters and commercial vessels.

The access road and the upgraded Bish FSR will provide improved year round access to the area, and may lead to increased roadway and waterway use, fishing, wildlife harvesting, recreational activities, overland travel on snowmobile and all-terrain vehicles, timber harvesting, and mineral exploration. Current use of the road is low and much of the new traffic would be related to the LNG facility and most likely to occur within specific timeframes.

Physical disturbance, noise, dust and human presence associated with construction activities or terminal operation may cause wildlife to avoid some areas and lead to interactions with hunters, trappers and/or outfitters/guides. This could cause some land and resource users to avoid the area. A decline in the aesthetic quality and/or wilderness character of an area, whether real or perceived, may be experienced.

Improved access may lead to increased hunting or fishing in the area, which may lead to conflicts between hunters and forestry operators. There may also be increased levels of illegal hunting and fishing as a result of the improved access. Increased harvesting of wildlife and fish resources may lead to resource depletion, with indirect effects on resource populations and resource use and users. A decline in the aesthetic or wilderness quality of the area may also be experienced by some users.

There may be interactions between public users and the marine-related construction and operation activities and vessel traffic. Public access and use of Bish or Emsley Cove for fishing and boating will be affected by construction barges, dredging activity, heavy machinery use and marine vessel traffic in the Douglas Channel and Kitimat Arm.

During construction, an estimated 30 vessels will bring construction materials and supplies to the site. These will include freight vessels and barges, as well as smaller craft. This new traffic may conflict with both commercial and sport/recreational fishing activities. Fishers may move their fishing activities to other areas. While the Kitimat LNG Project will not be using facilities at the Port of Kitimat, its operations will involve vessel traffic in the Douglas Channel and Kitimat Arm. There will be an estimated maximum of 90 LNG tanker movements (i.e. a return trip in and out of Kitimat Arm and the channel) annually, as well as a small number of other vessels associated with the facility operation. This additional traffic is not anticipated to pose a problem for shipping in Douglas Channel or Kitimat Arm, because this traffic will be controlled by the Canadian Coast Guard (CCG), there is a designated shipping route in Douglas Channel, and procedures are in place for vessel traffic management in Kitimat Arm.

Specific construction activities, such as land clearing, water management and waste management, if carried out properly are not likely to cause adverse effects. It would only be in the unlikely case of an accident, malfunction and/or other unplanned event that there could potentially be adverse effects. Kitimat LNG is committed to following provincial and federal regulations concerning these issues to minimize the effect.

Description of Proposed Mitigation
The Proponent committed in the Application to undertake mitigative measures to address potential land and resource use effects, including:

- Informing the community/public and Haisla community of plans;
- Obtaining required zoning changes;
- Entering into an agreement with road owner/operator for FSR use and notifying other road users;
- Giving notice of marine work and schedule to the Canadian Coast Guard (CCG) for Notice to Mariners; and
- Scheduling vessel arrival/ departure times outside of known times of traditional use, where possible.

3.3.3 Issues Raised and Proponent Response

The following key issues concerning potential effects of the Project on land and resource use were raised by the public, some government agencies and the Haisla during the environmental assessment:

1. District of Kitimat development and approval issues.

Proponent Response: The Proponent committed to continue working with the DOK to discuss issues related to: Official Community Plan (OCP) and zoning amendment applications; building permits and inspections; and the application of BC Building Code and Municipal Inspection Services. The Proponent made a new commitment to ensure the DOK is consulted throughout the design stage on Project components that are subject to municipal by-laws. A new commitment was made to consult with the District of Kitimat on the access road and FSR road improvements contemplated for the Project, prior to finalization of design.

2. Provision of Project information affecting land use.

Proponent Response: The Proponent committed to provide regular updates on the KLNG web site to advise the public on the Project schedule, permit approvals and construction schedules.

3. Potential restrictions on public, Haisla and recreational use of Emsley and Bish Cove areas, resulting from the Project.

Proponent Response: Public access restrictions around the LNG terminal and unloading vessels will be established through tenure provisions, and designed in consideration of public safety and site security. There are no legislated exclusion zones. The Proponent committed to manage public access on the foreshore through provisions of relevant foreshore tenures, to maintain a map of recommended public safety sites on its web site (i.e. restricted access areas where there is a risk to public safety due to proximity to the LNG facility); and to post and regularly update LNG vessel schedules on its web site. Restricted access areas are shown for Emsley Cove in **Figure 7**, and for Bish Cove in **Figure 8**. In addition, the Proponent committed to continue working with the DOK, local recreational groups, other industries and the Haisla to address public recreational access issues in Douglas Channel. The Proponent also made a new commitment to ensure that a vehicle turnaround area is included in the access road at the perimeter of the LNG terminal.

A complete list of issues concerning potential effects of the Project on land and resource use identified by the public, government agencies and the Haisla during the Application review stage of the Project's

EA, and the Proponent's response to these issues, is contained in each of **Appendices C and D** of this Report.

3.3.4 Conclusion of Effects and Mitigation

During the harmonized environmental assessment, EAO and the federal RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments on the potential effects of the Project; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** (particularly section 10), the EAO and the federal RAs are satisfied that the Project is not likely to result in significant adverse effects on land and resource use.

Figure 7. Restricted Access Areas for Emsley Cove Terminal

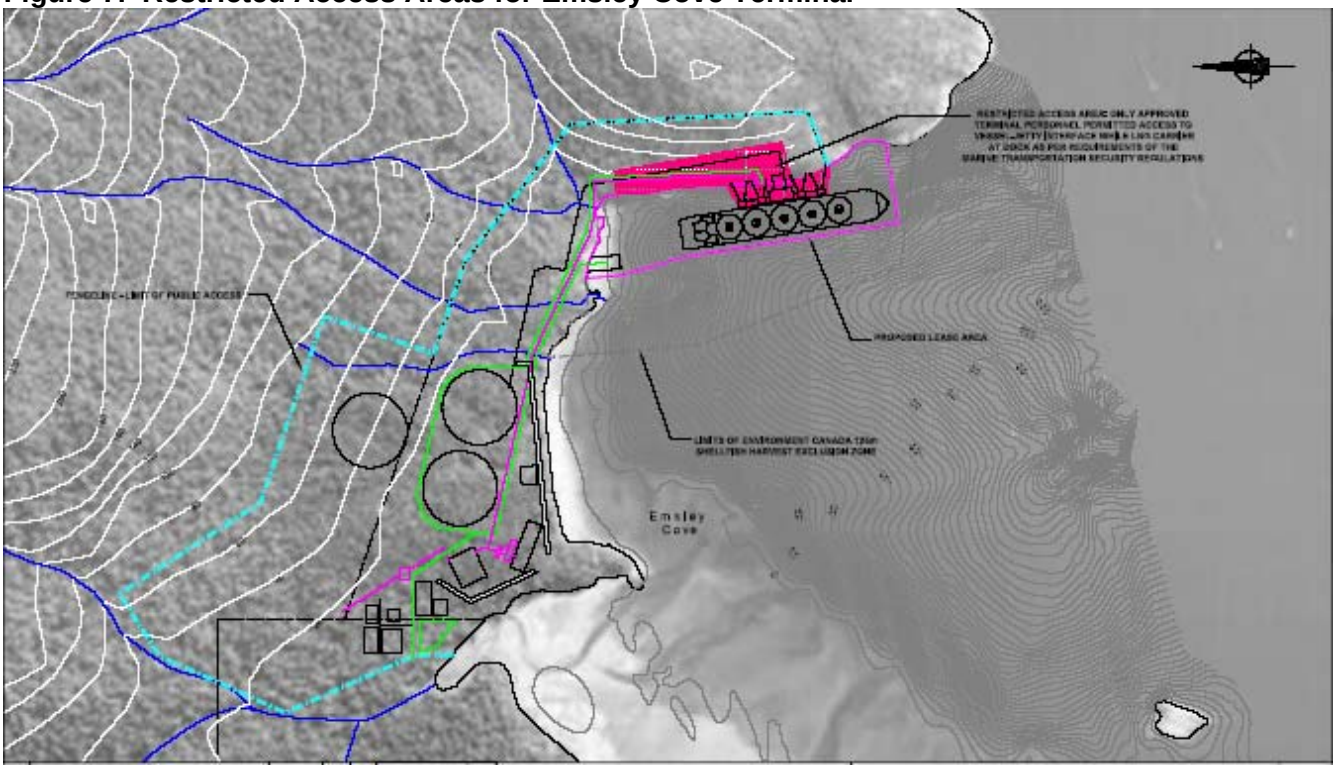
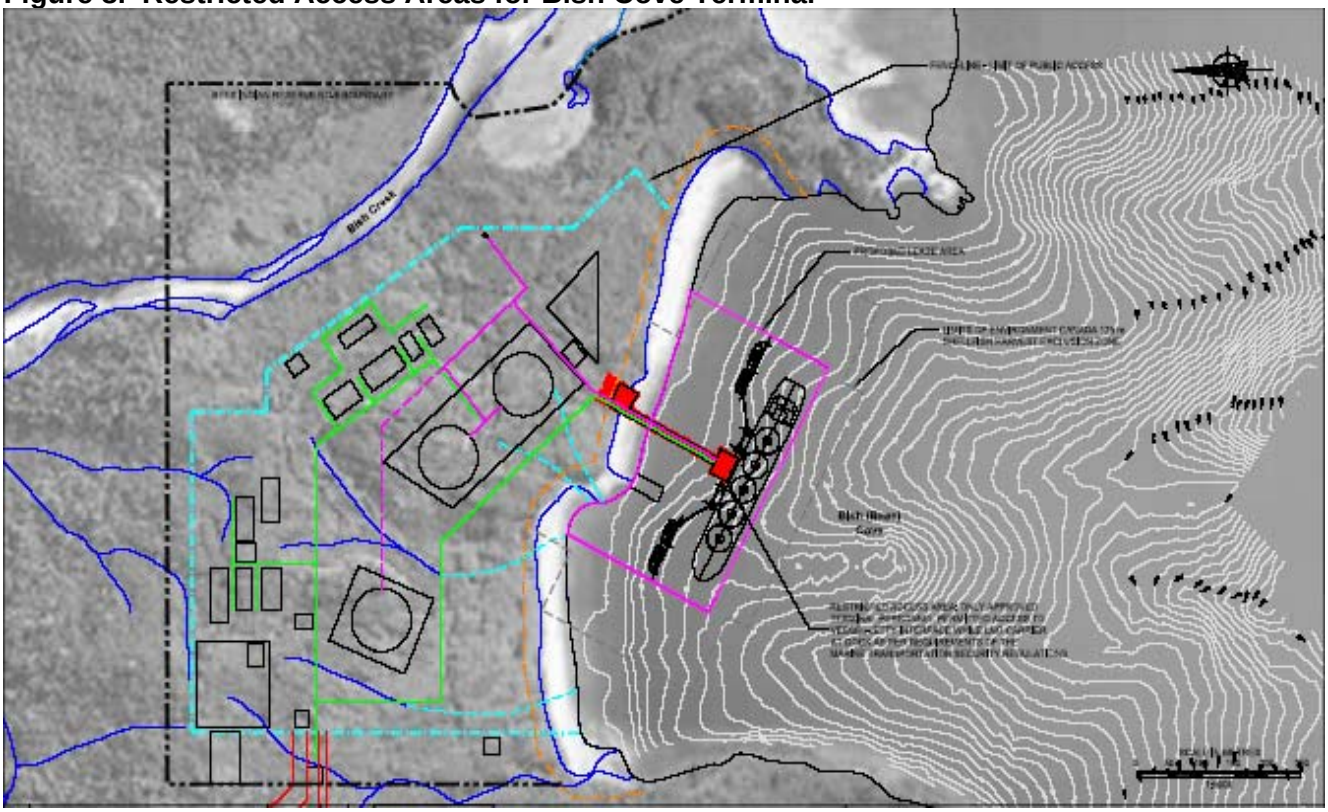


Figure 8. Restricted Access Areas for Bish Cove Terminal



3.4 NAVIGABLE WATERS

3.4.1 Background

Marine navigation in the Project area is dominated by activities associated with the Port of Kitimat and Douglas Channel. The port is a major private, sheltered, diversified, ice-free deepwater port that has been operating for almost 50 years. The Port handles a high volume of ship traffic, including vessels associated with the Alcan, Eurocan Pulp and Paper Company Limited and the Methanex facilities. It also serves as a trans-shipment point, for petrochemical products and lumber from Alberta and British Columbia. In 2000, the port handled over 800 scheduled or routine coastal movements and 180 movements associated with the Alcan, Eurocan and Methanex facilities.

Douglas Channel is the primary marine navigation route for commercial shipping. As noted in **Section 3.3** of this Report (Land and Resource Use), recreational boating and commercial fishing activities also take place in the Channel. Douglas Channel/Kitimat Arm is frequented by fog an average of 20 days per year. Fog is more frequent on the outer coast, with the southern tip of the Queen Charlotte Islands averaging 110 days of fog annually. Further inland of Kitimat, foggy days are less frequent.

The *Navigable Waters Protection Act* (*NWPA*) provides the federal government with the authority to require that the construction or placement of any structure or physical works in, upon, over, under, through, or across any navigable waterway in Canada is reviewed and approved under Section 5 of the Act. The definition of ”navigable waters” under the Act includes any body of water capable of being navigated by floating vessels of any description for the purpose of transportation, commerce or recreation.

Based on the navigable waters definition and a preliminary assessment of navigability of the affected waterways, the Project is subject to review and approval under the *NWPA* for five key Project components, namely:

- Construction of the LNG tanker berth;
- Infill and construction of the barge jetty and tugboat berth;
- Replacement of culverts and bridges on the streams crossed by the Bish FSR during road improvements;
- Construction of new bridges over Emsley Cove or Bish Creek for the LNG terminal access road; and
- Installation of the natural gas and natural gas liquids pipeline laterals under navigable streams between Emsley Cove or Bish Cove and the current terminus of the existing PNG pipeline in Kitimat.

Major watercourses considered to be navigable that may be crossed by pipeline lateral and road/transmission line corridors include Anderson Creek, Moore Creek, Bish Creek, Renegade Creek, Reliant Creek and Emsley Cove Creek.

The Emsley and Bish Cove locations have direct deep water access to the Douglas Channel shipping lanes and are also considered navigable waters. The terminal at either of these sites is expected to be receiving an average of one LNG tanker every four to five days, generating traffic in Douglas Channel of approximately 70 to 90 LNG tanker arrivals per year. Once the LNG vessel approaches the terminal and is in a position to leave the main channel, it is expected that three to four tugs will meet the vessel and provide escort to the cove and berthing assistance. Physical criteria are generally based on guidelines presented by the Society of International Gas Tanker and Terminal

Operators, the Oil Companies International Marine Forum, and International Navigation Association. Specific requirements for the safe operation of LNG tankers will be identified by Transport Canada, which administers the Canadian Marine Safety Program, through a TERMPOL Review Process (i.e. Technical Review Process of Marine Terminal Systems and Trans shipment Sites).

The TERMPOL code is a set of recommended standards and assessment procedures for marine transportation systems. The primary focus of TERMPOL is safety and pollution prevention. The purpose of the TERMPOL Review Process (TRP) is to identify and evaluate marine vessel movements and operations that could affect the environment near other marine vessels and marine terminal facilities. The TERMPOL review is a voluntary process that focuses on marine activities and is not intended to assess the terminal's land based shore installations, hinterland cargo handling or storage facilities. Nevertheless, the TERMPOL review addresses several specific "terrestrial" aspects such as the terminal wharf structure, mooring specifications and instrumentation, and those aspects of the terminal's operation and associated contingency planning that are applicable to the design of ships using the terminal. While there is some overlap between the EA process and the environmental requirements of the TERMPOL review process (TRP), the TRP is an independent study, involving a more detailed review of shipping and navigation issues related to the Project. For this Project, the marine loading and unloading berths will overlap in both processes. Shipping activities will be included in the TERMPOL review and are not within the scope of project for the EA.

Generally, mitigation measures resulting from the TERMPOL review will not be included as part of the NWPA Approval. However, there may be some exceptions made for mitigation measures that pertain strictly to navigation safety. This will be determined on a case-by-case basis.

3.4.2 Project Effects and Proposed Mitigation

In the Application and supplemental materials, the Proponent assessed the potential for effects of the Project on navigable waters and proposed measures to mitigate these potential effects.

Potential Effects and Evaluation
Construction and operation of the Project is expected to result in an increase in vessel traffic within Douglas Channel/Kitimat Arm, with a corresponding increase in the potential for collision with other vessels and marine mammals in addition to the possibility of cargo release (possible pollution) from the grounding of a ship travelling to the Kitimat LNG terminal.

There is also the potential for shoreline physical disturbances as a result of the wake of ships travelling to and from the KLNG terminal.

Within the coves, the movement of the marine vessels and tugs can, through physical disturbances from propeller wash and unexpected groundings, affect marine habitat. This effect is addressed in **Section 2.5** of this report (Marine Environment and Marine Mammals)

Increased vessel traffic has the potential to affect the use of the area by for commercial and sport/recreational fishing activities. This effect is addressed in **Section 3.3** of this report (Land and Resource Use).

As noted, the primary focus of TERMPOL is safety and pollution prevention and the TRP for the Kitimat LNG facility and vessel traffic will further identify and evaluate safe movement and operation of vessels and associated potential negative effect on the environment.

Construction of the pipeline, powerline and the potential construction/upgrade of bridges that cross navigable waters (as determined by Transport Canada) may result in impacts to navigation by small recreational water craft.

These potential effects were applicable to both Emsley Cove and Bish Cove locations for the LNG terminal.

Description of Proposed Mitigation
The Proponent committed in the Application to undertake mitigative measures to address navigable waters effects, including:

- Undertaking a TERMPOL review to eliminate or minimize potential adverse effects on environmental components of value to First Nations and the public that may arise from physical disturbances or releases resulting from tanker movements;
- Developing a Marine Terminal Manual to address specific requirements and operations of the LNG facilities;
- Developing operational procedures for tug traffic;
- Requiring larger LNG tankers to move further out of the cove for turning;
- Establishing marine safety zones for terminal and vessel access;
- Provision of notice of marine work and schedules to CCG for “Notice to Mariners”;
- Scheduling vessel arrival/departure times outside of known times of Haisla traditional use;
- Working with Transport Canada on establishing a designated route for shipping between shipping lanes and the terminal; and
- Adherence to following legislation and regulations pertaining to shipping, providing the necessary notification to the CCG's MCTS (Marine Communications and Traffic Services) in Prince Rupert, and consulting with local fishers, recreational users, the Port of Kitimat, harbour pilots and relevant regulatory agencies.

Transport Canada has advised the Proponent that the TRP for Kitimat LNG will need to consider the following:

- Potential effects of increased shipping activity on regional shipping patterns and fishing activity;
- Environmental concerns associated with the pollutant cargoes carried by the LNG ships;
- Risks to communities along the shipping route from vessels carrying LNG;
- Navigational safety along the shipping route(s) to the new LNG terminal;
- Services required to ensure safe navigation, such as fixed and floating aids, vessel traffic services, offshore electronic positioning systems, and pilotage and radio communication requirements;
- Design vessel suitability including operational safety aspects, manoeuvring characteristics, navigation and communications equipment, and cargo handling systems;
- Adequacy of terminal and related services;
- Pollution prevention programs; and
- Marine emergency contingency and response plans.

Transport Canada has also advised the Proponent that its TERMPOL submission must demonstrate that:

- The safety management system proposed by the Proponent meets recognized safety management procedures;
- Plans are developed and in place to conduct regular audits of the safety management system; and
- Potential major accident hazards have been identified, risks evaluated and measures proposed to reduce any risks to an acceptable level using the best available technology and practises.

The Proponent has been made aware that navigable watercourses affected by terrestrial components of the Project will require a navigational impact assessment by Transport Canada prior to approval pursuant to the *Navigable Waters Protection Act*.

3.4.3 Issues Raised and Proponent Response

The following are key issues concerning potential effects of the Project on navigation raised by the public, some government agencies and the Haisla during the EA:

1. **Initiation of a TERMPOL review process for the Project and clarification of the relationship between the EA process and TERMPOL.**

   Proponent Response: The Proponent has followed up its commitment to undertake a TERMPOL review process (TRP) by sending a letter to Transport Canada on July 27, 2005 requesting that a TERMPOL process be initiated for the Project. Transport Canada confirmed in an August 15, 2005 letter to the Proponent that it would initiate the process and establish a TERMPOL Review Committee (TRC). The Proponent has made a number of additional commitments as a result of issues raised respecting the relationship between the TERMPOL process and the EA process, which are found below as well as in a number of sections of this Report.

2. **Effects of tug berth size on navigable waters, specifically the potential size (and number of tugs) and the environmental effects of the jetty on Emsley Cove and Bish Cove.**

   Proponent Response: The tug berth is required during operation for emergency response and tanker berthing assistance. The TERMPOL process includes a review and simulation of navigation and berthing procedures, which can confirm final tug requirements for the tug berth. The Proponent made new commitments to work with the TERMPOL committee to confirm the number of tugs required, as well as to continue to work with TC and DFO in the approval/authorization processes to minimize the potential effects of the tug berth on the marine environment. The Haisla will be provided an opportunity to review and comment prior to finalization.

3. **Potential effects of tanker and tug operations in Bish and Emsley Coves, particularly the effects of potential physical disturbance from propeller wash given the cove's geometry and the size of the tankers for all phases of the Project.**

   Proponent Response: The Proponent has prepared propeller wash studies for operations in both Emsley Cove and Bish Cove. The Proponent used these studies to submit tug and tanker "No-Go" Zone maps for both Coves (see **Figures 5 and 6**). The Proponent has committed to develop a marine terminal manual that will include a speed/thrust management plan for tugs and tankers, identification of operating areas for tugs and tankers, identification and physical marking of areas for restricted operation using the vessel manoeuvrability mapping, and any additional recommendations from the TERMPOL committee. The Proponent made a new commitment to work with the TERMPOL review committee to ensure that preliminary commitments related to tug and tanker operation will be reviewed for operational feasibility by tug and tanker operators and local pilots before they are carried forward into the TERMPOL process.

4. **Need for additional information on potential erosion effects from tug and LNG vessel traffic in Douglas Channel, including the effect of wake on shoreline erosion on archaeological sites.**

Proponent Response: The management requirements and operational limitations for LNG vessel movement in Douglas Channel will be addressed through a TERMPOL process led by Transport Canada. The Proponent has committed to assessing potential shoreline erosion due to LNG shipping activity at significant sites along Douglas Channel as part of the TERMPOL process. Significant sites will be determined through a review of shoreline areas identified by First Nations as having cultural significance, as well as through a review of available archaeological information, and appropriate measures taken, as recommended by the TERMPOL committee.

5. Effect of vessel traffic along the shipping route in Douglas Channel on other First Nations.

Proponent Response: Other First Nations besides the Haisla may be affected by vessel traffic further south in Douglas Channel. The Proponent's commitment (above) respecting assessment of shoreline erosion at significant sites along Douglas Channel during the TERMPOL review will be applied to this issue.

6. Size of tugs necessary to manoeuvre a 250,000 m^3 Capacity LNG vessel.

Proponent Response: The tugs required for the Project terminal will be approximately 38 m (125 ft) long and 10.7 m (35 ft) wide with a maximum draft of about 5.5m (18 ft). The minimum required water depth is approximately 7m (23 ft). These tugs will have 75 to 80 tonne bollard pull range. The tug size is estimated based on experience from other facilities and simulations. Tug design is a key element of the TERMPOL review and will be addressed further during that process. The Proponent made a new commitment to ensure that appropriate size tugs are available when the marine facility is commissioned.

7. Drift tests for piloting of LNG vessels.

Proponent Response: The Proponent acknowledged Transport Canada's suggestion that drift tests be carried out in the berth area to better determine tidal currents and record them for use by pilots bringing in the LNG vessels. The Proponent made a new commitment to conduct drift tests in Douglas Channel and the cove approved for the marine terminal prior to facility commissioning, and will provide data to the pilotage authority. Real time wind and current data at berth face will be provided for use by the Pilots during ship berthing

A complete list of issues concerning potential navigable waters effects of the Project identified by the public, government agencies and the Haisla during the Application review stage of the Project's EA, and the Proponent's response to these issues, is contained in each of **Appendices C and D** of this Report.

3.4.4 Conclusion of Effects and Mitigation

During the harmonized environmental assessment, EAO and the RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments on the potential effects of the Project; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** (particularly section 11), the EAO and the federal RAs are satisfied that the Project will not likely result in significant adverse effects from a navigable waters perspective, taking into account the location of the LNG terminal at either Emsley Cove or Bish Cove.

4. FIRST NATIONS INTERESTS

4.1 SCOPE OF SECTION

This section of the Report discusses non-technical issues associated with potential effects of the Project as identified by Haisla representatives on the Project Working Group. Technical issues are dealt with in the relevant environmental and socio-economic effects sections of this Report and also described in more detail in **Appendix D** of this Report.

4.2 BACKGROUND

4.2.1 First Nations Setting

The Project is situated within the area indicated by the Haisla to be their traditional territory. The Haisla's main community and Indian Reserve (IR) is Kitamaat Village, on the east side of Douglas Channel, approximately 10 km south of the District of Kitimat. Kitamaat Village is approximately 11.6 km by water from the proposed Project site at Emsley Cove and approximately 8.6 km by water from the proposed Project site at Bish Cove, both of which are on the east side of Douglas Channel.

There are unoccupied Haisla IRs at Emsley Cove (Kitasa IR No. 7) and Bish Cove (Bees IR No. 6). Kitasa IR No. 7 is approximately 4 ha in size and is located on the western shore of Emsley Cove, to the west of the mouth of Emsley Creek. Bees IR No. 6 is approximately 73 ha in size, and occupies most of the northern and eastern portions of Bish Cove. The Haisla have designated Bees IR No. 6 for commercial industrial use. This was done pursuant to the *Indian Act*, and Privy Council Order 1997-1052 accepts the designation by the Haisla and gives effect to terms and conditions that apply to the use of the reserve as set out in the designation.

The Project is situated outside of the asserted traditional territory of the Tsimshian First Nation, but the Tsimshian community of Gitga'at is located in Douglas Channel at Hartley Bay approximately 30 km south of the proposed Project. There are also three Tsimshian communities, Kitsumkalum, Kitsalas and Kulspai, near Terrace. Vessels going to and from the Project will travel past the community of Gitga'at.

According to Haisla sources, the Haisla population is approximately 1400, with approximately 700 people residing in Kitamaat Village. Statistics Canada data indicates that the population of Kitamaat Village is 511. The standard of living in Kitamaat Village is generally much lower than in non-aboriginal communities in the area. The unemployment rate in Kitamaat Village is approximately 18%, compared to approximately 12 % in the District of Kitimat. There is limited data on incomes for Kitamaat Village, but available information indicates that median individual and household incomes in that community are substantially lower than in the District of Kitimat, and that a higher proportion of income in Kitamaat Village comes from government assistance.

According to Statistics Canada, the combined population of the four Tsimshian communities is approximately 560. Available information indicates that individual and household incomes in these communities are similar to Kitamaat Village. Unemployment rates in the three Tsimshian communities near Terrace tend to be much higher than in either Terrace or Kitamaat Village, at approximately 35%.

4.2.2 Information Sources

The Proponent commissioned a report to document Haisla traditional use activities of Emsley Cove and the adjacent coastal area (Traditional Use Study or TUS). The EAO and the federal Responsible Authorities (RAs) required the Proponent to supplement this report with additional, more detailed, information on Haisla current use for traditional purposes and historical use of land and resources for Emsley Cove, Bish Cove and the area included in the proposed ROW access corridors to the proposed Project sites in both locations (TUS Supplement). The Haisla have also provided the EAO and the RAs with additional information on their historical and current uses of land and resources for these areas through correspondence during the EA process (**see Appendix A**).

4.2.3 Discussions Between Haisla and Provincial and Federal Government Representatives

At the written request of the Haisla, the EAO, provincial agencies and the RAs held discussions directly with the Haisla regarding the Haisla's views about potential effects of the Project on their interests and asserted infringements of aboriginal rights, and to coordinate consultation with the Haisla on post-EA federal and provincial permit applications. Four such meetings were held during the EA process.

The EAO also arranged for a dedicated team of staff from relevant provincial agencies to work with the EAO and the Haisla to continue a post-EA, detailed discussion of potential impacts associated with post-EA tenuring and permitting of the proposed Project. This post-EA tenuring team will be led provincially by the Ministry of Economic Development and will continue to work with the Haisla on issues as they arise, should an EA certificate be issued.

On December 15, 2005 the Haisla wrote the EAO to advise that they had signed an agreement in principle with the Proponent to locate the Project at Bish Cove, and Haisla stated their support for the Proponent's request that Bish Cove be given a more thorough evaluation in the EA process. The letter further stated that, subject to the successful completion of due diligence, the Haisla would support an EA review recommendation that the Project be located in Bish Cove on Bees IR No. 6.

4.2.4 Impacts and Benefits Agreement between Haisla and Proponent

The Proponent commenced discussions with the Haisla in April 2004 to discuss potential Project impacts and potential Haisla benefits from the Project. The Proponent met with Haisla representatives approximately 22 times between April 2004 and November 2005 to attempt to address Haisla concerns regarding the Project and to discuss a possible impacts and benefits agreement.

Following the December 2005 agreement in principle between the Proponent and the Haisla to locate the Project at Bish Cove, the Proponent and Haisla commenced negotiating an impacts and benefits agreement for a Project located on Bees IR No. 6 that would address Haisla employment, training, procurement, taxation, long term leasing, decommissioning and environmental stewardship, to address any potential impacts on Haisla interests. On April 13, 2006 the Proponent advised the EAO and the RAs that an impacts and benefits agreement had been reached for Bish Cove.

4.3 BCEAA REQUIREMENTS AND PROVINCIAL PROCESS

4.3.1 Discussion of Haisla Aboriginal Rights Issues

The non-technical issues raised in meetings with the Haisla are identified in **Appendix E** of this Report. They relate primarily to issues concerning potential effects of the Project on asserted Haisla aboriginal rights.

Aboriginal rights are those practises, customs or traditions which were integral to the distinctive culture of the aboriginal group claiming the rights, prior to contact with Europeans. *Aboriginal title* is a form of aboriginal right. According to *Delgamuukw*,[6] in order to support a claim for aboriginal title a First Nation must show exclusive use and occupation prior to the assertion of British sovereignty in 1846. Aboriginal title is a *sui generis*, inalienable right in land and, as such, is more that the right to engage in specific activities which may themselves be aboriginal rights. Rather, it confers the right to use the land for a variety of activities. Aboriginal title encompasses the right to exclusive use and occupation of land, the right to choose to what uses that land can be put, and that lands held pursuant to aboriginal title have an inescapable economic component.

Although BCEAA does not require the Province to specifically address the effects of a project on aboriginal rights, the EAO includes such assessment in its processes in order to meet the Province's responsibilities pursuant to the Common Law.

The Haisla raised concern about potential infringement of Haisla Nation aboriginal title at either Bish Cove or Emsley Cove if the Project were to be located at either site in the absence of a Benefits Agreement with the Proponent. This has been addressed in a separate assessment provided to the Haisla by the EAO. The EAO and the federal RAs were advised on April 13, 2006 that the Proponent and the Haisla have concluded an impacts and benefits agreement, based upon the location of the Project at Bees IR No. 6.

4.3.2 Haisla Traditional and Current Use of Emsley Cove and ROW Corridor

The information provided in the Traditional Use Study (TUS) and TUS Supplement indicates that the Haisla used and continue to use the proposed Emsley Cove Project area for subsistence (e.g. harvesting of wild foods and medicines)and cultural activities. Community members relate stories of historic and current family use of the area for various subsistence and cultural activities.

The Haisla claim aboriginal title to their entire traditional territory. The Emsley Cove Project is within the *Kitasa wa'wais* (*Kitasa*), an area encompassing 9 km of shoreline from Emsley Point south past Markland Point to a location about 1 km north of Jesse Falls, and inland 13 km up Emsley Creek to an area known as the *Tlanu'yewa* highlands. Historically the Haisla peoples used Emsley Cove and the surrounding area for seasonal subsistence activities and that at one time a "family" unit wintered at this location. In 1907, a 10 acre reserve was set aside at Kitasa, a "fishing and hunting station on the west shore of Kitimat Arm." The Reserve Commissioner's 1907 map establishes that the Kitasa Reserve was intended to be located on the northern side of Emsley Cove – in the area where the Proponent originally proposed to locate its facility.

The TUS Supplement indicates that the Haisla settlement consisted of one or more traditional big houses located on the eastern side of Emsley Cove. According to the TUS, the wa'wais was used as

[6] *Delgamuukw v. British Columbia*, (1997) 153 D.L.R. (4th) at par. 143

the Cross family homesite, fishing, hunting and gathering territory. The TUS indicates that at some point the family abandoned the site, after which the Cross family and other Haisla continued to use the *Kitasa* as a part of their subsistence resource territory.

The TUS indicates that while the *Kitasa* belongs to the holder of the Eagle clan name *Gepsginais*, other Haisla were given express or implied permission to visit the area and harvest resources.

The TUS provides evidence that *Kitasa* was one of many resource harvesting sites in Haisla traditional territory. Among the resources traditionally harvested by Haisla at *Kitasa* were the following:

- Marine resources, including coho salmon, pink (humpy) salmon, chum (dog) salmon, spring salmon, steelhead, halibut, red cod (possibly snapper), grey cod, herring;
- Beach life and shellfish, including crabs, mussels, cockles, sea cucumbers, big and small sea urchins, chitons, octopus, prawns;
- Animal life, including moose, deer, black bear, marten, mink, fox, weasel;
- Bird life, including mallards, goldeneyes, Canada geese; and
- Plant life, including large cedar, cedar bark, salmonberries, red huckleberries, blueberries, currants, rose hips, buttercup roots, devil's club, hellebore, alder bark.

The ROW corridor to Emsley Cove would cross three Haisla *wa'wais* areas: *Kitasa, Bismut'is/Wau'exdu and Yaksda* (Moore Creek area). According to the TUS Supplement, the Yaksda wa'wais has already been impacted by activities related to the Alcan aluminium smelter. Haisla carry out limited traditional activities within the ROW corridor to Emsley Cove.

According to the TUS Supplement, the Haisla traditionally harvested cedar for canoes and bark along the ROW corridor to Emsley Cove (as evidenced by the relatively high number of culturally modified trees (CMTs) recorded in the area in various Archaeological Impact Assessments or AIAs) and, except for goats, did not traditionally hunt in this area. After European contact, when Haisla were able to acquire steel traps (c. 1840), they trapped in this area along the creeks and up to higher beaver ponds.

Although the Haisla do not currently reside at Emsley Cove, it is currently used by Haisla on a seasonal basis to trap, hunt, fish, dig clams, put out crab traps, pick berries, dig roots, pull cedar bark, collect medicines, swim and explore, camp overnight or have a barbecue, sit alone and talk to the Creator, do cold water spirit-cleansing bathing, or perform more personal rituals. The Haisla use both the foreshore area and the beach and (to a lesser extent) the inland areas. Factors such as plant foods in season, the timing of fish runs, animal habits, the tide chart, weather, boat-gas prices, and community preference all have an impact on how many Haisla will visit *Kitasa* in any season.

According to the TUS Supplement, the Haisla fish for coho, spring, pink and chum salmon and steelhead in Emsley Cove. Emsley Creek has a healthy coho run that is of importance to the Haisla, because of its proximity to Kitamaat Village and because many other coho runs in their territory have been eliminated by industrial activity. The TUS Supplement notes that shellfish are no longer harvested by the Haisla for sustenance purposes at Emsley Cove because of pollution caused by industrial development in the upper Douglas Channel.

According to the TUS Supplement, Haisla hunters use the ROW corridor to Emsley Cove marginally more at present than traditionally, because they have access along the existing Bish Forest Service Road.

4.3.3 Haisla Traditional and Current Use of Bish Cove and ROW Corridor

The information provided indicates that the Haisla used and continue to use the Bish Cove area for subsistence and cultural activities. Bish Cove appears to have traditionally been a primary site for subsistence harvesting for the Haisla, and community members relate stories of consistent historic and current family use of the area for various subsistence and cultural activities.

The Haisla claim aboriginal title to their entire traditional territory. The Bish Cove Project falls within the *Bismut'is/Wau'exdu wa'wais* (*Bismut'is*), which is located north of *Kitasa* and approximately 20 kilometres long and 9 kilometres wide from the foothills of Mt. Carthew to saltwater. The area includes Bish Creek and the Haisla Bees IR No. 6 at Bish Cove. Historically the Haisla peoples used the area surrounding Bish Cove for seasonal subsistence activities, and at one time Bish Cove was the site of a main Haisla Village. The remains of monumental traditional Haisla house posts were once visible on the southwest side of Bees IR No. 6, above the high tide line. Haisla traditional use of the *Bismut'is* is further evidenced by the presence of pre-historic Haisla paintings found on a rock in the Bish Creek area.

According to the TUS Supplement, *Bismut'is* was traditionally an important hunting ground for the Haisla because of the abundance of game and because of its proximity to the main Kitamaat villages. Bish Creek traditionally had an important salmon run that was a chief source of food for the Haisla.

According to the TUS and TUS Supplement, resources traditionally harvested in the *Bismut'is* by the Haisla included:

- Marine life, including seals, coho salmon, chum (dog) salmon, pink (humpy) salmon, steelhead;
- Beach life and shellfish, including crabs, mussels, cockles, clams, sea eggs, chitons, anemones and octopus;
- Animal life, including moose, black bear, deer, goats, marten, mink, otter, weasel, rabbit, squirrel, wolf, fox, beaver, fisher;
- Bird life, including ducks, geese, grouse gulls and cormorants; and
- Plant life, including cedar logs, cedar bark, spruce, hemlock, buttercup, fern, riceroot, blueberries, salmonberries, currants, huckleberries, cranberries, crabapples, rosehips, hellebore, devil's club, cattails, nettles and ryegrass.

Although the Haisla do not currently reside at Bish Cove, it is currently used on a seasonal basis to fish, trap, hunt, gather and recreate. Bish Cove is currently one of the Haisla's most valued hunting and fishing grounds, in part because of its proximity to Kitamaat Village. According to the TUS Supplement, the fishery at Bish Cove is currently preferred over Emsley Cove in terms of accessibility, amount of fish and length of the annual run time (having three different types of salmon and a few steelhead). Shellfish and beach life are no longer harvested by the Haisla for sustenance purposes at Bish Cove because of pollution caused by industrial development in upper Douglas Channel.

The ROW corridor to Bish Cove would cross two Haisla *wa'wais* areas: *Bismut'is and Yaksda*. The TUS Supplement provides no information about Haisla traditional or current hunting or gathering activities in the ROW corridor to Bish Cove, except to note that in traditional times they hunted mainly along the beaches or watersheds, and would go part way up the mountains only to hunt goats or, after the arrival of steel traps (c. 1840s) to shoot game that appeared while setting traps, or to hunt if there was an emergency food shortage.

As indicated above, the Haisla have designated Bees IR No. 6 for commercial industrial use. This was done pursuant to the *Indian Act*, and Privy Council Order 1997-1052 accepts the designation by the Haisla and gives effect to terms and conditions that apply to the use of the reserve as set out in the designation.

4.4 FEDERAL PROCESS AND CEAA REQUIREMENTS

This Section 4.4 addresses federal CEAA requirements and Canada does not adopt the contents of section 4.3 which applies to provincial requirements. Furthermore, nothing in this Report is to be taken as any admission by Canada, for the purposes of this Report or for any other purpose, in respect of any statements pertaining to aboriginal rights, including aboriginal title. Canada takes the view that references to aboriginal rights and title are included in this Report to meet provincial requirements and their inclusion does not mean that Canada accepts or agrees with these statements.

As required under CEAA, this section of the Report addresses potential changes to the environment caused by the Project, and the effect of those changes on the current use of lands and resources for traditional purposes by aboriginal persons. For the purposes of this report it is important to keep in mind the scope of the Project as set out in Part A of this report.

On the basis of information submitted to the BC Treaty Commission and the Haisla TUS documents there is no indication of another First Nation asserting traditional territory in the Project area as defined by the established scope of the Project.. As such, the review of the current use of land and resources for traditional purposes focuses on the Haisla.

4.4.1 Current Use of Lands and Resources for Traditional Purposes by the Haisla

Emsley Cove and ROW Corridor

The information provided in the Traditional Use Study (TUS) and TUS Supplement indicates that the Haisla used and continue to use the proposed Emsley Cove Project area for subsistence harvesting of wild foods and medicines and cultural activities. Community members relate stories of historic and current family use of the area for various subsistence harvesting and cultural activities.

According to the TUS, the Haisla carry out limited traditional activities within the ROW corridor to Emsley Cove.

Although the Haisla do not currently reside at Emsley Cove, the TUS indicates it is currently used by them on a seasonal basis to trap, hunt, fish, dig clams, put out crab traps, pick berries, dig roots, pull cedar bark, collect medicines, swim and explore, camp overnight or have a barbecue, sit alone and talk to the Creator, do cold water spirit-cleansing bathing, or perform more personal rituals. The TUS also indicates the Haisla use both the foreshore area and the beach and (to a lesser extent) the inland areas. Factors such as plant foods in season, the timing of fish runs, animal habits, the seasonal tide levels, weather, boat-gas prices, and community preference all have an impact on how many Haisla will visit Emsley Cove in any season.

According to the TUS Supplement, the Haisla fish for coho, spring, pink and chum salmon and steelhead in Emsley Cove. Emsley Creek has a healthy coho run that is of importance to the Haisla, because of its proximity to Kitamaat Village and because many other coho runs in their territory have been eliminated.. The TUS Supplement notes that shellfish are no longer harvested by the Haisla for sustenance purposes at Emsley Cove.

According to the TUS Supplement, Haisla hunters use the ROW corridor to Emsley Cove marginally more at present than in the past, because they have improved access along the existing Bish Forest Service Road.

Bish Cove and ROW Corridor

The TUS indicates that the Haisla used and continue to use the Bish Cove area for subsistence harvesting and cultural activities. Bish Cove appears to have historically been a primary site for subsistence harvesting for the Haisla, and community members relate stories of consistent historic and current family use of the area for various subsistence harvesting and cultural activities.

Although the Haisla do not currently reside at Bish Cove, the TUS indicates it is currently used on a seasonal basis to fish, trap, hunt, gather and recreate. The Haisla advise that Bish Cove is currently one of their most valued hunting and fishing grounds, in part because of its proximity to Kitamaat Village. According to the TUS Supplement, the fishery at Bish Cove is currently preferred over Emsley Cove in terms of accessibility, amount of fish and length of the annual run time (having three different types of salmon and a few steelhead). Shellfish and beach life are no longer harvested by the Haisla for sustenance purposes at Bish Cove.

The TUS Supplement provides no information about Haisla current hunting or gathering activities in the ROW corridor to Bish Cove.

As indicated above, the Haisla have designated Bees IR No. 6 for commercial industrial use. This was done pursuant to the *Indian Act*, and Privy Council Order 1997-1052 accepts the designation by the Haisla and gives effect to terms and conditions that apply to the use of the reserve as set out in the designation.

4.4.2 Summary

All phases of Project would cause changes in the environment that would have an impact on all aspects of the current use of lands and resources by the Haisla for traditional purposes. Access to areas traditionally used by the Haisla and traditional use carried out by the Haisla in the vicinity of the Project site, including the marine area, would be disrupted by changes in the environment caused by the Project. The Project site and immediate area would not be available for traditional use activities.

From a CEAA perspective, the issues below outline the potential effects arising from changes in the environment caused by the Project on the Haisla's current use of lands and resources for traditional purposes, as well as proposed mitigation measures to reduce those potential effects. A very important element of this part of the Project review is the Haisla's advice that they supported the Project proceeding at Bish Cove having the terminal located on Bees IR 6.

4.5 ISSUES RAISED BY THE HAISLA AND RESPONSE BY PROPONENT/GOVERNMENT AGENCIES

The following concerns were raised by the Haisla with respect to the effect of the Project at Emsley Cove and Bish Cove terminal locations:

1. **Haisla concern about lost or reduced ability of Haisla to hunt and trap animals and birds, to fish, to gather plant materials for food, medicines and construction purposes in the ROW corridors and on the LNG terminal site, and to use the areas for bathing, recreation and spiritual purposes.**

   Response: The EAO and federal RAs required the Proponent to demonstrate that it had addressed this issue in its Application and supplementary materials, or that appropriate new commitments were made and these commitments are reflected in this Report.

A number of commitments made by the Proponent, designed to mitigate the potential effects of a Terminal and associated ROW corridor at either Emsley or Bish Cove sites, serve to address this Haisla concern. Many of these were made in response to the concerns raised by the Haisla as part of the Project Working Group. They include commitments related to:

- Designing the LNG terminal and ROWs to minimize their footprint and disturbance of fish, streams, wildlife, birds and vegetation communities;
- Minimizing vegetation clearing and grubbing activities for ROWs;
- Restricting construction activities in spring and fall to minimize impacts on wildlife and avifauna;
- Facilitating wildlife movement across construction areas and access road snow banks, and providing adequate hiding cover buffers;
- Minimizing effects on riparian areas and foreshore to the greatest extent possible;
- Minimizing runoff of sediment and chemicals into freshwater and marine environment;
- Maintaining fish passage through streams affected by new and upgraded roads and new pipelines and power lines;
- Spill and emergency response plans and procedures to minimize effects of spills on fish, wildlife and birds;
- Haisla review and input to proposed stream crossing designs, and riparian management plan within the terminal fenceline;
- Use of traditional knowledge identified in Haisla traditional use studies during Project design and construction and operation;
- Provision of cultural awareness training for all terminal personnel; and
- Consulting with the Haisla on decommissioning plans; and
- Negotiating an impacts and benefits agreement with the Haisla to address loss of access to the Project area.

The EAO arranged for a dedicated team of staff from relevant provincial agencies to continue discussion of potential impacts and to negotiate potential accommodation of impacts associated with post-EA tenuring and permitting of the proposed Project should this tenuring be found to produce impacts on aboriginal rights. This work is to be led provincially by staff of the Ministry of Economic Development.

The federal RAs agreed to work with the Ministry of Economic Development to coordinate their own post-EA authorizations and permits with the provincial team.

2. Haisla concern about Haisla loss of access to the marine environment in Emsley and Bish Cove for traditional use, for fishing and gathering of shellfish and marine plants, recreation and bathing due to marine terminal facilities and LNG vessel unloading.

Response: The EAO and federal RAs required the Proponent to demonstrate that it had addressed this issue in its Application and supplementary materials, or that appropriate new commitments were made and these commitments are reflected in this Report.

A number of commitments made by the Proponent, designed to mitigate the potential loss of access to the marine environment at either Emsley Cove or Bish Cove, serve to address this Haisla concern. Many of these were made in response to the concerns raised by the Haisla as part of the Project Working Group. They include commitments related to:

- Provision for access to all parts of the marine areas of the Cove, including the foreshore areas, except for the areas under provincial foreshore lease and a required exclusion zone around LNG tankers when unloading cargo;
- Minimizing the foreshore lease area and the unloading time for tankers;
- Identification of "no-go" zones for tugs and tankers to protect environmentally sensitive areas;
- Designing a Bish Cove marine terminal to avoid eelgrass beds, blasting and dredging requirements, and minimizing the effects of an Emsley Cove marine terminal on eelgrass beds;
- Scheduling of tanker arrivals and departures outside of known times of traditional use of marine resources, where possible;
- Developing a notification protocol with the Haisla about LNG vessel arrivals and departures and posting this information on the Proponent's website; and
- Continuing to address public recreational access issues in Douglas Channel with the Haisla and other interested parties; and
- Negotiating an impacts and benefits agreement with the Haisla to address loss of access to the Project area.

As discussed above, the EAO arranged for a dedicated team of staff from relevant provincial agencies to continue discussion of potential impacts and to negotiate potential accommodation of impacts associated with post-EA tenuring and permitting of the proposed Project should this tenuring be found to produce impacts on aboriginal rights.

Also as discussed above, the federal RAs agreed to work with the Ministry of Economic Development to coordinate their own post-EA authorizations and permits with the provincial team.

3. Haisla concern about potentially adverse effects of the Project on marine habitat and fisheries resources, and on freshwater fish and fish habitat, vegetation, wildlife and wildlife habitat including avifauna and avifauna habitat.

Response: The EAO and federal RAs required the Proponent to demonstrate that it had addressed this issue in its Application and supplementary materials, or that appropriate new commitments were made.

A number of commitments made by the Proponent serve to address this Haisla concern. Many of these were made in response to the concerns raised by the Haisla as part of the Project Working Group. They are addressed in other sections of this Report, particularly Section 2.2 (Terrestrial Environment), Section 2.3 (Wildlife and Wildlife Habitat), Section 2.4 (Freshwater Environment and Fisheries), and Section 2.5 (Marine Environment and Marine Mammals).

4.6 CONCLUSION OF EFFECTS AND MITIGATION

As this Report addresses both provincial and federal environmental assessment requirements, it contains matters relating to the Haisla's asserted aboriginal rights as required by the Province. Under CEAA, the RAs and the Minister will take into account environmental effects as defined in the Act including: any effect of any change to environment caused by the project on the current use of lands and resources for traditional purposes by aboriginal persons. Canada takes the view that Section 4.3 and other references to asserted aboriginal rights and titles are included in this Report to meet provincial requirements, and their inclusion does not mean that Canada accepts or agrees with these statements.

During the harmonized EA, the EAO and the federal RAs have considered: the Application; additional Project review material listed in **Appendix A**; Haisla comments on the potential effects of the Project; responses by the Proponent and by government agencies; and the discussions at Haisla-federal department-provincial agency meetings.

Based on advice from the Haisla of support for the Project, with the preferred site at Bish Cove locating the terminal facilities on Bees IR No. 6 contingent upon the Haisla and the Proponent concluding an impacts and benefits agreement that addresses the Haisla's concerns for Bish Cove or an acceptable impacts and benefits agreement that addresses the Haisla's concerns for Emsley Cove, and based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** - Table of Commitments, and subject to the commitments made by government agencies as noted above, the federal RAs are satisfied that the Project is not likely to cause significant adverse effects on the current use of lands and resources for traditional purposes by the Haisla.

Based on the factors identified above, and a separate provincial assessment of the Haisla's asserted aboriginal rights, and based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F** - Table of Commitments, and subject to the commitments made by government agencies as noted above, the EAO is satisfied that the Project is not likely to cause significant adverse effects on First Nations interests.

5. SPECIFIC CEAA REQUIREMENTS

5.1 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

5.1.1 Background

In addition to evaluating the environmental effects of the Project, changes to the Project that may arise as a result of the environment are also to be considered. This analysis will include consideration of natural hazards such as extreme weather events (lightning, extreme precipitation, flooding, wind and waves), natural seismic events, changes in sea level, and climate change. Proposed mitigation, including design strategies, is considered in the evaluation of the effects of the environment on the Project and the determination of their significance.

The Project Application and supplemental information outline the potential effects of the environment on the Project, and outline proposed mitigation measures to minimize those effects. The following environmental conditions or events are discussed for their potential to affect the Project:

- Forest fires generated by natural causes, such as lightning strikes and ignition from extreme drought conditions;
- Climate change and sea level rise;
- Avalanches, including snow avalanches generated by snowfall, rain, solar heating, cold temperatures and wind;
- Extreme weather;
- Slope instability, including rock slides and rock falls generated by freeze-thaw activities, heavy rain or wind on steepened slopes;
- Earthquakes and seismic activity, including liquefaction of overburden; and
- Tsunamis.

These environmental activities could have an effect on the Project and all areas where Project-related activities occur. Specifically, this includes the pipeline laterals and access road ROWs, the LNG storage and regasification facilities, the ship berth, and the shipping lanes and berth approach.

5.1.2 Discussion

Forest Fires
While the terminal site and berth will be cleared of vegetation, there is a risk to the site from forest fires generated by natural causes, such as lightning strikes and ignition from extreme drought conditions. An immediate concern for forest fires is the obvious risk to wildlife and the environment from the consequences of uncontrolled forest fires (natural or human-triggered). The probability of such occurrences is quite low due to the wet climate of the region. In the unlikely event of a fire in the vicinity of the facility or on the facility, a Fire Contingency Plan will be activated as described in the Environmental Protection Plan (EPP).

Climate Change and Sea Level Rise
Increasing concentrations of greenhouse gases in the atmosphere are believed to be causing global warming. Increased temperatures may contribute to an increase in ocean volume (i.e. sea level rise). Although estimates vary, global sea level rise is expected to be +0.5 m by 2100. Other atmospheric changes relating to climate change may include increased storm intensity and other changes relevant to coastal stability such as surface winds, ocean waves storm surges and ice conditions.

Rising sea levels have prevailed on the BC coast, with the exception of the western coast of Vancouver Island, for the past 95 years. However, these rising levels have been offset by the effects of tectonic uplifting and the relatively mountainous characteristic of the BC coast. The design of the structures incorporates an adequate factor of safety to deal with anticipated changes in weather severity during the lifetime of the Project, including storms and sea level rise associated with climate change. It is unlikely that climate change due to global warming will have a significant effect on the Project.

Avalanches
Weather factors such as snowfall, rain, solar heating, cold temperatures and wind can create inconsistencies and weaknesses in the snow pack, making it prone to snow avalanches.

The annual snowfall in the Project area consists of intermittent wet, heavy snowfall, followed by periods of rapid melting. The areas where there are steep cliffs would be unlikely to hold sufficient snow to cause an avalanche. In most of the Project area, the slope angle is insufficient to create an avalanche hazard. There is a minimal risk of having a persistent snow pack in steep areas that has the potential for avalanches, and therefore the risk of avalanches in the Project area is minimal.

Extreme Weather
Extreme weather events have the potential to damage the facility and related vessels, resulting in the unintended release of LNG. Predominant winds in Kitimat Arm are northeast-southwest, with the strongest winds coming from the northeast (maximum of 65 km/hr). However, both Emsley Cove and Bish Cove are protected by the strong northeast winds, with only a small window through which significant wind and wave action is possible. The maximum wind speed recorded over a 15-year period through this window is 53 km/hr.

Extreme wind can produce high waves, dense blowing sea foam, heavy tumbling of the sea and poor visibility. High winds and heavy seas at reduced temperatures can cause freezing spray conditions. Freezing spray can occur between November and April; however the potential for moderate or greater vessel icing from freezing spray is greatest in February. Safe work aboard a vessel can be impeded by freezing spray. The rate of ice build-up is strongly influenced by the vessel design, speed and direction of travel. Ice build-up may also occur during very cold winters; however, the thickness of the ice would be minimal and would not affect vessel manoeuvrability.

There is the potential for dense fog or blowing snow at times in Kitimat Arm. Fog typically occurs in the morning hours and burns off by the afternoon. If visibility hinders berthing, an anchorage point is available within Kitimat Harbour, which tends to have less fog than the remainder of the channel.

There is a potential risk for failure of erosion and sediment control structures from periods of significant or heavy precipitation. Failure of such structures could result in a large quantity of sediment-laden runoff being released to adjacent watercourses within a watershed, which could lead to potential adverse environmental effects on fish and fish habitat. The appropriate systems and procedures will be implemented in the planning phase of the Project to prevent the failure of these control structures. Under normal conditions, if the procedures are followed, there should be minimal risk for failure of erosion and sediment control structures from periods of significant or heavy precipitation, barring unusually severe or sustained weather that cannot be anticipated or predicted.

All facilities will be fully weather-proofed and designed for a full range of climatic conditions including severe rain, wind and waves. Extreme rain can result in stoppages of outdoor work. Rain is an expected work condition and the schedule allows for it. The EPP will include provisions for site drainage; sedimentation and erosion control will be designed to ensure that structural loadings in the event of extreme rain do not put the facility structures at risk. The tanks will be designed taking into

account the wind loads (both typical and atypical) for the region. Equipment and structures will be designed to withstand the harshest recorded environment for the region. LNG ships are designed to be seaworthy in all types of weather. The LNG tankers will not dock and, if docked, will undock and depart should the weather exceed the design criteria. For example, LNG tankers do not dock in winds in excess of 25 knots. If extreme winds are predicted, the LNG tanker's officers would monitor the weather to avoid being caught in restricted weather during a storm.

The terminal will be designed to withstand all climatic elements with a substantial margin of safety. The increased frequency of adverse events is not directly relevant as every event must be accommodated without adverse impact to the safety of the plant systems. Since the CSA Z276-01 design standard (Liquefied Natural Gas - Production, Storage, and Handling) contains design requirements that take wind and weather factors into account, a significant release of LNG resulting from facility damage due to severe weather is not likely.

The terminal will conduct real-time monitoring of weather elements. The data will be archived and used on a real-time basis for guidance in ship berthing, safety planning, and interpretation of any compliance issues. No climatic data gaps have been identified relevant to the Project or characterized as important for the purposes of plant design or environmental assessment.

Slope Instability

In the areas of steep terrain within the Project area, it is likely that there is a greater risk of rock fall than avalanches. Rocks periodically come loose from freeze-thaw, heavy rain or wind. This creates a risk to people or equipment located below steep rocky cliffs.

At Emsley Cove, the berth will be linked to the LNG terminal by a road that traverses a steep slope adjacent the shoreline. The first 100-200 m of the area from the berth to the terminal may be subject to rock fall. These areas have steep, forested and barren cliffs which have loose rock that could dislodge under favorable conditions.

At Bish Cove, the marine berth has been located in the centre of the Cove to avoid potential rockfall events. The terminal site has been extended farther out into the Cove to avoid potential rockfall events occurring in the northwest area of the Cove.

Sections of the access road and pipeline lateral ROWs for the Emsley Cove site are in the vicinity of steep rocky slopes. Slope instability resulting from weather events such as severe rain and/or thawing and freezing and/or avalanche could result in a rock fall or slide. Such an event could block access along the road or damage the pipeline. However, since most of the pipeline will be buried, there will be limited risk to damage from slope failure. Furthermore, any above-ground facilities for the pipeline will be located in areas that are not prone to slope failure. The access road and ROWs for the Bish Cove site have been located on relatively flat terrain to avoid building on unstable terrain.

Seismic Activity

Although the Pacific Coast is the most earthquake-prone region of Canada, Kitimat Arm lies in a relatively quiet seismic zone in which large magnitude earthquakes are infrequent. In terms of peak horizontal ground acceleration (the parameter used to measure hazards to small or rigid structures), area is in Zone 2, where seismic hazard is low (according to the Geological Survey of Canada). Between 1968 and 1992, there have only been two earthquakes in close proximity to the Project site (near Terrace), and these have been between 3.0 and 4.9 on the Richter Scale. The LNG storage tanks will be designed for the seismic rating in the region, as required under CSA Z276-01 and US NFPA 59A.

The LNG tank and all related facilities will be designed to the applicable standards for earthquakes in this area. The design standards will ensure the integrity of the facilities based on the level of risk for

an earthquake in the area. An earthquake with a magnitude substantively greater than the design-base earthquake could result in damage to the facilities that are not technically or economically feasible to repair. It should be noted that seismicity is not considered a significant factor with respect to the operations of the Project in relation to the transfer of LNG to the storage facility. The results of the seismic hazard assessment indicate that the earthquake activity along the Queen Charlotte Fault is too distant to result in a substantive contribution to the Kitimat LNG site. The seismic hazard at the Project site is dominated by contributions from local seismicity. In this zone, earthquakes tend to be more diffuse (less concentrated in clusters) and infrequent, as they tend to occur in zones of weakness of large crustal extent rather than along plate boundaries or narrow well defined faults.

Liquefaction of surficial materials could potentially affect plant site stability and displacement of storage tanks. However, the site preparation for the tank footprints will include removal of all surficial soil deposits and construction of a level surface prepared in competent bedrock materials. Under these conditions, liquefaction or loss of tank foundation support during a SSE event will not occur. The marine facilities and piperack at Bish Cove have been placed in the centre of the Cove to avoid an area subject to liquefaction.

Studies of the threat to the BC coastline from tsunamis generated by distant events indicate that the west coasts of Vancouver Island and Graham Island (in the Queen Charlotte group of islands) and the central part of the mainland coast are most vulnerable. Tsunamis of significant height are not foreseen within the Strait of Georgia or Hecate Strait. The tsunamis threat is also minimized as the Kitimat LNG tank site will be located at an approximate elevation of 20 m (geodetic) at either Emsley Cove or Bish Cove.

5.1.3 Issues Raised and Proponent Response

The following are key issues concerning effects of the environment on the Project, as raised by the public, some government agencies and the Haisla during the EA:

1. Effects of seismic activity on LNG facilities.

Proponent Response: The Proponent has made a new commitment that confirms its Front End Engineering Design studies being done for the LNG plant site will include a seismic risk analysis in accordance with governing standards. Based on the seismic hazard assessment conducted by the Proponent and as required in Canada, the LNG storage tanks will be designed for the seismic rating in the region, as required under CSA Z276-01 and US NFPA 59A."

2. Effects of high winds on LNG vessel berthing.

Proponent Response: Maximum winds speed recorded in Kitimat Arm was from the north east at 53 km/hour. LNG carriers are highly manoeuvrable, with bow and stern thrusters, and are guided in berthing by tugs, by radio communications to pilots on weather conditions, and by information posted at the berth (as part of the emergency response system or ERS). If environmental conditions are considered unfavourable for berthing, the vessel would likely proceed to the nearest safe anchorage (Kitimat Harbour). Procedures for vessel berthing operations will be addressed as part of the TERMPOL review process. The Proponent made a new commitment to install wind anemometers at the Cove entrance, if determined by Transport Canada to be advantageous for berthing of LNG vessels.

5.1.4 Conclusion

The Approved Terms of Reference for the Project's environmental assessment certificate application required that the application address the potential address adverse effects of the environment on the Project. However, since this is a specific requirement under CEAA, the EAO defers any conclusion on this topic to the federal RAs.

During the harmonized environmental assessment, the EAO and the federal RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F**, the federal RAs are satisfied that the environment is not likely to cause significant adverse effects to the Project.

5.2 ENVIRONMENTAL EFFECTS OF ACCIDENTS AND MALFUNCTIONS

5.2.1 Background

The EA required under CEAA is to include consideration of the potential accidents, malfunctions and unplanned events that could occur in any phase of the Project, the likelihood and circumstances under which these events could occur, and the environmental effects that may result from such events.

The Project Application and supplemental information outline the environmental effects of accidents and malfunctions, and identify proposed mitigation measures to minimize those effects. The following potential accidents and malfunctions are discussed for their potential to affect the environment:

- Hazardous materials spills from the LNG facility and from marine vessels;
- LNG spills or releases from marine vessels, unloading, transfer and storage facilities;
- Marine vessels collisions, groundings, accidents and fires;
- Tug boat accidents;
- Accumulation of gas in confined areas;
- Leakages of gas from pipelines;
- Process upsets and interruptions;
- Failure of sediment and erosion control measures;
- Accidental fires, including forest fires; and
- Acts of sabotage;

These potential effects were evaluated generally and by ecosystem component and are applicable to both Emsley Cove and Bish Cove locations for the LNG terminal.

5.2.2 Discussion

LNG and Natural Gas Related Accidents, Malfunctions and Unplanned Events
There are potential risks to the public from LNG and natural gas related accidents and malfunctions that can arise from: ship grounding and collisions, acts of sabotage on a ship or the facility to LNG releases due to natural causes or system failures. The average frequency for deep-sea ships in Douglas Channel in 2004 was estimated around 0.78 moves per day. The proposed Cascadia Aggregate Terminal Project will increase this an additional 0.14 moves per day during the early stages

and up to 0.57 moves per day during peak operating volumes (by year 5). The Kitimat LNG project will add 0.25 movements per day.

The primary hazard is related to the flammability of LNG upon release. Two exclusion zones are required for LNG facility siting relative to adjacent structures and buildings: a vapour dispersion zone and the thermal radiation zone. The CSA Z276 standard provides the criteria for design releases that take into account the worst potential incidents. The boundaries of the exclusion zones set by the code put restrictions on occupancies and activities permitted within them. Other hazards such as lack of oxygen and low temperatures would occur in the immediate area of the LNG release and will be confined to the site. These hazards extend to distances much less than the exclusion zones required by the CSA.

As a liquid, LNG cannot explode or burn. If LNG is spilled, the resulting LNG vapor will warm, become lighter than air and disperse with the prevailing wind. Although LNG is colourless, should it be released into the air, the cold vapour would appear as a white cloud. The lighter-than-air property of LNG actually makes it less hazardous than some other fuels, such as propane or butane whose gases are heavier than air and tend to settle closer to the ground.

In gaseous form, LNG vapor can burn only if it is released into the air and mixes with the correct proportion of air (5 to 15 percent). Too little air, and there is not enough oxygen to sustain a flame. Too much air and the natural gas is diluted too much to ignite."

According to the Proponent, damage to the environment and socio-economic components would be limited to short-term hazards to flora, fauna and humans in the immediate vicinity of a release, primarily due to low temperature. The affected area would be expected to be contained within the facility boundaries.

The possibility of cargo release from the grounding of a ship traveling to or from the Kitimat LNG facility is predicted to be extremely remote. The water depth of Douglas Channel precludes the risk of grounding for an LNG ship. Facilities are designed to minimize the effects of a credible LNG release and protect the safety of the surrounding population and property. Danger to the surrounding population and property will be minimal and personal injury will be limited to the immediate vicinity of the LNG release, such as freezing burns or asphyxiation.

No impact from fires over water are predicted for the marine traffic channel from either an Emsley or Bish Cove location, as modeling results show the heat flux remains in close proximity to the shoreline.

For incidents involving unloading of LNG from ships, the predicted downwind travel of vapour had limited infringement over the water. Spills associated with failure of the unloading arm were found to have the greatest downwind travel distance. However, given the isolation of the Emsley and Bish Cove sites and width of Douglas Channel, this was considered to be a low risk to the public and to marine traffic. The steep onshore topography is predicted to prevent LNG or NGL vapour clouds from traveling inland.

Hazardous Material Spills

There is a possibility that hazardous material spills could occur during all phases of the Project. During the construction and commissioning phases, the potential for spills is limited to materials that will be used for the preparation, fabrication and installation of the site facilities and equipment. For example, hydrocarbons such as gasoline, diesel fuel, propane, lubricants, grease, motor oil and hydraulic fluids will be used by heavy equipment during the preparation of the site. During construction and installation, compressed gases such as oxygen and acetylene are used for welding. Other hazardous substances such as paints, glues, epoxies, concrete additives, glycol, methanol, cleaners and solvents will also be used.

The probability of hazardous materials spills is reduced and the effects of any spills are reduced with the implementation of hazardous materials management processes and procedures. For example, a Hazardous Spill Contingency Plan will be employed for all phases of the Project. This plan will include initial response, spill containment procedures, management of spills adjacent to or into water bodies, reclamation of the spill area, and reporting and documentation procedures.

Failure of Erosion and Sedimentation Prevention Measures
Erosion and sedimentation prevention measures apply to construction and operation of the LNG terminal and the pipeline laterals across water bodies, including: lakes, estuaries, coastal shorelines, marshes, rivers, creeks and streams.

The Proponent will develop a comprehensive Environmental Health and Safety (EHS) Management System for all phases of the Project, including an Environmental Protection Plan (EPP) specific to construction. Erosion and sediment control measures will be implemented during construction and will be maintained according to EPP procedures. An erosion control plan (ECP) will be prepared for each stream class (e.g. S1-S6) and crossing type (e.g. horizontal directional drilling, aerial crossing, trenching, culvert upgrade/replacement, etc.) and type of water body that will be crossed during construction of the pipeline laterals and LNG terminal.

Forest Fires
Causes of forest fires can vary between natural causes, such as lightning strikes and ignition from extreme drought conditions to human-caused fires due to discarded cigarettes, idling vehicles in tall grass, arson or mismanagement of recreational campfires. Alternatively, incidents on the site or its associated pipeline laterals could have the potential for igniting local forest fires. Examples of potential causes of a site-related fire include: potential LNG releases; pipeline leaks or ruptures, and other accidents or incidents involving spills of flammable materials near a spark or ignition source.

An immediate concern for forest fires is the obvious risk to humans, wildlife and the environment from the consequences of uncontrolled forest fires (natural or human-triggered). Other effects related to forest fires include local air quality issues related to smoke generated by the fire. In the unlikely event of a fire in the vicinity of the facility or on the facility, a Fire Contingency Plan will be activated as described in the Environmental Protection Plan.

Seismic Events
The LNG tanks and all related facilities will be designed to the applicable standards for earthquakes in this area. Specifically, the LNG tanks and their impounding and protection system will be designed in compliance with the National Building Code of Canada, and CSAZ276-01 codes (2001 Edition and 2005, not yet published). In accordance with recent Natural Resources Canada requirements, the LNG facility will also be designed for seismic events pursuant to the NFPA 59A (United States code, 2001 Edition). The intent of the above-described design standards is to ensure the integrity of the facilities based on the level of risk for an earthquake in the area.

Air and Sound Quality
Accidents and malfunctions may affect air and sound quality. Accidental LNG releases may result in a cloud of vaporized LNG, or thermal radiation associated with fires at the proposed LNG facility. Vapour clouds may release a flammable substance that may cause ignition at some distance from the source or expose environmental receptors to high concentrations of natural gas that may deplete oxygen. Resultant fires could cause emission of fine particles and unburned natural gas. Process upsets, such as minor power losses, may cause minor emissions of particulate matter and combustion gases from plant machinery. Pipeline lateral-related accidents and malfunctions may result in elevated concentrations of natural gas or gas liquids in an area of failure, and possible ignition which would generate hydrocarbon combustion by-products. If a secondary forest fire results there is

potential for gaseous and particulate matter wood combustion by-products (wood smoke). Sound quality changes due to accidents and malfunctions would be of short term duration and localized in impact.

Given the design considerations incorporated into the planned facility and the strict requirements for operation, the likelihood of a spill or release of LNG and/or natural gas liquids of any substantial size is extremely low. Sound quality changes due to accidents and malfunctions would be of short term duration and localized in impact.

Freshwater Environment and Fish Habitat

Accidents and malfunctions may also affect the freshwater environment and fish habitat. Spills from roads and the LNG facilities into fish habitat could result in temporarily degradation of water quality and subsequent effects on freshwater fish and habitat productive capacity, both at source and downstream, depending on the quantity and the toxicity of the material spilled, flow and channel gradient. Mortality of all life stages could potentially occur within the zone of influence. Changes in water quality could also affect other trophic levels, resulting in direct mortalities of benthic organisms. Sublethal environmental effects could include avoidance behaviour and disruption of feeding and migration patterns. Depending on the nature and extend of a hazardous materials spill, the effect could be large; however, the risk for a large spill is considered to be low. In consideration of proposed mitigation and spill contingency plans the potential adverse environmental effects on fish and fish habitat involving the release of a hazardous material into fish habitat are considered manageable.

A Project-induced forest fire could destroy riparian vegetation and alter water quality within the Project area, resulting in environmental effects on fish and fish habitat, including fish mortality. Factors influencing the severity and duration of environmental effects caused by a forest fire include time of year, weather conditions, extent of fire damage and type of fire. A fire during late summer or early fall could affect salmon and char migration and spawning timing and success. Although individual fish and ova mortality may occur as a result of a forest fire, the environmental effects on the population of resident and migratory fish are likely reversible due to eventual recolonization from unaffected areas.

There is a potential risk for failure of erosion and sediment control structures during pipeline watercourse crossings and/or road upgrading (culvert replacement) due to significant or heavy precipitation. Failure could result in sediment-laden runoff being released to adjacent watercourses within a watershed, which could lead to potential adverse environmental effects on fish and fish habitat due to increased sedimentation and turbidity, or deposition of debris and material. The extent of the environmental effects on fish is predicted to be low to moderate due to the relatively large watershed areas located downstream from many stream crossings. Reversibility of environmental effects on fish populations will depend on the species life stage present and the proportion of watershed affected.

For wildlife and avifauna, the likelihood of accidents and malfunctions is low and adherence to the EPP for the Project will mitigate potential environmental effects of any accidental event.

Wildlife and Avifauna

Accidents and malfunctions may affect wildlife and avifuana and their habitat through hazardous material and LNG spills, vehicular accidents (i.e. wildlife and bird collisions) and forest fires. Hazardous material spills may cause direct or indirect mortalities of birds and wildlife by contaminating water, soil or food sources. Many chemicals could be directly adsorbed by avifuana and wildlife through dermal contact with contaminated soils or water or ingested via contaminated prey or soil.

Marine vessel accidents could result in the release of LNG or other petroleum products into the marine environment, putting marine birds at risk of mortality, thermal stress (LNG) or oiling. Hazardous materials spills in the marine environment could result in the oiling of shoreline habitat. As small

estuaries are located nearby, hazardous materials that are spilled could contaminate the water and soils, and adversely affect the biological function of the estuaries. Avifauna and wildlife collisions could occur due to increases in vehicular traffic throughout the life of the Project, and any Project phase. Fire could potentially occur during construction, operation, and decommissioning activities. Forest fires induced by a Project-related accident could result in direct mortalities, and a change in terrestrial habitat. Erosion control failure and resultant rock/mud slides may result in a loss or alteration of habitat or direct mortality depending on time of occurrence.

Vegetation Resources
Accidents and malfunctions may affect vegetation resources. A pipeline leak or rupture could result in the loss of rare plant species on a localized basis. Hazardous material spills may cause direct or indirect mortalities of plants by contaminating water or soil. As wetlands tend to be located in the lowest point of a watershed or sub-catchment area, hazardous materials that are spilled could migrate to wetlands contaminating the water and soils. Forest fires induced by a Project-related accident could result in direct loss or temporary extirpation of rare plant species or communities. For vegetation resources, the likelihood of accidents and malfunctions is low and following the EPP for the Project will mitigate potential environmental effects of accidental events.

Marine Environment and Mammals
Accidents and malfunctions may affect the marine environment and marine mammals. Effects include direct species mortality, alteration of habitat and changes in the use of habitat. Accidental impingement of operating vessels outside of prescribed vessel lanes and within sensitive biological buffer zones may result in direct mortality to benthic organisms including eelgrass, loss of habitat (physical propeller destruction), change in habitat (sediment resuspension, water quality degradation) and change in use of habitat.

Hazardous materials released into the marine environment due to accidents at the marine berth would disperse according to the tidal, wind and wave environment. The area affected by an accident outside the berthing area would depend on prevailing winds and tidal regime. LNG would disperse under relatively strong tidal action, wind and wave effects, with the possibility of being directed in any direction. The expected effects of an LNG spill are initial surface “boiling” and cryogenic effects (low temperatures) that could result in severe freezing on contact. Methane would be generated in large quantities at the air/water interface. Surface animals within the spill zone, especially marine mammals would be most severely affected. Since LNG floats on the water surface, potential LNG spill effects to the subtidal environment are not anticipated. Spill effects would decrease with water depth and are predicted to be minimal for demersal fish and fish habitat. Exposure of the intertidal community to heat generated from burning methane would also result in direct mortality. This potential effect would be reversible as these organisms recolonize quickly.

5.2.3 Issues Raised and Proponent Response

The following are key issues concerning environmental effects of the accidents and malfunctions raised by the public, some government agencies and the Haisla during the EA:

1. Effects of accidental road spills on water and fisheries.

Proponent Response: As identified in **Section 2.4** of this Report (Freshwater and Fisheries Environment), the Proponent has committed to include in its EPP spill prevention and spill response provisions for the construction and operation phases. The EPP will also include an ERP which will detail requirements for addressing potential effects on streams and measures to prevent road based spills from entering intertidal wetlands and/or the marine environment. The

ERP will include spill response kits (including requirements for absorbent booms), location of the kits for road-based spills, and provision for spill response training.

2. **Potential effect of accidental spills on the marine environment, intertidal wetlands and coastal streams.**

   Proponent Response: As indicated in **Section 2.5** (Marine Environment and Marine Mammals), the LNG facility has been designed to minimize land-based spills and ensure their containment before reaching the marine environment. A potential LNG spill on the water is unlikely and not predicted to have adverse effects since LNG will not mix with water, and will evaporate without leaving any residues. Spill response will also be addressed in the TERMPOL review. The Proponent has committed to preparing an EPP that includes spill prevention and response provisions for construction and operation in accordance with applicable federal and provincial requirements. An ERP in the EPP will detail requirements to address potential effects on the marine environment and intertidal wetlands and streams that intersect the shoreline.

3. **Spills of contaminants or hazardous materials from vessels as a result of grounding or collision.**

   Proponent Response: As outlined in **Section 3.2** of this Report (Public Safety and Health), the Proponent has indicated that all LNG tankers are double hulled. Any bunker fuel is protected by the double hull construction and risk of breach is low. LNG vessel fleet is among the newest and advanced in technology and construction and less susceptible to collisions and other mishaps. LNG vessels typically burn gas and distillate fuel. On board chemicals are kept in drums and in small quantities. LNG carriers have dry bilge systems which are devoid of water. Grey water is collected and treated on board. The Proponent's commitments include development of a comprehensive EHS management plan, a Hazardous Spill Contingency Plan, and a Marine Terminal Manual to address this issue.

4. **Control of potential releases from LNG storage tanks.**

   Proponent Response: As outlined in **Section 3.2** of this Report (Public Safety and Health), the Proponent has indicated the full containment tanks are designed and constructed so that both inner tank and outer containment walls are capable of independently containing the stored LNG. Full containment tanks offer the highest level of safety, but any unplanned release will be contained by the concrete tank and the vapour released to the atmosphere through pressure relief valves. The Proponent's commitments include ensuring that the Hazardous Spill Contingency Plan includes prevention and mitigation of potential releases from the terminal, and that the EPP will address any potential releases from the storage tanks.

5. **Need for emergency response coordination.**

   Proponent Response: As indicated in **Section 3.2** of this Report (Public Safety and Health) federal emergency response agencies are interested in being involved in the development of a plan on response coordination with local and provincial responders, as an incident would likely involve all three levels of government. The DOK is also concerned that its unique resources for emergency response and preparedness be considered in any response plan. The Proponent has made a new commitment to provide relevant federal agency response organizations with a draft of the ERP for comment, and to consult with and obtain comment from the DOK in development of the ERP for the Project facilities.

6. **Size and firefighting capability of tugs**

Proponent Response: As indicated in **Section 3.4** of this Report (Navigable Waters), the tugs required for the Project terminal will be approximately 38 m (125 ft) long and 10.7 m (35 ft) wide with a maximum draft of about 5.5m (18 ft). Tug design is a key element of the TERMPOL review and will be addressed further during that process. Tugs for the facility will have standard firefighting capability used for LNG facilities in North America, based on Society of International Gas tankers and terminal Operators guidelines. The Proponent made a new commitment to ensure that firefighting capabilities are provided on the tugs required for the marine facility when the facility is commissioned.

5.2.4 Conclusion

The Approved Terms of Reference for the Project's environmental assessment certificate application required that the application address the potential accidents and malfunctions associated with the Project. However, since this is a specific requirement under CEAA, the EAO defers any conclusion on this topic to the federal RAs.

During the harmonized EA, EAO and the RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F**, the federal RAs are satisfied that potential accidents and malfunctions associated with the Project are not likely to result in any significant adverse environmental effects.

5.3 CAPACITY OF RENEWABLE RESOURCES

5.3.1 Background

Under CEAA, the EA is to include a consideration of the capacity of renewable resources that are likely to be affected by the Project to meet the needs of the present and those of the future.

Adverse effects on forest resources, marine and freshwater fish, wildlife and avifuana could result in a reduced capacity of these resources to support present and future forestry, fishing, hunting, trapping and traditional land use activities.

Project activities will interact with forest resources, marine and freshwater fish, wildlife and avifauna throughout the life of the Project. Potential adverse effects of the Project on fish and fish habitat, the marine environment and marine mammals, wildlife and wildlife habitat and avifauna were identified and assessed.

5.3.2 Discussion

For vegetation resources, the evaluation focused on rare plants and rare plant communities, rather than forest resources for harvesting purposes. Project-related forest clearing will result in a small percent increase of altered vegetation communities within the Project area. Salvageable timber will be harvested during clearing. Forest cover altered by the Project will not result in a permanent deletion from the forest land base as the land will be re-forested when the terminal is decommissioned. When considering the relatively small Project footprint compared to the forest land base in the region and the

reversible nature of the effect, the Proponent concluded that the potential Project-related effect on forest resources is assessed as being not significant.

A significant adverse environmental effect on fish and fish habitat alters valued habitat physically, chemically and/or biologically to the extent that instream habitat productivity does not recover through mitigation or compensation within three years and/or the riparian functions do not recover within five years of the alteration. In light of mitigation and compensation measures, the Proponent concluded that the Project is predicted to not have significant adverse effects on freshwater fish and fish habitat and will therefore not have a significant adverse effect on the capacity of the freshwater fisheries resource.

A significant adverse environmental effect on the marine environment and marine mammals is one that affects the environment in such a way as to cause declines in abundance or changes in distribution of populations over one or more generations. The Proponent concluded that the potential adverse environmental effects of the Project on the marine environment and marine mammals were predicted to be not significant, and therefore the Project is predicted to not have a significant effect on the capacity of the marine resources.

A significant adverse environmental effect on wildlife and wildlife habitat or avifauna is one that alters terrestrial habitats within the Project area physically, chemically, or biologically, in quality or extent, in such a way as to cause a change or decline in the ecological function of that habitat, or a change or decline in the distribution or abundance of an animal population (as represented by the indicator species) that is dependent upon that habitat, such that natural recruitment would not reestablish the population to its original level within one generation. The Proponent concluded that the potential adverse environmental effects of the Project on the wildlife and wildlife habitat or avifauna were predicted to be not significant, and therefore the Project is predicted to not have a significant effect on the capacity of this resource to meet the needs present and future First Nation and non-First Nation hunters and trappers.

According to the Proponent, the Project is not expected to have a significant adverse effect on forest resources, freshwater and marine environment and marine mammals, wildlife or avifauna, and therefore the capacity of those renewable resources will not likely be significantly affected by the Project.

5.3.3 Issues Raised and Proponent Response

No issues were raised by the public, government agencies and the Haisla during the EA on the capacity of renewable resources.

5.3.4 Conclusion

The Approved Terms of Reference for the Project's environmental assessment certificate application does not require that the application address any significant adverse effects to the capacity of renewable resources to meet the needs of the present and those of the future. Since this is a specific requirement under CEAA, the EAO defers any conclusion on this topic to the federal RAs.

During the harmonized EA, EAO and the RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, provided that the Proponent conducts the mitigation as indicated above and implements the actions described in the Summary of Commitments listed in **Appendix F**, the federal RAs are satisfied that the Project is not likely to cause any significant adverse effects to the capacity of renewable resources to meet the needs of the present and those of the future.

5.4 CUMULATIVE ENVIRONMENTAL EFFECTS ASSESSMENT

5.4.1 Background

Section 16(1) of CEAA requires a comprehensive study to include a consideration of "any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out". Cumulative effects are changes to the environment that are caused by an action in combination with other past, present and future human actions and include changes to the biophysical environment or socio-economic setting (indirectly from a biophysical change). Cumulative effects are to be considered for those reasonably foreseeable projects and activities, the effects of which have the potential for overlapping in time and space with the environmental effects of the proposed project (construction and operation phases).

Cumulative environmental effects assessment is conducted to ensure the incremental effects resulting from the combined influences of various actions are considered. These combined effects may be significant even though the effects of each action, when individually assessed, are considered insignificant.

5.4.2 Methodology

The Proponent's environmental assessment methodology included an evaluation of the potential cumulative effects of each Project phase (Construction and Commissioning, Operation and Decommissioning) as well as Accidents, Malfunctions and Unplanned Events with regard to Valued Components (VCs). The evaluation of potential cumulative effects with regard to other projects and activities includes existing, approved and proposed activities that will interact temporally or spatially with the Project.

The cumulative effects assessment included consideration of existing projects or activities outlined below as part of the existing environment and future projects and activities that have a high level of

certainty of proceeding. It should be noted that the proposed projects identified below as proposed will be undergoing environmental assessments and will also include a cumulative effects assessment:

- Methanex Corp facility and marine terminal;
- Alcan Primary Metal Group operations and marine terminal;
- Eurocan Pulp and Paper facility and marine terminal;
- Forestry activities;
- Haisla land and resource use;
- Commercial fisheries;
- Other land and resource use activities (hunting, trapping, fishing);
- Tourism and recreation activities (including eco-tourism);
- Other airshed emissions sources;
- Proposed Enbridge Gateway Pipeline project,
- Proposed Kitimat-Summit Lake Pipeline Looping Project;
- Cascadia Aggregate Terminal Project; and
- Commercial shipping.

The cumulative effects assessment considered all of the Project's anticipated residual effects, and the expected effects of other present, approved and proposed projects on the following Valued Components (VCs):

- Atmospheric environment, particularly climate, air quality and sound quality;
- Marine environment, particularly marine fish and fish habitat and marine species of special conservation status;
- Freshwater fish and fish habitat, including fish bearing streams;
- Wildlife and wildlife habitat, particularly grizzly bear, black bear, mountain goat, moose, black-tailed deer, marten, and coastal tailed frog;
- Avifauna associated with the marine and terrestrial environment, including migratory, non-migratory, resident and wintering species listed in the *Migratory Birds Convention Act* and the BC *Wildlife Act* and bird species with special conservation status;
- Vegetation resources, including rare plants and rare plant communities and species with special conservation status;
- Heritage and archaeological resources;
- First Nations communities and land use;
- Land and resource use; and
- Public safety and health.

These potential effects were deemed applicable to both Emsley Cove and Bish Cove locations for the LNG terminal and marine facilities.

Temporal boundaries include periods of Construction and Commissioning, subsequent Operation of the LNG terminal throughout its expected life span (minimum 20 years), and eventual Decommissioning and Abandonment (12 months after useful life). Spatial boundaries for the cumulative effects assessment were set specifically for each VC as noted in the discussion of the various VCs.

5.4.3 Discussion

Atmospheric Environment

An analysis was completed on three distinct sub-components or aspects of the atmospheric environment including: climate; air quality; and sound quality. The Proponent anticipated that the LNG terminal will not result in any substantive interaction with Atmospheric Environment (Climate) in a way that would result in discernible changes to regional, national, or global climate patterns. As such, climate was not considered in the cumulative effects assessment.

The spatial boundary for the atmospheric environment includes the Project site and an appropriately sized region that captures areas potentially affected by project emissions and all emissions sources that can potentially impact on the Project area. The assessment area encompassed an elliptically shaped area approximately 30 km long and 7 km wide trending southwest to northeast, encompassing the Kitimat Arm from southwest of the Project site to northeast of the District Municipality of Kitimat.

Potential cumulative effects that have been defined for the atmospheric environment include air emissions and noise resulting from construction (heavy equipment) and operation (ships and the facility).

According to the Proponent, other projects and activities presently in operation, or planned, are not likely to result in interactions with air quality and sound quality. These other projects and activities, alone or in combination with the LNG terminal, are unlikely to contribute to cumulative environmental effects in the assessment area. Most of the projects and activities identified in the cumulative effects assessment area are between 13 and 16 km distant from the LNG terminal. The Proponent noted that given the distance separating the projects there is limited opportunity for substantial interactions.

For air quality, the Proponent noted that industries are consistently striving to improve energy efficiency, reduce costs, select more environmentally-friendly feedstock materials, and improve product quality, which may result in direct and indirect improvements to air quality. However, given that these improvements are difficult to substantiate and quantify, these activities are therefore conservatively rated as resulting in neutral environmental effects with respect to air quality.

Once operational, the LNG terminal will supply approximately 1 billion standard cubic feet of natural gas per day to the western North American market. This natural gas supply is expected to displace the current and future emissions that would otherwise be generated from the combustion of other fossil fuels such as oil or coal.

Any interactions are expected to result in neutral environmental effects in relation to air quality. There may be short-term, intermittent, and reversible air quality interactions between these projects and activities, but the long-term operation of these other Projects and activities are expected to result in improved air quality in the assessment area.

According to the Proponent, sound emissions tend to be a localized, intermittent, low duration, and low frequency environmental effect, often associated with impulse sounds that may result from specific activities such as can occur from construction projects. The long-term, chronic environmental effects on sound quality) that may be associated with the operation of specific facilities or activities tend to be very rare and are generally addressed by regulatory agencies. Therefore, the potential interactions between the long-term operation of the other projects and activities are expected to result in neutral environmental effects with respect to sound quality. There may be short-term, intermittent, and reversible sound quality interactions between the listed projects and the LNG terminal during their construction. These can readily be addressed by mitigation.

Based on the above factors, the Proponent concluded that no significant adverse cumulative effects on air quality and sound quality are anticipated.

Marine Environment and Marine Mammals

The spatial boundaries considered for this cumulative effects assessment included Emsley Cove and Bish Cove with an emphasis on the marine environment in the immediate vicinity of the marine terminal, and the shipping route between the terminal and the shipping lane and that portion of Kitimat Arm extending from the southern tip of Coste Island to Clio Point (excluding Kildala Arm).

Potential cumulative effects that have been defined for the marine environmental and marine mammals include: water quality, contamination of sediments; vessel and construction related underwater acoustic pollution; and marine mammal - vessel collision potential.

The Emsley Cove and Bish Cove marine environments are relatively pristine. Poly Aromatic Hydrocarbons (PAHs) and dioxins identified in sediments at Emsley Cove are likely related to past and present effects of industries in the Port of Kitimat. According to the Proponent, the proposed LNG regasification process will not require use, storage or production of PAHs and dioxins in appreciable quantities and therefore will not act additively nor constitute a cumulative effect during normal operation of the facility.

Eurocan, Methanex and Alcan ship arrivals to the Port of Kitimat totaled 180 (45 ships up to 50,000 dead weight tonnes or dwt), 135 up to 40,000 dwt) in 2000. The proposed Cascadia Aggregate Terminal is initially expected to receive approximately 26 ship per year (1 ship every 2 weeks) increasing to 52 ships per year (1 ship per week) towards the 5th year of operations. As the Cascasdia production volumes increase, vessel frequency will increase to a maximum of 112 ships/year (2 ships/week). Initially, Panamax class vessels of about 60,000 to 65,000 dwt will be used, but future production volumes may lead to the use of vessels as large as 80,000 to 85,000 dwt. It is expected that the Kitimat LNG terminal berth will receive up to 90 LNG carriers per year, which is an appreciable increase in tanker traffic in Douglas Channel/Kitimat Arm and near the Port of Kitimat. Increases in acoustic emissions and the risk of marine mammal - vessel strikes are likely.

LNG tankers frequenting the terminal will range from 125,000 m^3 to 250,000 m^3 throughout the life of the terminal; up to approximately three times the weight of typical tankers presently using the Port of Kitimat. Modeling studies on commercial ship generated underwater noise suggest larger tankers produce higher source levels over greater frequency ranges than smaller tankers. Acoustic emissions are vessel specific but models suggest that large tankers and supertankers can produce source levels approaching 175 to 190 dB. Particular vessels produce unique noise source levels with frequency, known as acoustic signatures. Sharp peaks (tones) produced by rotating and reciprocating machinery such as diesel engines, diesel generators, pumps, fans, blowers, hydraulic power plants, and other auxiliaries can be observed in an acoustic signature of a vessel. Propeller blade passage tones and their harmonics, as well as propeller blade rate modulation of propeller cavitation, also contribute to the tonal structure of typical ship signatures and are particularly evident at lower ship speeds. With increased ship speed, broadband noise-generating mechanisms, such as propeller cavitation and hydrodynamic flow over the hull and hull appendages, become more important. Therefore, sound fields around LNG tankers will be larger than those produced by the smaller freighters frequenting the Port of Kitimat.

According to the Proponent, these disturbances are typically temporary and are short in duration. Effects are typically reversible with animals returning to areas after vessels have passed through.

Management of vessel traffic to avoid or mitigate potential collisions with marine mammals, and potential acoustic emission increases, will be implemented through the TERMPOL program.

Based on the above and anticipated mitigation through TERMPOL, the Proponent concluded that no significant adverse cumulative effects on marine environment and marine mammals are anticipated.

Freshwater Fish and Fish Habitat

The spatial boundaries for the Project area include all riparian management areas (RMA) from approximately 100 m upstream from a pipeline or road/transmission line crossing, downstream to Douglas Channel or to confluence with a watercourse RMA. Existing and proposed forestry-related activities (cutblock timber harvesting, road building, culvert placements, *etc*.) within the vicinity of the Project, has and will continue to affect fish and fish habitats in areas upstream and downstream from the proposed pipeline lateral corridor. The cumulative environmental effects area considered potential effects on a watershed-wide basis. Accordingly, the cumulative environmental effects assessment area has been calculated as the total RMA for each watershed potentially affected by the Project.

Potential cumulative effects that have been defined for freshwater fish and fish habitat include: riparian vegetation loss associated with road upgrading; riparian vegetation alteration (community structure) attributable to pipeline and transmission line clearing within the RMAs; and alteration of instream fish habitat associated with culvert replacement activities at watercourse crossings.

These potential cumulative effects consider previous, current and proposed forestry-related activities (timber harvesting, road construction and potential increased angling pressure/effort (once road upgrading has been completed) which will continue to affect fish and fish habitat within the vicinity of the Project.

Project activities will contribute to cumulative riparian vegetation losses and alteration of vegetation structure and communities. For example, new road construction or road widening activities will result in the loss of riparian vegetation for the duration of the Project (road surface footprint). Alternately, as pipeline lateral (subterranean) and transmission line (aerial) ROWs within the RMAs will be replanted immediately following construction (shrubs, brush and grasses), clearing efforts alter species composition and function (loss of shade, bank stability, *etc.*) of the RMA for a relatively short duration (three to five years for green-up). Both riparian vegetation losses and alterations will have a cumulative effect within the vicinity of the Project due to past timber harvesting and road construction activities throughout the respective watersheds as well as potential new activities in the area from future projects.

According to the Proponent, road building and upgrading activities for both Emsley and Bish Coves will result in minimal percentage riparian vegetation loss in the cumulative effects area.

Measures to mitigate the effects of riparian vegetation alterations will be detailed in the EPP and will include shrub re-planting as well as willow planting and/or staking to restore riparian vegetation at each pipeline lateral and transmission line ROW crossing of fish bearing (S1-S4) and non-fish bearing (S5-S6) watercourses. Past experience on stream restoration projects has shown that these efforts can successfully mitigate the environmental effects of clearing. Over a relatively short period of time (three to five years) the vegetation will green-up and off-set potential Project-specific and cumulative effects such that no net loss of riparian habitat is anticipated.

According to the Proponent, Project-related road upgrading and culvert replacement activities will contribute to cumulative effects of instream habitat alteration. Road upgrading will be required to accommodate two-way traffic (forestry and Kitimat LNG related). No alteration of fish habitat is anticipated for bridge replacement or upgrading, as construction of clear-span bridges (as currently exists) is not expected to affect instream habitats or productive capacity. An estimated 0.2 % of total

watercourse length for all streams located within the vicinity of the Project may be affected by culvert replacement.

As indicated by the Proponent, although the Project has the potential to affect instream habitat, application of *Standards and Best practices for Instream Works* and adherence to *Fish-Stream Crossing Guidelines* will ensure that the Project does not contribute to a loss of instream habitat productive capacity. Any changes in water quality (e.g. increase in TSS) will be of short duration and mitigable through implementation of the EPP.

The Proponent indicated that, although impossible to determine with certainty, it appears that past road construction and timber harvesting activities within the cumulative environmental effects area have had minimal effect on downstream fish populations and critical habitats. Based on a qualitative assessment of effects to riparian habitat on similar projects, it is concluded that Project-related disturbance of riparian vegetation will be minimal, short term and mitigable though application of appropriate *Standards and Best Practices for Instream Works*.

Based on the above and planned mitigation, the Proponent concluded that no significant adverse cumulative effects on fish and fish habitat are anticipated.

Wildlife and Wildlife Habitat

The spatial boundaries for the Project include the footprint of the Project where activities associated with construction and commissioning, operation, and decommissioning and abandonment, as well as accidents, malfunctions, and unplanned events could result in environmental effects on wildlife and wildlife habitat (the Assessment Area). The existing ecosystems and habitats within the spatial boundaries of the Assessment Area provide benchmarks for the evaluation of cumulative environmental effects as they reflect the sum of the environmental effects of past and presently existing Projects/activities on wildlife and wildlife habitat. Where appropriate, however, the Cumulative Effects Assessment Area is extended beyond the local Assessment Area to include wide ranging species (grizzly bear) as well as account for potential cumulative effects to known areas of concern that border the Assessment Area boundary (e.g. mountain goat winter ranges). In this instance, the Cumulative Effects Assessment Area was extended to include the Jesse-Bish and Wedeene Landscape Units, which represents a total area of approximately 1080 km^2 (108,000 ha). The northern portion of the local Assessment Area is contained in the Wedeene Landscape Unit and the southern portion including Emsley Cove in the Jesse-Bish Landscape Unit. It should be noted, however, that data limitations precluded a quantitative analysis over this large area. Existing land use policies were used to qualitatively assess potential cumulative environmental effects.

Potential cumulative effects that have been defined for wildlife and wildlife habitat include: habitat avoidance, wildlife habitat loss, and direct and indirect mortality.

The cumulative environmental effects of all present and future land uses have been considered including forestry, other industrial development (e.g. Alcan, Eurocan), First Nations resource use, hunting, trapping, fishing and recreation-based activities.

For the purposes of this EA, cumulative environmental effects analysis for wildlife and wildlife habitat is limited to grizzly bear and marten, which are species most vulnerable to increased road access and loss of mature and old forest. The use of indicator species helps focus the cumulative environmental effects assessment because their habitat requirements and sensitivities are well known, which provides a better basis to assess measurable parameters as well as estimate thresholds required to determine significance.

The key potential environmental effects on wildlife and wildlife habitat associated with the Project include effects on: species of special concern (i.e. provincially/federally listed species or species of regional importance); critical habitats; and seasonal use and movement corridors; that may be impacted by clearing associated with portions of the proposed ROW and plant site.

Wildlife habitats in the Cumulative Effects Assessment Area have been altered by past development activities, in particular forest harvesting and road development. The primary effects of these activities have been the conversion (alteration) of mature and old forested habitats to early seral vegetation communities (cutblocks) as well as increased road access into a formerly remote area. Currently, harvest units (cutblocks) comprise a total of 400 ha or approximately 10 % of the local Assessment Area. Of the total existing mature and old forest (2,404 ha), another 173 ha of mature and old forest will be altered due to future (approved) cutblocks for a combined area of 573 ha (24 % of total mature/old forest).

The total contribution of Project-related clearing activities for Emsley Cove is 158.4 ha. Of that total, 83 ha are represented by mature and old forest, which would result in a total of 656 ha of mature and old forest previously and potentially disturbed. Project related clearing of mature and old forest will result in a 3.5 % increase in altered wildlife habitat within the local Assessment Area compared to conditions without the Project.

The total contribution of Project-related clearing activities for Bish Cove is 134.8 ha. Of that total, 46 ha are represented by mature and old forest, which would result in a total of 619 ha of mature and old forest previously and potentially disturbed. Project-related clearing of mature and old forest will result in a 1.9 % increase in altered wildlife habitat within the local Assessment Area compared to conditions without the Project.

Most of this forested habitat is represented by the *Western Hemlock-Amabilis Fir-Blueberry* (AB) and *Western Hemlock-Amabilis Fir-Deer Fern* (HD) ecosystem units, which provide moderate habitat suitability for grizzly bear and marten as well as the other wildlife species under consideration. As such, the incremental loss of such a small amount of habitat combined with its relative value indicates Project-related contributions to cumulative environmental effects are minor and are judged not to exceed any estimated thresholds for habitat supply of critical habitats. With regards to grizzly bear, critical seasonal habitats such as avalanche chutes are lacking in the local Assessment Area, but are dispersed throughout the larger Cumulative Effects Assessment Area (i.e. Jesse-Bish and Wedeene Landscape Units).

The Proponent indicated that although Project-related contributions to cumulative environmental effects are minor, other projects, especially forestry activities have a greater potential to affect wildlife habitats at a regional or watershed scale. In this instance, the Jesse-Bish and Wedeene Landscape Units as well as the local Assessment Area will experience a greater degree of forestry development over time because it has been designated by the provincial government to meet a relatively low and intermediate level of biodiversity respectively (i.e. Low and Intermediate Biodiversity Emphasis Options - BEO). A lower biodiversity emphasis option is applied in areas where other social and economic demands are the primary management objectives. As such, there is an inherently higher risk to biodiversity, especially wildlife species dependent on mature and old coastal forest (e.g. bears, marten) over the long term. Specifically, mature forested areas within landscape units designated as Low BEO can be reduced to a maximum of 25 % of natural levels, and within landscape units designated as Intermediate to 50 % of natural levels. This suggests that although the Project-related

contributions to cumulative environmental effects are minor primarily because of the limited amount of mature forest habitat alteration and/or loss, there is potential to have substantial adverse environmental effects due to future forest harvesting and associated development activities in these landscape units. Adherence to the management direction outlined in the Kalum LRMP combined with other government initiatives for priority species including grizzly bear, however, will mitigate cumulative environmental effects on these species.

One of the key issues related to potential effects of resource development on wildlife is increased access. Proliferation of new access is a primary concern because it is associated with increased legal and illegal harvests (trapping, hunting), and human disturbance, as well as loss of core security areas for grizzly bears.

The construction of the pipeline lateral ROW and improved access will provide corridors that facilitate human access, including ATV use, and access to wildlife (i.e. potential hunting or poaching). However, it should be emphasized that although a portion of the pipeline lateral ROW will provide additional access (approximately 5 km), road access already exists via the Bish FSR and is not likely to result in a substantial increase in the current use.

Based on the above and assuming current regional LRMP policies and wildlife protection measures (e.g. access management, protection of grizzly bear critical foraging areas, old growth management areas) are implemented and effective, the Proponent concluded that no significant adverse cumulative effects on wildlife and wildlife habitat are anticipated.

Terrestrial Environment
An analysis was completed on two distinct sub-components or aspects of the terrestrial environment including avifauna and vegetation resources.

The spatial boundaries for the Project include the footprint of the Project where activities associated with construction and commissioning, operation, and decommissioning and abandonment, as well as accidents, malfunctions, and unplanned events could result in environmental effects on avifauna and vegetation resources. This same boundary is used for the assessment of cumulative environmental effects because it includes all geographic areas where Project-related environmental effects could overlap with those of other projects.

Potential cumulative effects that have been defined for the terrestrial environment include: effects on avifauna due to terrestrial habitat loss and fragmentation, associated with the vegetative clearing required for installation of the LNG terminal and natural gas pipeline lateral; effects on avifauna due to the operation of the marine terminal (e.g. noise and lighting), and increased shipping activities during construction and operation; and effects on vegetation due to the loss of rare plants and plant communities and introduction of noxious weeds or invasive plants associated with vegetative clearing required for installation of the LNG terminal, natural gas pipeline lateral ROW, aerial transmission line ROW, and upgrades and extension of the access road.

The cumulative environmental effects of all current and proposed adjacent land uses (e.g. forestry and industrial development) have been considered. There is the potential that previous industrial activities in Kitimat have and continue to have an effect on terrestrial and marine avifauna within the vicinity of the Project. Existing industrial developments in Kitimat are serviced by marine vessels which pass by Emsley Cove and Bish Cove. While most of the current projects have potential effects that are associated with noise and disturbance, these effects are generally localized, of short duration and are

related to passing marine traffic. Short-term noise and disturbance effects are generally reversible after the disturbance is removed.

Forestry practices are the main activities in the assessment area that have the potential to act cumulatively on the terrestrial environment. The primary effect of these activities has been the alteration of habitats and vegetation clearing. The Project-related clearing will result in up to a 4 percent increase of altered vegetation communities within the cumulative effects area.

Some of the area disturbed by the Project will return naturally to a low shrub/herbaceous vegetation community over time; however, the Project will act cumulatively with previous disturbances such that an overall incremental loss of native vegetation will occur. As forest companies are not required to conduct rare plant surveys of their cutblocks prior to harvesting, it is not possible to determine whether these activities have resulted in the loss of rare plants or rare plant communities.

Existing cumulative effects on the Marbled Murrelet in the Kitimat area include forest harvesting activities, shipping activities and commercial use of gill nets. There will be no loss of areas that have been identified as having high or moderate suitability for Marbled Murrelet breeding as a result of the Project. It should be noted that these areas are relatively small and isolated and are only identified as potential areas for breeding and that despite being observed in the Kitimat area year round, no evidence of breeding has ever been observed. In addition, the cumulative water quality degradation and contamination of sediments from industrial sources in Kitimat may also contribute to overall habitat degradation and effects on prey availability and abundance. However, the Project site represents a very small portion of the population range, and birds may avoid the area for short periods of disturbance, with no adverse effect.

Given the small percentage of forest cover altered by the Project, the mitigation proposed, efforts to identify and avoid effects to rare plants and significant plant communities, ongoing weed control efforts, and the implementation of the EPP, the Proponent concluded that no significant adverse cumulative effects on the terrestrial environment are anticipated.

Heritage and Archaeological Resources

Assessment of the cumulative effect of development on archaeological and heritage resources can be measured only in the broadest of terms. The inventory of heritage and archaeological sites in the general area of the Project has been compiled primarily through impact assessment studies. As a result, the annual growth of the inventory represents an index of the cumulative effects of development on these resources in this portion of the Pacific coast. The cumulative effect of non-development related impacts on archaeological and heritage resources are much more difficult to measure, as they result from increased human presence, as well as clandestine collection, disturbance, and vandalism of known sites. Secondary effects related to Project construction arising from erosion, slumping, precipitation, frost cracking, effects of acidic soils on organic materials and other natural events and actions also take a continuous toll and contribute to cumulative effects on these resources.

To date, cumulative effects on archaeological and heritage resources is primarily related to forest harvesting activities and culturally modified trees (CMTs) are the specific site type that is most affected. In this context, approximately 96 % of the CMT sites on record have been or will be disturbed with consequent loss of information and cultural features. Based on available Information, approximately 15.5 % of the recorded precontact sites and 27 % of the recorded historic sites have been previously disturbed. None of the recorded multi component sites are associated with disturbance relating to development.

Based on the above and planned mitigation, the Proponent concluded that no significant adverse cumulative effects on archaeological and heritage resources are anticipated.

First Nations Communities and Land Use
Existing operations and activities will have cumulative environmental effects on Haisla communities and land use. New vessel traffic will be incremental to that already experienced in the area. Forestry operations will cause potential cumulative environmental effects for aspects of First Nations use. Similarly, First Nations subsistence activities, hunting, fishing and trapping by non-First Nation people, and tourism and recreation operations would also interact to have cumulative effects on various aspects of Haisla use. The improved access to the area provided by the upgraded access road and new ROW for the pipeline laterals and transmission line offers new opportunities for such activities as forestry, hunting, fishing and trapping and other recreational uses. Each of these to varying degrees would affect Haisla traditional use in the area and, when carried out in combination with the Project, could result in adverse cumulative effects on Haisla interests. However, an impacts and benefits agreement between the Proponent and the Haisla has now been concluded for a Bish Cove terminal location.

Based on the above, the Proponent concluded that no significant adverse cumulative effects on First Nations communities and land use are anticipated.

Land and Resource Use
Existing operations and activities will have cumulative environmental effects on land and resource use. The Project will expand the industrial land base in Kitimat. These facilities are located within the primary industrial area of the district and make substantial use of the port facilities. While Project will not use these facilities, it will add up to 90 vessels to the marine traffic in Kitimat Arm and Douglas Channel. This new traffic will be incremental to that already experienced in the area. The planned mitigation measures will ensure that appropriate management plans and procedures are in place for the new vessel traffic.

Forestry operations will result in potential cumulative environmental effects for most aspects of land and resource use, except for commercial fishing and parks and special areas. The improved access into the area provided by the upgraded access road and new ROW for the pipeline offers new opportunities for development activities, such as forestry, hunting, fishing and trapping and other recreational uses. Each of these, to varying degrees, affects resource use and users in the area and, when carried out in combination with the Project, could result in cumulative effects.

According to the Proponent, the role of government agencies in managing aspects of land and resource use will mitigate any cumulative effects due to improved access into the area.

Based on the above, the Proponent concluded that no significant adverse cumulative effects on land and resource use are anticipated.

Public Safety and Health
The Project will be implemented such that all applicable regulations, codes and standards governing public and worker safety and health will be met, and routine emissions and activities, with planned mitigation, would not result in substantive environmental effects. Current and future projects have, and will be, subject to the same or similar regulations, codes and standards governing public and worker safety and health. Thus, although in the worst case significant cumulative environmental effects on safety and health could occur, they are very unlikely due to planned mitigation.

Based on the above, the Proponent concluded that no significant adverse cumulative effects on public safety and health are anticipated.

5.5.4 Issues Raised and Proponent Response

The following key issues were raised by the public, government agencies and the Haisla during the EA on cumulative environmental effects of the Project

1. Additional direction on cumulative effects related to shipping in Douglas Channel.

> **Proponent Response:** As identified in **Section 3.4** of this Report (Navigable Waters), a TERMPOL review process has been initiated for this Project by TC. The TERMPOL process provides the opportunity to address issues related to cumulative effects of the increase in vessel traffic along Douglas Channel. All vessels will be equipped with modern radar and navigational aids and will be under control of an experienced BC Coast Pilot during arrival to and departure from the terminal. During these manoeuvres, vessels will be accompanied by tugs and moving at slow speeds.

2. Additional information on cumulative effects related to Haisla interests.

> **Proponent Response:** As identified in **Section 4** of this Report (First Nations Effects), the Proponent indicated in a letter dated December 19, 2005, that it had signed an agreement-in-principle with the Haisla. The Proponent and Haisla are negotiating an impacts and benefits agreement that includes financial compensation from the Proponent for any potential cumulative effects of the Project on Haisla interests, including asserted rights and title.

5.4.5 Conclusion

The Approved Terms of Reference for the Project's environmental assessment certificate application required that the application address the potential cumulative effects associated with the construction and commissioning, operation and decommissioning of the Project. However, since this is a specific requirement under CEAA, the EAO defers any conclusion on this topic to the federal RAs.

During the harmonized environmental assessment, the EAO and the RAs have considered: the Application; additional Project review material listed in **Appendix A**; public, government agency and Haisla comments; responses by the Proponent; and the discussions of the WG.

Based on the information in this Report, and provided that the Proponent conducts the mitigation as indicated and implements the actions described in the Summary of Commitments listed in **Appendix F**, the federal RAs are satisfied there is not likely to be any significant cumulative effects associated with the construction and commissioning, operation and decommissioning of the Project.

6. COMPLIANCE, EFFECTS MONITORING AND FOLLOW-UP

6.1 CEAA REQUIREMENTS

Under the *Canadian Environmental Assessment Act* (CEAA), the need for, and requirements of, a follow-up program must be considered during a comprehensive study. The purpose of a follow-up program is to verify the accuracy of the environmental assessment and determine the effectiveness of measures taken to mitigate the potential adverse environmental effects of the Project. The environmental assessment provided the basis for determining the nature of the follow up program and who will be responsible for implementing and reporting on its various components.

The Proponent will design and implement a focused follow-up Environmental Effects Monitoring Program in consultation with relevant regulators which will be worked out prior to the permitting stage.

6.2 PROPONENT COMMITMENTS IN APPLICATION

The Proponent's proposed environmental monitoring program was intended to collect data and compile information to detect potential Project impacts measured against an established baseline. The Proponent has also committed to undertake follow-up monitoring for some Valued Components (VC) described in the Application to verify the accuracy of the predicted environmental effects of the Project and effectiveness of the proposed mitigation. With both environmental monitoring and follow-up programs, it is important to clearly define objectives, responsibility, methods, timing, reporting, triggers for action and planned actions.

Table 5 provides a summary of the environmental monitoring, project planning and follow-up monitoring for the Project as proposed in the Application and refined during the course of the EA when several new components were added. The intent was not to monitor all components of the environment, but to focus efforts on those areas where VCs are expected to be affected by Project activities.

Table 5. Proposed Environmental Monitoring, Project Planning and Follow Up

Valued Component (VC)	Project Phase	Commitment	Desired Outcome
All	Construction	Develop an EPP for construction phase.	To outline environmental compliance and monitoring, inspection and auditing.
All	Operation	Develop an EPP for terminal operations.	To outline environmental compliance and monitoring, inspection and auditing.
All	All Phases	Conduct internal audits at planned intervals to ensure the EHS management system and specific management plans are fully implemented.	To determine whether EHS system confirms to planned environmental management arrangements.
All	All Phases	Conduct external audits of the EHS management system at reasonable intervals.	To provide an independent assessment of compliance.
Atmospheric Environment	Operation	Implement a preventive maintenance and leak detection and repair program.	To minimize any leaks that may occur from pipelines and equipment.
Atmospheric Environment	Operation	Provide an annual report on greenhouse gas emissions.	To comply with CEPA monitoring requirements.
Atmospheric Environment	Operation	Monitor passive sulphur dioxide at three locations for an appropriate period of time. Monitoring to occur at jetty and two reference locations.	To verify the dispersion modelling results and verify the conclusions of the effects assessment.
Valued Component (VC)	**Project Phase**	**Commitment**	**Desired Outcome**

Atmospheric Environment	Operation	Investigate the assumptions used in the Application respecting emissions of sulphur dioxide from the LNG Vessel fleet, and the practicability of requiring the use of lower-sulphur fuel by ships as a condition of terminal use.	To verify accuracy of air emissions modelling.
Terrestrial Environment	Construction	Ensure that all ROW engineering design work is supervised and approved by a professional engineer in the Province of BC.	To ensure design of road, pipeline and transmission line ROWs minimizes erosion and terrain hazards.
Terrestrial Environment	Design	For a Bish Cove terminal location, complete rare plant surveys in May-June 2006.	To confirm absence of rare plants within road, power and pipeline ROWs or facility sites, and to prepare and implement a pre-construction mitigation program if such plants are found.
Marine Environment	Construction & Operation	Include a marine mammal monitoring program in the EPP	To offset effects of underwater blasting and noise.
Marine Environment	Operation	Monitor fish habitat compensation if habitat compensation plan is prepared.	To determine if the objectives of any marine fish habitat compensation plan required by DFO were achieved.
Marine Environment	Construction	Incorporate water quality monitoring into the EPP.	To ensure effectiveness of sediment control and other measures.
Marine Environment	Design	Conduct a habitat assessment within the jetty and marine terminal footprint, including an eelgrass survey.	To determine habitat loss and establish habitat compensation requirements.
Marine Environment	Construction	Investigate the presence of acid generating rock during geotechnical surveys, and adhere to federal and provincial legislation or guidelines applicable to management and disposal in marine environment.	To offset potential effects if rock used as fill in marine environment or disposed at sea.
Marine Environment	Construction	Incorporate a marine mammal monitoring program into the EPP.	To ensure effectiveness of marine mammal impact reduction and strike avoidance measures.
Freshwater Environment and Fisheries	Operation	Monitor fish habitat compensation if habitat compensation plan is prepared.	To determine if the objectives of any freshwater fish habitat compensation plan required by DFO were achieved.
Freshwater Environment and Fisheries	Construction	An on site monitor will be present during construction of all pipeline watercourse crossings and culvert and bridge upgrades.	To ensure that EPP and conditions of approvals are met.
Freshwater Environment and Fisheries	Operation	Watercourse crossings will be inspected routinely during first year of operation.	To ensure erosion and sedimentation control measures are successful.
Valued Component (VC)	**Project Phase**	**Commitment**	**Desired Outcome**

Freshwater and Fisheries Environment	Design	For a Bish Cove terminal, KLNG will conduct a habitat assessment on the final road and plant footprint with DFO are staff.	To finalize habitat compensation requirements, and incorporate DFO advice into the design and location of stream crossings.
Wildlife and Wildlife Habitat	Construction	An on site monitor will be present during construction.	To ensure that the EPP and conditions of approval are met.
Wildlife and Wildlife Habitat	Construction	A wildlife monitor will conduct reconnaissance surveys prior to vegetation clearing along proposed ROWs.	To confirm habitat suitability ratings as well as identify any special habitat features that may be affected.
Wildlife and Wildlife Habitat	Design	For a Bish Cove terminal, complete a tailed frog survey.	To confirm predicted absence in streams affected by the facility footprint, and to prepare and implement a pre-construction mitigation program if presence is confirmed.
Wildlife and Wildlife Habitat	Construction	Include in the EPP mitigation measure to protect the coastal tailed frog, including the isolation and inspection of in-stream areas to ensure no frogs are present before commencing work, and inspection of trenches for frogs prior to backfilling.	To comply with legislation and protect species of conservation concern.
Avifauna	Construction	An on site monitor will be present during construction.	To ensure that the EPP and conditions of approval are met.
Avifauna	Design	For a Bish Cove terminal, complete a Marbled Murrelet survey.	To confirm absence of forested areas to be affected by the LNG terminal footprint and to prepare and implement a pre-construction mitigation program if presence is confirmed.
Avifauna	Operation	Participate in the Coastal Waterbird Survey Program for 10 years.	To gather long-term data on the abundance and distribution of waterbird species to enable monitoring and tracking changes in waterbird populations and habitat use
Avifauna	Construction	Undertake nest surveys in advance of any vegetation clearing proposed during migratory bird breeding season and provision of survey results to relevant agencies if migratory bird nests are found, to determine the appropriateness of clearing and the width and diameter of any required nest buffer zones.	To increase database for coastal bird species and comply with legislation.
Avifauna	Construction	Survey for Blue Heron nests and other significant wildlife features during on site environmental monitoring phase, including survey prior to forest harvesting activities. If clearing overlaps breeding bird season, conduct a nest survey prior to clearing during the breeding bird season.	To minimize potential effects on Blue Heron and other avifaunal species of conservation concern and comply with legislation.
Valued Component	**Project Phase**	**Commitment**	**Desired Outcome**

(VC)			
Avifauna	Construction	Survey for Blue Heron foraging activity in the cove authorized for the marine terminal during Spring 2006 breeding season, and conduct a more focussed nest search should heron activity be observed. If a nest survey is warranted, the nest survey will be conducted prior to proposed vegetation clearing of any mature trees.	To minimize potential effects on Blue Heron and other avifaunal species of conservation concern and comply with legislation.
Vegetation	Construction	An on site monitor will be present during construction to ensure that erosion control structure are properly installed, maintained and removed.	To ensure that the EPP and conditions of approval are met.
Vegetation	Construction	The ROWs will be monitored during and following construction.	To assess the effectiveness of the weed control measures
Heritage and Archaeological Resources	Construction	Monitor construction and post-construction effects on heritage and archaeological resources.	To develop mitigation strategies for sites identified during construction.
Heritage and Archaeological Resources	Construction	Develop a protocol for consultation with the Haisla Nation on heritage and archaeological resource assessment, monitoring and disturbance mitigation activities.	To minimize impact on sites from construction.
Heritage and Archaeological Resources	Construction	Complete an archaeological impact assessment for unsurveyed portions of the road, right-of-way, and terminal site at the Bish Cove location.	To document the presence of archaeological resources and develop appropriate mitigation as needed.
Heritage and Archaeological Resources	Construction	Conduct field audits of cleared and blasted/cut bedrock areas at Emsley Cove location.	To address potential of bedrock areas to contain burial sites in crevasses.
Public Safety and Health	All Phases	Define safety and health follow-up activities for each Project phase in the EPP	To ensure that planned mitigation is effective as the Project proceeds.
Public Safety and Health	Construction	Conduct a seismic risk analysis in accordance with the governing standards as part of a Front End Engineering Design study.	To reduce possible accidents and malfunctions, and improve safety.
Navigable Waters	Construction and Operation	Initiate a TERMPOL review process.	To confirm adequacy of commitments made to address issues raised about marine shipping, navigation and operational effects.
Navigable Waters	Construction and Operation	Initiate and work within the TERMPOL review process.	To address shipping related issues in Douglas Channel.

PART C - REVIEW CONCLUSIONS

1. BASIS OF CONCLUSION

The conclusions from the review of the Project pursuant to the federal and provincial EA legislation are based on the following documents and review process:

- The Proponent's Application for an environmental certificate;
- All review material and documents submitted by the Proponent and listed in **Appendix A**;
- The Proponent's Table of Commitments and Consultation Commitments, as updated and consolidated in **Appendix F**;
- **Tables 6 – 13** that outline a summary of the evaluation of the nature and extent of the residual adverse effects arising from the Project after mitigation and whether the adverse effects are significant and likely. A number of criteria are outlined in the Tables including: magnitude; geographic extent; duration and frequency; reversibility; and ecological context;[7]
- The BCEAA review procedures as defined in the section 11 and section 13 orders;
- A letter from the Haisla, indicating they signed an agreement-in-principle with the Proponent respecting the Project;
- A letter from the Haisla confirming support for this Report and its conclusions;
- A letter from the Haisla indicating they have been adequately consulted and satisfactorily accommodated in the EA process; and
- The assessment carried out by the WG comprised of federal, provincial and local government agencies and the Haisla, with input from the public.

2. COMPLIANCE EFFECTS MONITORING AND FOLLOW UP

As summarized in **Appendix F**, the Proponent has committed to developing EPPs for Project construction and for Project operations that provide a more detailed description of how various environmental impacts will be avoided, managed and mitigated. The Proponent has also committed to undertake measures for compliance, environmental effects monitoring, and follow-up, as summarized in **Section 6** (Part B) of this Report. A number of these measures involve consultation and collaboration with the Haisla.

In addition to the Proponent's commitments towards environmental management and monitoring, the Proponent would also be required to comply with specific mitigation, monitoring and reporting requirements for pre and post construction operations as well as habitat compensation operations required by subsequent federal authorizations, permits, approvals and lease including the TERMPOL study and recommendations.

[7] For a definition of these criteria see Part B, Section 1.2 of this Report.

3. OVERALL CONCLUSION

The general conclusion of the assessment is that there are no likely significant adverse effects as a result of the Project, with the application of proposed commitments, including compliance, effects monitoring and follow-up measures (see **Appendix F**), and the implementation of the impacts and benefits and other agreements (including follow-up environmental management and monitoring program agreements) established by the Proponent with the Haisla to address Haisla interests in relation to the Project.

3.1 CONCLUSION OF EAO

Pursuant to the requirements of the BC *Environmental Assessment Act* (BCEAA), EAO is satisfied that:

- The process and documents generated as part of this EA adequately identify and address the potential adverse environmental, land use, socio-economic, public safety and health, heritage, navigable waters and First Nations effects;
- Public and First Nations consultation, and the distribution of information have been adequate;
- Issues identified during the review process by the public, the Haisla, federal, provincial and local government agencies have been adequately addressed by the Proponent during the review of the Application; and
- Practical means have been identified to prevent or reduce to an acceptable level any potential adverse effects.

3.2 CONCLUSION OF FEDERAL RESPONSIBLE AUTHORITIES

Pursuant to the requirements of the CEAA, the RAs have determined that, on the basis of this Comprehensive Study Report, the Project is not likely to cause significant adverse environmental effects whether it is located at either Emsley Cove or Bish Cove.

Table 6. Summary of Effects, Mitigation and Significance – Atmospheric Environment

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likeli-hood
			Context	Extent	Occurrence	Reversibility		
Operation of construction equipment, vehicle traffic and operation of marine vessels, decommissioning	Emission of green house gases (GHG) that may affect contribute to global CO_2 emissions and the associated phenomena of global warming	• Working with regulatory agencies to manage GHG through adaptive management; • Managing GHG emissions as Large Final Emitters group identified as part of Canada's implementation of the Kyoto Agreement; and • Using Best Available Technology. • Undertaking a Hazard Operability Analysis of the terminal design to assist in minimizing the potential for spills or unintentional releases of both LNG and natural gas	Area is relatively pristine or not adversely affected by human activity	Low magnitude. Are considered minute when compared to Canadian CO_2 emissions	Infrequent except for operation of marine vessels – expected to be 30 trips during construction and 70 to 90 trips per year for operation	Effects are reversible	Effects are minor, applicable standards will be met	High probability occurrence
Operation of construction equipment, vehicle traffic, operation of marine vessels, and operation of process equipment at the facility, decommissioning	Emissions of criteria air contaminants that may affect human health, wildlife, vegetation and other biota. SO_2 emissions exceed ambient air quality objectives	• Following vehicle maintenance schedules and using low sulphur diesel in equipment; • Implementing a preventative maintenance and leak detection and repair (LDAR) system to minimize and correct any leaks associated with the terminal infrastructure that may occur • Using natural gas fired engines in LNG vessels and nitrogen purging of pipes following vessel unloading; • Ensuring steady-state operation of burners to minimize transient emissions; • Ensuring all land vehicles (and marine vehicles where practicable) use on-road diesel fuel; • Considering use of lower-sulphur fuel by ships as a condition of marine terminal use; • Putting in place ship speed restrictions near shore areas where SO_2 effects are predicted; • Applying appropriate code of practice provisions from the draft report on Best Practices for Reduction of Air Emissions from Construction and Demolition Activities. • Abiding by any new emission reduction standards provided by either federal or provincial agencies. • Monitor passive SO_2 at three locations and for a specified time period (both determined in discussions with Environment Canada) to verify the dispersion modelling results and verify the conclusions of its effects assessment.	Area is relatively pristine or not adversely affected by human activity	Low magnitude. Relatively low emissions in comparison to other sources in the Assessment Area	Occur over a relatively short period for construction activities. Continuous emissions from plant operations. Vehicle traffic will be to transport workers and deliveries. Operation of marine vessels expected to be 30 trips during construction and 70 to 90 trips per year for operation	Effects are reversible	The applicable air quality objectives will not be exceeded for all but SO_2. Emissions of criteria air contaminants associated with the LNG terminal are small in comparison to other sources in the Assessment Area. It is not expected that SO_2 concentrations will be manifest in the ambient environment in excess of the ambient air quality objectives	High probability occurrence
Operation of construction equipment and vehicle traffic, decommissioning	Fugitive emissions of particulate matter or dust contaminants that may affect human health, wildlife, vegetation and other biota.	• Controlling dust and fugitive emissions by adoption of best practices, including the application of dust suppressants during periods of heavy activity and/or dry periods, limiting the extent of clearing, and restricting dust generating activities during windy conditions; • Minimizing fugitive emissions of particulate matter by paving high-traffic areas	Area is relatively pristine or not adversely affected by human activity	Low magnitude for vehicle traffic. Medium magnitude for clearing and grubbing activities with an increase to baseline but within regulatory limits and objectives. Emissions are expected to be nominal.	Emissions are transient in nature and occur intermittently. Expected to be of low frequency and short duration.	Effects are reversible	Dust and particulate matter emissions from construction and operation are not expected to be substantive.	High probability occurrence

Table 6. Summary of Effects, Mitigation and Significance – Atmospheric Environment (continued)

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likeli-hood
			Context	Extent	Occurrence	Reversibility		
Vehicle traffic, construction activities and equipment, and operation of marine vessels, decommissioning	Sound emissions that may affect human health, wildlife, vegetation and other biota	• Employing noise control measures; and • Conducting activities during regular business hours only.	Area is relatively pristine or not adversely affected by human activity	Medium to high magnitude. May cause exceedances or impingement upon limits and objectives beyond the Project boundary. Effects are remote in nature, and situated well away from human receptors.	Expected to be of short duration. Sound will be localized to the Project, intermittent and transient.	Effects are reversible	There is very little potential for noise nuisance at nearby residences or other noise sensitive receptors. There is substantial attenuation of noise emissions.	High probability occurrence

Table 7. Summary of Effects, Mitigation and Significance – Terrestrial Environment

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Site preparation for terminal infrastructure, installation of pipeline laterals, upgrades and extension of access roads, and installation of aerial transmission line with associated ROW (including maintenance)	Slope stability, soil erosion and sedimentation: increased soil and slope erosion (through increased stormwater runoff), increased slope instability and rockfalls.	• Minimizing grubbing an stripping of soils; • Covering of erosion-prone, exposed slopes and covering of stockpiled excavation materials; • Recontouring and seeding of ROWs, and specialized control measures on high erosion hazard ROW areas; • Implement erosion and sediment control measures as outlined in the Environmental Protection Plan (EPP) including ROW preparation measures, sediment control and clean-up and re-vegetation measures to ensure that the risk of erosion and wash-outs are minimized. • Implement necessary erosion control measures for each stream class, crossing type and type of waterbody to be crossed; • Applying protective measures in areas prone to rockfall; • Developing a Stormwater Management Plan (SMP) prior to construction of the facility including a site run-off control program; • Undertaking geotechnical investigations, detailed road design, hydraulic analysis of all culverts/bridges, and environmental protection measures during construction; and • Preparing a formal reclamation and stabilization strategy for all ROWs with potential slope instability. • For the Bish Cove access road, the Proponent has proposed a route that crosses relatively flat terrain and avoids building on unstable and steep side slope conditions along Bish Creek.	Evidence of existing negative environmental effects (*e.g.,* existing forest harvesting).	Low magnitude. Localized effect mostly limited to construction period or over a short period of time for maintenance Off-set by mitigation.	During construction and operations. Will only occur once for construction and on a regular basis for operations.	Effects are reversible	Potential environmental effects are expected to be mitigated	High probability of occurrence
Site preparation for terminal infrastructure, installation of pipeline laterals, upgrades and extension of access roads, and installation of aerial transmission line with associated ROW (including maintenance)	Loss of plants or plant communities of Provincially listed species of special concern (e.g. "red-listed" Salmonberry, "blue-listed" Devils Club and mature and old forest growth)	• Conducting a rare plant survey for areas that have not been previously surveyed and that involve vegetation clearing; • Minimizing removal of vegetation and grubbing; • Adjusting the ROW alignment to avoid plant communities; • Keeping the pipeline, powerline and road ROW in a single corridor wherever possible to minimize vegetation disturbance.	Evidence of existing negative environmental effects (*e.g.,* existing forest harvesting).	Low to moderate in magnitude. Moderate is defined as a portion of a population, habitat, or ecosystem, 1 or 2 generations, rapid and unpredictable change, temporarily outside range of natural variability; for rare species, a change in distribution or behavioural patterns, 1 or 2 generations. Will be restricted to the Project footprint.	During construction and operations. Will only occur once for construction and on a regular basis for operations.	Effects are reversible	Small percent of plant communities of special concern. Environmental effects restricted to ROW or LNG footprint. Mitigation to avoid or minimize effects.	Probability of occurrence : based on professional judgment is low

Table 7. Summary of Effects, Mitigation and Significance – Terrestrial Environment (continued)

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Site preparation for terminal infrastructure, installation of pipeline laterals, upgrades and extension of access roads, and installation of aerial transmission line with associated ROW (including maintenance) and decommissioning	Effect of the introduction of noxious weeds or invasive plants on rare plants and plant communities as well as on existing native vegetation assemblages, and regeneration of trees planted in adjacent cutblock areas. Potential to provide a site from they may spread to other areas of potential concern.	• Implementing the Hazardous Spill Contingency Plan, Timber Clearing and Salvage, Clean-up, Reclamation, and Fire Prevention and Suppression sections of EPP; • Implementing a Noxious Weed Management Plan and weed control measures; • Refrain from applying herbicides as a standard vegetation management technique on the Project controlled ROWs and managing ROW vegetation by mechanical means with herbicides only being applied around above-ground pipeline infrastructure; • Implementing the Provincial *Integrated Pest Management* Act and require Pest Management Plan for vegetation management for BC Hydro managed areas of ROWs;	Evidence of existing negative environmental effects (*e.g.,* existing forest harvesting).	Low to moderate in magnitude. Moderate is defined as a portion of a population, habitat, or ecosystem, 1 or 2 generations, rapid and unpredictable change, temporarily outside range of natural variability; for rare species, a change in distribution or behavioural patterns, 1 or 2 generations. Will be restricted to the Project footprint.	During construction, operation and decommissioning. Will only occur once for construction. Minimal use of herbicides for vegetation management.	Effects are reversible	Effect is minor given the control of invasive plant introduction.	Probability of occurrence : based on professional judgment is low
Installation of pipeline laterals, upgrades and extension of access roads, and installation of aerial transmission line with associated ROW	Potential loss of wetland habitat.	• ROW alignments were adjusted to avoid tufted clubrush – Sphagnum bog plant community	Evidence of existing negative environmental effects (*e.g.,* existing forest harvesting).	Clearing of vegetation for the transmission line ROW will n0t affect the tufted clubrush – Sphagnum bog plant community.	During construction. Will only occur once for construction	Effects are reversible	No effect on wetland plant communities in the Assessment Area.	Probability of occurrence : based on professional judgment is low
Site preparation for terminal infrastructure, installation of pipeline laterals, upgrades and extension of access roads, and installation of aerial transmission line with associated ROW	Loss of salvageable timber	• Implementing the Hazardous Spill Contingency Plan, Timber Clearing and Salvage, Clean-up, Reclamation, and Fire Prevention and Suppression sections of EPP; • Implementing a Timber Harvest Plan for clearing of the ROWs and plant site	Evidence of existing negative environmental effects (*e.g.,* existing forest harvesting).	In the absence of proper planning and other mitigation, salvageable timber could be lost during clearing activities.	During construction. Will only occur once for construction	Effects are reversible	The EPP will require salvageable timber to be retrieved.	Probability of occurrence : based on professional judgment is low

Table 8. Summary of Effects, Mitigation and Significance – Wildlife and Wildlife Habitat

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Construction of the LNG terminal (including marine construction activities), pipeline lateral and hydro transmission ROWs, and new and upgraded access road.	Loss of habitat. An alteration of terrestrial habitats within the Assessment Area physically, chemically, or biologically, in quality or extent, in such a way as to cause a change or decline in the ecological function of that habitat. or a change or decline in the distribution or abundance of an animal population that is dependent upon that habitat.	• See description of proposed mitigation for detail. • Minimizing the size of temporary work spaces, • Confining clearing and grubbing to ROWs; • Minimizing the removal of riparian vegetation; • Scheduling construction work outside breeding/nesting/migratory/foraging seasons; • Revegetating decommissioned areas with native species; • Minimizing the LNG terminal footprint; • Minimizing ROW width and clearing; • Developing and implementing management and mitigation strategies to meet the requirements of the *Migratory Birds Convention Act* and the BC *Wildlife Act*; • Conducting field survey for Marbled Murrelets, tailed frogs, nesting areas, Great Blue Heron, other significant wildlife features; • Conducting reconnaissance surveys to confirm habitat suitability ratings as well as identify any special habitat features (dens, wildlife trees, etc.) that may be affected.	Evidence of existing negative environmental effects (*e.g.,* existing stream crossings).	Low to moderate magnitude. Moderate for wildlife is between 11-20% change in a measurable parameter (*i.e.*, habitat availability, mortality risk *etc*.). Specifically, between 11-20% of Moderate (Class 3) and/or High (Class 1 or 2) suitability habitats affected (alteration/loss) within Assessment Area. Moderate for avifauna is permanent alteration limited to the Assessment Area with no loss of habitat critical to Avifauna within the Assessment Area. Environmental effects restricted to Project site (*i.e.*, ROWs and/or LNG terminal footprint.	Short term effects are measurable for < 2 year . Occurs once only during construction.	Most potential effects are reversible, except the loss or alteration of habitat associated with the footprint	Alteration/loss of a small amount of habitat is not considered to be critical (habitat) for species survival. Low effect given the relatively small amount of habitat affected combined with the proposed mitigation	Probability of occurrence : based on professional judgment is high
Construction, operation and decommissioning of the LNG terminal (including marine construction activities), pipeline lateral and hydro transmission ROWs. Construction and operation of the new and upgraded access road.	Habitat Avoidance due to sensory disturbance and reduced effectiveness of the habitat which may cause a change in seasonal habitat suitability and/or populations	• See description of proposed mitigation for detail. • Scheduling construction/operation/ decommissioning activities outside critical seasons; • Providing visual screen buffers; • Designing site security lighting; • Prohibiting All Terrain Vehicle Use; • Considering public access control points; • Minimizing time required for tanker unloading; • Maintaining adequate hiding cover buffers; • Using designated shipping routes and pilots; • Minimizing high snow berms; the size of temporary work spaces; ROW width and clearing; • Maintaining low speed limits on access roads and posting of wildlife crossing signs; • Implementing and practicing bear safety	Evidence of existing negative environmental effects (*e.g.,* existing stream crossings).	Low to moderate magnitude. Environmental effects extend beyond the ROWs or LNG footprint but remain localized within the Assessment Area	Short to medium term: Effects are measurable for 2 to 20 years. Occurs rarely and at sporadic intervals except for vehicle traffic, unloading from vessels to tanks and maintenance which occurs on a regular basis and at regular intervals.	Effects are reversible	Although the effects could be somewhat higher for grizzly and black bear due to reduced habitat effectiveness , the small amount of habitat affected together with the proposed mitigation measures indicate the overall magnitude of residual adverse environmental effects of the Project as low	Probability of occurrence : based on professional judgment is high

Table 8. Summary of Effects, Mitigation and Significance – Wildlife and Wildlife Habitat (continued)

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Construction, operation and decommissioning of the LNG terminal (including marine construction activities). Pipeline lateral and hydro transmission ROWs. Construction and operation of the new and upgraded access road.	Changes to wildlife movement patterns	• See description of proposed mitigation for detail. • Scheduling construction/operation/ decommissioning activities outside critical seasons; • Facilitating wildlife movement across construction areas; • Posting wildlife crossing signs; • Minimizing extent and duration of the disturbance; high snow berms; the size of temporary work spaces; • Using designated shipping routes and pilots; • Ensuring a maximum distance of <200m is left between forest patches after harvesting; • Implementing a coordinated access management plan; • Ensuring the EPP addresses avifauna effects mitigation measures associated with repair work on pipelines; • Designing site security lighting	Evidence of existing negative environmental effects (*e.g.,* existing stream crossings).	Low magnitude for wildlife: Low to moderate magnitude for avifauna with some permanent alteration limited to the Assessment Area with no loss of habitat critical. Increased vehicle traffic is not expected to result in any substantive reduction in habitat quality. The proposed road upgrades intersect very little high value wildlife habitat or critical bird habitat for species most likely to interact with road activities or that may affect birds nesting in habitats near the road. Environmental effects extend beyond the ROW or LNG footprint but remain localized within the Assessment Area.	Primarily short term effects that occur rarely and at sporadic intervals. Vehicle traffic will have a longer duration on a more regular basis. Onshore preparation will have medium term duration effects (measurable for 2 to 20 years). Marine vessel traffic and transportation as well as vehicle traffic will have short to medium term duration effects which occurs rarely and at sporadic intervals.	Most potential effects are reversible, except the loss or alteration of habitat associated with the footprint and increased vehicle traffic related effects	The mitigation measures provided will result in residual environmental effects that are of low or moderate magnitude, generally localized in geographic extent and generally reversible over the long term.	Probability of occurrence: based on professional judgment is high
Construction, operation and decommissioning of the LNG terminal (including marine construction activities). Pipeline lateral and hydro transmission ROWs. Construction and operation of the new and upgraded access road.	Direct (e.g. vehicular collisions) or direct and indirect (e.g. bear-human conflict) mortality.	• See description of proposed mitigation for detail. • Avoiding the re-seeding of roadsides with preferred bear or ungulate forage plants; • Implementing and practicing bear safety; • Implementing a coordinated access management plan; • Scheduling construction/operation/ decommissioning activities outside critical seasons • Maintaining low speed limits on access roads and posting of wildlife crossing signs; • Considering public access control points; • Minimizing size of temporary work spaces • Ensuring safe handling, storage and disposal of food and food wastes as part of EPP	Evidence of existing negative environmental effects (*e.g.,* existing stream crossings).	For wildlife, low magnitude. For Avifauna, low magnitude except for ROW construction and construction vehicle traffic. These activities are high magnitude with permanent alteration within the Assessment Area of habitat critical to the survival of Avifauna within the Assessment Area. Environmental effects may extend beyond the ROWs or LNG footprint but remain localized within the Assessment Area.	Short term effects that occurs rarely and at sporadic intervals. Maintenance and vehicle traffic are of longer duration and occur more regularly	Effects are Irreversible	Although the effects could be somewhat higher for grizzly and black bear due increased mortality risk, the small amount of habitat affected together with the proposed mitigation measures indicate the overall residual adverse environmental effects of the Project as low	Probability of occurrence: based on professional judgment is high

Table 9. Summary of Effects, Mitigation and Significance – Freshwater Fish and Fish Habitat

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Site preparation (grubbing, clearing and grading), construction of on-shore facilities, watercourse crossings (pipeline lateral and road/transmission line), road upgrading, and pipeline access.	Loss of riparian vegetation or alteration of the native species assemblage (*e.g.* change of vegetation type from forest or shrub to grassland on the pipeline lateral ROW) can adversely affect habitat productive capacity of fish habitat.	• Minimizing vegetation removal and soils loss within Riparian Management Areas of all streams; • Re-vegetating stream banks with native plants, grasses, shrubs and trees; • Locating Project facilities outside of established Riparian Management Areas; and • Locating pipeline lateral and transmission line ROWs side-by-side to reduce area of effect and overall impact.	Terminal site area is relatively pristine or not adversely affected by human activity. ROW has evidence of existing negative environmental effects (*e.g.,* existing stream crossings).	Low magnitude. Localized effect on fish or fish habitat limited to construction with no permanent destruction or alteration of riparian or in-stream fish habitat quality or quantity. Alteration off-set by mitigation. Environmental effects mainly restricted to stream within right-of-way or LNG facilities footprint. Some environmental effects to streams within and downstream from right-of-way or LNG facilities footprint.	Short to medium term – measurable for 1 to 5 years. Occurs rarely.	Effects are Reversible Reversibility can be accelerated through mitigation and habitat restoration techniques.	Potential environmental effects are expected to be mitigated and will not result in: a reduction in the ecological function of habitat; a reduction in the abundance of a fish community that is dependent upon that habitat, and/or an unmitigated or non-compensated net loss of fish habitat.	High probability of occurrence
Site preparation (grubbing, clearing and grading), construction of on-shore facilities, watercourse crossings (pipeline lateral and road/transmission line), road upgrading, pipeline access and maintenance of vegetation along the ROWs.	Alteration of habitat quality. Potential degradation of water quality caused by deposition of eroded sand, gravel and fines. Increased sediment loads entering a watercourse that may affect pool depths, spawning substrate quality, instream fish cover attributes and/or creation of partial or permanent migration barriers	• Implementing sediment control measures as outlined in a sediment control plan; • Implement necessary erosion control measures as outlined in an erosion control plan (ECP) for each stream class, crossing type, and type of water body that will be crossed during construction; • Use of aerial pipeline crossings and open bottom arch or oversized/countersunk road culverts; • Use of bridges for road crossings and horizontal directional drilling or aerial methods for pipelines for all fish bearing stream crossings for S1 and S2 class streams; • Conducting stream crossings during the period of least risk to fish and fish habitat; • Restoration of streambeds to pre-construction status and by incorporating large woody debris (LWD) and boulders into stream channel restoration; • Adhering to the *Forests and Range Protection Act*, Stream Crossing Guidebook (FRPA 2002) and MOE's Standards and Best Practices for Instream Works; and • Maintaining roads to the standards of the existing Bish FSR and through a road maintenance plan, minimize effects on water and fisheries, such as: roadside maintenance; road signage; surface drainage; surface and bridge/structure maintenance; and winter maintenance. • Designing the proposed FSR upgrades in accordance with the Ministry of Transportation (MOT) Low Volume Rural standard for Category C (Industrial Resource Roads), and to enter into a road use agreement with West Fraser Mills Ltd. that incorporates this standard using the enhanced design criteria contained in the supplementary Road Report	Terminal site area is relatively pristine or not adversely affected by human activity. ROW has evidence of existing negative environmental effects (*e.g.,* existing stream crossings).	Low magnitude. Localized effect on fish or fish habitat mostly limited to construction period or over a short period of time for maintenance with no permanent destruction or alteration of riparian or in-stream fish habitat quality or quantity. Alteration off-set by mitigation. Environmental effects mainly restricted to stream within right-of-way or LNG facilities footprint. Some environmental effects to streams within and downstream from right-of-way or LNG facilities footprint.	Short to medium term – measurable for 1 to 5 years. Occurs rarely except for maintenance activities which occur more regularly.	Effects are Reversible Reversibility can be accelerated through mitigation and habitat restoration techniques.	Potential environmental effects are expected to be mitigated and will not result in: a reduction in the ecological function of habitat; a reduction in the abundance of a fish community that is dependent upon that habitat, and/or an unmitigated or non-compensated net loss of fish habitat.	High probability of occurrence

Table 9. Summary of Effects, Mitigation and Significance – Freshwater Fish and Fish Habitat (continued)

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Site preparation (grubbing, clearing and grading), construction of on-shore facilities, watercourse crossings (pipeline lateral and road/transmission line), road upgrading, and pipeline access.	Fish/Ova mortality	• Isolating work area and salvage fish before commencing crossing work (a permit for fish salvage may be required from DFO); • Implement sediment and erosion control measures in a sediment control plan; • Conducting crossings in the dry between July 15 and September 01; • Implement EPP guidelines for treatment and disposal of concrete wash water, and storm water that comes into contact with uncured concrete and hydrostatic test water • Screen by-pass and water intake pumps as per Freshwater Intake End-of-Pipe Fish Screen Guidelines; • Conducting blasting in accordance Guidelines for use of Explosives in Canadian Fisheries Waters. • The Proponent will adhere to the spill prevention and response provisions in its EPP, which are in accordance with all applicable provincial and federal legislation and regulations.	Terminal site area is relatively pristine or not adversely affected by human activity. ROW has evidence of existing negative environmental effects (*e.g.,* existing stream crossings).	Low magnitude. Localized effect on fish or fish habitat limited to construction period with no permanent destruction or alteration of riparian or in-stream fish habitat quality or quantity. Alteration off-set by mitigation. Fish mortality should not occur if mitigation is applied as described. Environmental effects mainly restricted to stream within right-of-way or LNG facilities footprint. Some environmental effects to streams within and downstream from right-of-way or LNG facilities footprint.	Short to medium term – measurable for 1 to 5 years. Occurs rarely.	Effects are Irreversible	Potential environmental effects are expected to be mitigated and will not result in: a reduction in the ecological function of habitat; a reduction in the abundance of a fish community that is dependent upon that habitat, and/or an unmitigated or non-compensated net loss of fish habitat.	High probability of occurrence
Water and waste water management	Waste water discharges affecting water quality.	• Implement EPP guidelines for treatment and disposal of concrete wash water, and storm water that comes into contact with uncured concrete and hydrostatic test water • Collecting and neutralizing all high pH waters prior to disposal • Mitigations outlined in a Water Management Summary Report will be implemented to address potential effects to water chemistry • Implement sediment control measures as outlined in a sediment control plan; • Working with the DOK to address issues related to long-term wastewater treatment and use of community infrastructure prior to construction; • Developing a Stormwater Management Plan (SMP) prior to construction of the facility including a site run-off control program • Screening water intakes as per DFO guidelines; • Implementing an automatic neutralization process for settling pond effluent; • Working with DFO and the Ministry of Environment to determine an appropriate location for discharge of process water, as well as acceptable water quality and discharge infrastructure requirements.	Terminal site area is relatively pristine or not adversely affected by human activity. ROW has evidence of existing negative environmental effects (*e.g.,* existing stream crossings).	Low magnitude. Localized effect on fish or fish habitat limited to construction period with no permanent destruction or alteration of riparian or in-stream fish habitat quality or quantity. Alteration off-set by mitigation. Environmental effects restricted to streams within and downstream from right-of-way or LNG facilities footprint.	Short to medium term – measurable for 1 to 5 years. Occurs rarely.	Effects are Reversible Reversibility can be accelerated through mitigation and habitat restoration techniques.	Potential environmental effects are expected to be mitigated and will not result in: long-term exceedances of water quality guidelines.	High probability of occurrence

Table 10. Summary of Effects, Mitigation and Significance – Marine Environment and Marine Mammals

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Construction of the LNG tanker berth; construction of the tug and barge docking facility; marine vessel (tug, LNG tanker) traffic; site water management and run-off; the intake of marine water, and decommissioning	Direct mortality. Of intertidal and subtidal benthic communities or organisms. Increased risk of vessel-marine mammal collisions. Boat generated waves dislodging eggs. Potentially exposing native marine organisms to exotic/invasive species introduction through ballast water exchange, hull fouling and direct transport	• Requiring construction vessels to operate outside of biologically sensitive areas and outside of periods of critical fish life stages; • Including in the EPP a marine mammal monitoring program for construction; • Construction timing outside of biologically sensitive areas and periods and critical fish stages; • Including requirement for a construction sediment control plan (silt curtains) in the EPP; • Designing of barge and tug berth facilities to reduce number of piles, dredging and blasting, and to remove dredged material from site as required; • Timing of dredging to avoid key biological processes (migration, spawning, etc.), and to minimize sediment transport and mixing; • Reducing the amount of blasting necessary through use of specialized drilling equipment; • Detailed designing of blasting to minimize pressure waves, and avoidance of biologically sensitive areas; • Screening of marine intake pipes required for fire control, as required by DFO; • A brochure will be produced for shipping contractors that includes information on seasonal marine mammal activity and critical avoidance areas; • Requiring in shipping contracts that ships adhere to Transport Canada's National Ballast Water Management Guidelines and Oil Pollution Prevention Regulation for bilge water management. Contracts will also ensure that no bilge water is released while tankers are at berth	Evidence of existing negative environmental effects (*e.g.,* Methanex, Eurocan or Alcan).	Low magnitude. HADD on fish or fish habitat avoided by mitigation only Geographic extent for construction is within the footprint of the LNG tanker/tug/barge berthing and unloading infrastructure for the barge loading structure; from existing shipping lane to the berthing footprint for off-shore site preparation (blasting, dredging and side-casting) and tug traffic; and out to the Kitimat Arm and Douglas Channel for vessel traffic.	Construction, operation and decommissioning. Short term: effects that occurs rarely and at sporadic intervals. Operation of the facility and marine vessels occurs on a regular basis and at regular intervals	Effects are Irreversible	Not expected to cause declines in abundance or changes in distribution of populations. Natural recruitment is expected to re-establish species presence to baseline conditions	High probability of occurrence
Construction of the LNG tanker berth; construction of the tug and barge docking facility; marine vessel (tug, LNG tanker) traffic; site water management and run-off; discharge of freshwater; and the intake of marine water.	Habitat Use Change. Construction activities may cause avoidance of the adjacent waters by fish and marine mammals. Vessel-marine mammal collisions may alter typical marine mammal and fish movements and behaviour. Noises generated may attract or deter marine mammals (and marine fish) and hence deter marine mammals from traditional migratory or travel routes.	• Implementing acoustic restrictions during construction, and planning of construction timing outside of biologically sensitive areas and periods and critical fish life stages; • Including in the EPP a marine mammal monitoring program for construction; • Inclusion in the EPP of a site run-off control program for construction; • Including requirement for a construction sediment control plan (silt curtains) in the EPP; • Including in the EPP a marine water quality monitoring program for construction; • Provision for the discharge of fresh water during construction only during high-tides; • Designing of barge loading structure with consideration for fish movement and habitat use (shoreline, spawning, etc.); • Minimizing the use of night lighting; • Berth orientation and design to minimize potential shade effects of decking and effects on eelgrass habitat; • A brochure will be produced for shipping contractors that includes information on seasonal marine mammal activity and critical avoidance areas	Evidence of existing negative environmental effects (*e.g.,* Methanex, Eurocan or Alcan).	Low magnitude. HADD on fish or fish habitat avoided by mitigation only. Due to the short construction phase and the implementation of the EPP, the potential effects to marine mammals are predicted to be low. With proposed mitigations, potential environmental effects of LNG tanker operations are considered low. Noise effects will not be continuous and will be of short duration. Effects extend to include the majority of Cove for construction and include the Kitimat Arm and Douglas Channel for vessel traffic.	Construction, operation and decommissioning. Short tern effects that occur rarely and at sporadic intervals. Operation of the facility and marine vessels occurs on a regular basis and at regular intervals	Effects are reversible	Habitat use change will be mitigated with specific protection measures and through timing of construction activities.	High probability of occurrence

Table 10. Summary of Effects, Mitigation and Significance – Marine Environment and Marine Mammals (continued)

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likeli-ood
			Context	Extent	Occurrence	Reversibility		
Construction of the LNG tanker berth; construction of the tug and barge docking facility; marine vessel (tug, LNG tanker) traffic; site water management and run-off; and discharge of freshwater.	Habitat change. Introduction of suspended sediment to the marine water column, degrading water quality, increasing the suspended sediment load, and potentially accumulating on the substrate. Effects on marine benthic organisms and pelagic fish may occur through water quality degradation, ingestion of suspended sediments, substrate alterations due to grain size shifts or by smothering due to accumulated sediment. Disturbance of finer-grained bottom sediments through propeller wash effects, and these alterations to the flow of water and sediment suspension may potentially affect eelgrass beds. Discharge of freshwater into the marine environment.	• Implementing acoustic restrictions during construction, and planning of construction timing outside of biologically sensitive areas and periods and critical fish life stages; • Construction timing outside of biologically sensitive areas and periods and critical fish stages; • Including in the EPP a marine mammal monitoring program for construction; • Developing operational procedures for tug traffic; • Implementing vessel speed/thrust management program; • Including requirement for construction sediment control plan (silt curtains) in EPP; • Designing of barge and tug berth facilities to reduce number of piles, dredging and blasting, and to remove dredged material from site as required; • Use of a grab dredge to minimize marine sedimentation; • Including in the EPP a marine water quality monitoring program for construction; • Utilization of admixtures with underwater concrete to avoid increased sedimentation and pH levels during construction; • Inclusion in the EPP of a site run-off control program • Implement ballast control measures • For Bish Cove site, use a fibro-densification process to compact and stabilize marine sediments for marine facility construction, thereby eliminating the requirement for dredging and blasting. Put procedures in place to ensure capture and control of silt and other fine sediments displaced by this process; • Implement a vessel speed/thrust management plan, identifying and marking environmentally sensitive areas for restricted vessel operation, as well as any other recommendations of the TERMPOL committee; • Collect all process water in a containment pond that will provide an opportunity for sediments to settle out of the water, and for reduction of water temperatures before water is discharged into the marine environment. • Working with DFO and the Ministry of Environment to determine an appropriate location for the discharge of process water into the marine environment during operations, and to confirm acceptable water quality (salinity and temperature) and discharge infrastructure	Evidence of existing negative environme ntal effects (*e.g.,* Methanex, Eurocan or Alcan).	Low magnitude. HADD on fish or fish habitat avoided by mitigation only. Given mitigation (EPP water quality monitoring) and site design, effects associated with site water management are considered low. Geographic extent includes the footprint of the LNG tanker/tug/barge berthing and unloading infrastructure to also include the majority of Cove for certain project components. Vessel traffic includes the Kitimat Arm and Douglas Channel. For freshwater discharge, most species are somewhat tolerant of low saline waters, so the effects will be contained to the immediate area of discharge.	Construction and operation. Short tern effects that occur rarely and at sporadic intervals. Operation of the facility and marine vessels occurs on a regular basis and at regular intervals.	Effects are reversible	Fish and invertebrate use of the habitat is expected to return to baseline conditions.	High probability of occurrence

Table 10. Summary of Effects, Mitigation and Significance – Marine Environment and Marine Mammals (continued)

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likeli-ood
			Context	Extent	Occurrence	Reversibility		
Construction of the LNG tanker berth; construction of the tug and barge docking facility and decommissioning.	Habitat loss. Removal or physical effects to benthic habitat. Destruction of adjacent inshore fish habitat. Degradation of water quality and bottom habitat that and may result in eelgrass and other habitat loss in Emsley.	• Designing of barge and tug berth facilities to reduce number of piles, dredging and blasting, and to remove dredged material from site as required; • Use of a grab dredge to minimize marine sedimentation; • Berth orientation and design to minimize potential shade effects of decking and effects on eelgrass habitat; • Development of a fish habitat compensation plan for DFO approval, within an agreed upon time frame	Evidence of existing negative environmental effects (*e.g.,* Methanex, Eurocan or Alcan).	Moderate magnitude. HADD on fish or fish habitat; offset by mitigation and compensation. Geographic extent is restricted to the footprint of the LNG tanker/tug/barge berthing and unloading infrastructure.	During construction and decommissioning. Medium term effects that occurs once. The reversibility of any potential effects is high once construction ends Potential effects due to habitat loss are considered temporary.	Effects are reversible	Amount of habitat lost will be limited through mitigation. Any residual loss will be compensated for through s.35(2) *Fisheries Act* Authorization(s), which will include a compensation plan.	High probability of occurrence

Table 11. Summary of Effects, Mitigation and Significance – Heritage and Archaeological Resources

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Clearing, blasting, grading, trenching	Disturbance of archaeological and heritage resources.	• Designing the Project to avoid disturbance of known archaeological sites wherever possible • Documentation of sites identified in the Project area; • Undertaking of mitigative studies in consultation with the Haisla and as approved by the Archaeology Branch (AB)of the MTSA(or PC), should site disturbance be required; • Avoidance of known resources if possible; and • Excavation of identified resource where disturbance is unavoidable, as approved by the AB (or PC). • Undertake archival research on the location of the early village in Emsley Cove, if Emsley Cove is authorized for the plant site, to be completed prior to Project construction to determine whether the village lies within the Project boundaries, and if so, further field investigation will be undertaken prior to Project construction. • Prior to disturbance; undertake additional inventory and assessment for any areas affected by plant site or road, power and pipeline route alterations that were not within the study area of the initial HIA report, and for any substantial changes to Project design. • Undertake a post-disturbance inventory of the bedrock areas located above the proposed ship berth site in Emsley • Undertake additional Haisla interviews regarding the burial site of a 'giant' individual as reported in the Emsley Cove AIA. • For a Bish Cove plant location, conduct an AIA for unsurveyed portions of the road, ROW and terminal site to document archaeological resources.	Area is relatively pristine or not adversely affected by human activity	Low magnitude. Loss of a minor proportion of data at site, local or regional level; after low impact, interpretive capacity of the remains is virtually intact, limited only by loss of minor items and/or features. Limited extent	During construction. Limited duration and frequency.	Effects are Irreversible	The recommended mitigation measures and consultation with the Haisla Kitamaat Village will ensure suitable accommodation	Probability of occurrence is low
Maintenance, road and facility	Disturbance of sites	• same as above	Area is relatively pristine or not adversely affected by human activity	Low magnitude. Loss of a minor proportion of data at site, local or regional level; after low impact, interpretive capacity of the remains is virtually intact, limited only by loss of minor items and/or features. Limited extent	During operations. Continuous.	Effects are Irreversible	The recommended mitigation measures and consultation with the Haisla Kitamaat Village will ensure suitable accommodation	Probability of occurrence is low
Natural processes such as major storms and floods as well as shoreline disturbance from tanker traffic	Site erosion Site disturbance	• same as above • Assess the impact of tanker traffic on the rock art sites on bedrock exposures flanking Douglas Channel in the vicinity of the marine terminal and implement mitigative measures if required.	Area is relatively pristine or not adversely affected by human activity	Low magnitude. Loss of a minor proportion of data at site, local or regional level; after low impact, interpretive capacity of the remains is virtually intact, limited only by loss of minor items and/or features. Limited extent	Ongoing as events occur.	Effects are Irreversible	The recommended mitigation measures and consultation with the Haisla Kitamaat Village will ensure suitable accommodation	Probability of occurrence is low

Table 12. Summary of Effects, Mitigation and Significance – Land and Resource Use

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Facility Construction (on land) and operation	Change in land use. Disruption or change in land and resource activities. Restriction in access. Loss of natural aesthetic/wilderness character	• Obtain zoning change. • Provide environmental awareness training for all personnel. • Inform/update community/public of plans and changes occurring at the facility.	Area is relatively pristine or not disturbed by human activity	Low magnitude. Low magnitude is where land and resource use activities and users are disrupted or subject to change for short periods of time. Geographic extent relatively limited given the availability of other areas outside the District of Kitimat that can be used for related activities	Construction and operation. Continuous	Effects are reversible	Disturbance of established activity patterns will be for less than two generations.	High probability of occurrence
Marine facility construction, operation and vessel traffic	Disruption or change in fishing and recreational activities. Loss of natural aesthetic /wilderness character	• Inform vessel operators, related organizations, and public of plans for marine work and LNG vessel schedules. • Use designated shipping routes. • Scheduling vessel arrival/ departure times outside of known times of fishing and traditional use, where possible • Manage public access on the foreshore through provisions of relevant foreshore tenures, maintain a map of recommended public safety sites on its web site (i.e. unrestricted access areas where there is a risk to public safety due to proximity to the LNG facility); • Continue to work with the DOK, local recreational groups, other industries and the Haisla to address public recreational access issues in Douglas Channel.	Area is relatively pristine or not disturbed by human activity	Low magnitude. Low magnitude is where land and resource use activities and users are disrupted or subject to change for short periods of time. Geographic extent relatively limited given the availability of other areas outside the District of Kitimat that can be used for related activities	Construction and operation. Continuous	Effects are reversible	Disturbance of established activity patterns will be for less than two generations.	High probability of occurrence
Access road upgrade/ extension. Pipeline and transmission line construction/installation.	Disruption or change in land and resource use activities. Improved access for users. Loss of natural aesthetic/wilderness character	• Inform community/public and Haisla of plans • Entering into an agreement with road owner/operator for FSR use and notifying other road users. • Post notices at start of road and along route, where necessary, to inform vehicle operators about any maintenance work.	Evidence of disturbance from human activity	Low magnitude. Low magnitude is where land and resource use activities and users are disrupted or subject to change for short periods of time. Geographic extent relatively limited.	Construction. Continuous	Effects are reversible	Disturbance of established activity patterns will be for less than two generations.	High probability of occurrence
Water management (waste water and runoff management)	No effect if managed properly.	• Ensure that treatment and discharge equipment is proper maintained and monitored. • Ensuring the DOK is consulted throughout the design stage on components that are subject to municipal by-laws.	Area is relatively pristine or not disturbed by human activity	Low magnitude and small (,<1 $km^{2)}$ geographic extent. Low magnitude is where land and resource use activities and users are disrupted or subject to change for short periods of time	Construction and operation. Low frequency	Effects are reversible	Disturbance of established activity patterns will be for less than two generations.	High probability of occurrence

Table 12. Summary of Effects, Mitigation and Significance – Land and Resource Use (continued)

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Waste Management	No effect if managed properly.	• Ensuring the DOK is consulted throughout the design stage on components that are subject to municipal by-laws.	Area is relatively pristine or not disturbed by human activity	Low magnitude. Low magnitude is where land and resource use activities and users are disrupted or subject to change for short periods of time. Geographic extent relatively limited given the availability of other areas outside the District of Kitimat that can be used for related activities	Construction and operation. Low frequency	Effects are reversible	Disturbance of established activity patterns will be for less than two generations.	High probability of occurrence
Vehicle Traffic	Disruption or change in land and resource use activities. Increased potential for accidents.	• Inform community/public and Haisla of plans. • Entering into an agreement with road owner/operator for FSR use and notifying other road users. Post notices on at start of road and along route, where necessary, to inform vehicle operators about construction work.	Evidence of disturbance from human activity	Low magnitude. Low magnitude is where land and resource use activities and users are disrupted or subject to change for short periods of time. Geographic extent relatively limited given the availability of other areas outside the District of Kitimat that can be used for related activities	Construction and operation. Increased frequency	Effects are reversible	Disturbance of established activity patterns will be for less than two generations.	High probability of occurrence

Table 13. Summary of Effects, Mitigation and Significance – Navigation

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Marine vessel traffic	An increase in vessel traffic within Douglas Channel/Kitimat Arm has a corresponding potential increase in the chance for: collision with other vessels and marine mammals. (safe movement and operation of vessels) and cargo release (pollution) from the grounding of a ship traveling to the Kitimat LNG facility	• Developing a Marine Terminal Manual to address specific requirements and operations of the LNG facilities; • Developing operational procedures for tug traffic; • Establishing marine safety zones for terminal and vessel access; • Provision of notice of marine work and schedules to CCG for "Notice to Mariners"; • Working with Transport Canada on establishing a designated route for shipping between shipping lanes and the terminal; • Adherence to following legislation and regulations pertaining to shipping, providing the necessary notification to the CCG's MCTS (Marine Communications and Traffic Services) in Prince Rupert, and consulting with local fishers, recreational users, Port of Kitimat, harbour pilots and relevant regulatory agencies. • Conduct drift tests in Douglas Channel and the cove approved for the marine terminal prior to facility commissioning, and will provide data to the pilotage authority. Real time wind and current data at berth face for use by the Pilots during ship berthing.	Evidence of disturbance from human activity.	Low magnitude as the potential for collision will be reduced through mitigation and regulation. Disturbances will extend beyond the scope of the project into the Douglas Channel and Kitimat Arm.	Construction and operation. Continuous	Effects are reversible	The effect is predicted to be minimal, as management of vessel traffic will mitigate the potential effect to the marine environment	Low probability of occurrence for collisions.
Marine vessel traffic	Increased potential use conflict among recreational and commercial marine vessel users	• Scheduling vessel arrival/departure times outside of known times of fishing and Haisla traditional use; • Continue to work with the DOK, local recreational groups, other industries and the Haisla to address public recreational access issues in Douglas Channel	Evidence of disturbance from human activity.	Low magnitude. Low magnitude is where use activities and users are disrupted or subject to change for short periods of time. Geographic extent relatively limited given the availability of other areas outside the District of Kitimat that can be used for related activities	Construction and operation. Continuous	Effects are reversible	The effect is predicted to be minimal, as management of vessel traffic will mitigate the potential effect	High probability of occurrence
Marine vessel traffic	An increase in vessel traffic within Douglas Channel/Kitimat Arm has a corresponding potential increase in the chance for: physical shoreline disturbances from wake; and marine habitat disturbance in the Coves.	• Undertaking a TERMPOL review to eliminate or minimize potential adverse effects on environmental components of value to First Nations and the public that may arise from physical disturbances or releases resulting from tanker movements; • Working with the TERMPOL committee to establish the number of tugs required and the size of the tug berth, as well as to continue to work with TC and DFO in the approval/authorization processes to minimize the potential effects of the tug berth on the marine environment. • Working with the TERMPOL review committee to ensure that preliminary commitments related to tug and tanker operation will be reviewed for operational feasibility by tug and tanker operators and local pilots before they are carried forward into the TERMPOL process • Assessing potential shoreline erosion due to LNG shipping activity at significant sites along Douglas Channel as part of the TERMPOL process. Significant sites will be determined through a review of shoreline areas identified by First Nations as having cultural significance, as well as through a review of available archaeological information, and appropriate measures taken, as recommended by the TERMPOL committee. • Requiring larger LNG tankers to move further out of the cove for turning.	Evidence of disturbance from human activity. Coves are relatively pristine or not adversely affected by human activity	Low magnitude as the potential for shoreline disturbances, and effect on marine habitat will be reduced through mitigation and regulation. Disturbances will extend beyond the scope of the project into the Douglas Channel and Kitimat Arm. Effects on marine habitat are from existing shipping lane to the berthing footprint in both Emsley and Bish Coves.	Construction and operation. Continuous	Effects are reversible	The effect is predicted to be minimal, as management of vessel traffic will mitigate the potential effect to the marine environment and shoreline	High probability of occurrence for effects

Table 13. Summary of Effects, Mitigation and Significance – Navigation (continued)

Component	Project Effect	Mitigation Measures	Residual Effect				Significance	Likelihood
			Context	Extent	Occurrence	Reversibility		
Construction of the pipeline, powerline and the potential construction/upgrade of bridges that cross navigable waters	May result in impacts to navigation by small recreational water craft.	• Adhering to the stream crossing commitments applicable to roads, pipelines and powerlines as identified in Section 2.4.2 of this Report (Freshwater Environment and Fisheries).	NA	NA	NA	NA	NA	NA
Construction and operation of the berth facilities	Will likely result in a hindrance to some recreational boaters using the cove as the berth will be a physical obstruction	• Transport Canada will require lighting and marking as conditions of the Navigable Waters Protection Act approval to ensure all marine users are aware of its presence. • The berth facilitate will be placed on marine navigation charts by the Canadian Hydrographic Services.	Coves are relatively pristine or not adversely affected by human activity	Low magnitude. Low magnitude is where use activities and users are disrupted or subject to change for short periods of time. Geographic extent relatively limited given the availability of other areas outside the District of Kitimat that can be used for related activities	Construction and operation. Continuous	Effects are reversible	The effect is predicted to be minimal, as management of vessel movement in the Coves will mitigate the potential effect	High probability of occurrence for effects

APPENDIX A - CRITICAL DOCUMENTS AND KEY CORRESPONDENCE

Link to EAO website
http://www.eao.gov.bc.ca/epic/output/html/deploy/epic_project_home_244.html

December 8, 2004	Summary of Working Group Meeting #1. Link to EAO website
June 6, 2005	Application and Supporting Appendices for an Environmental Assessment Certificate for the Kitimat LNG Terminal Project. Link to EAO website
June 27, 2005	Summary of Working Group Meeting #2. Link to EAO website
July 21, 2005	Environmental Assessment Track Report for Kitimat Liquefied Natural Gas (LNG) Terminal Project, submitted by Environment Canada and Transport Canada to the Minister of Environment. Link to EAO website
July 27, 2005	Letter from Rosemary Boulton (Kitimat LNG Inc.) to Gerard A. McDonald (Transport Canada) requesting a TERMPOL review for the Kitimat LNG Terminal Project. Link to EAO website
August 3, 2005	Preliminary map of eelgrass beds in Emsley Cove. Link to EAO website
August 15, 2005	Letter from Gerard A. McDonald (Transport Canada) to Rosemary Boulton (Kitimat LNG Inc.) agreeing to establish a TERMPOL review process for the Kitimat LNG Terminal Project. Link to EAO website
August 19, 2005	Technical Data Report - Breeding Bird Survey June 2005 for Kitimat LNG Terminal Project. Link to EAO website
August 29, 2005	Map of Watercourse Crossings in Emsley Cove and Bish Cove for Alternative Site Analysis. Link to EAO website

September 13, 2005	Report dated August 2005 on Preliminary Recommendations for Improvements to Access Road to Emsley Cove. Link to EAO website
September 13, 2005	Report on Post-Application Public and Haisla community consultation for Kitimat LNG Terminal Project. Link to EAO website
September 19, 2005	Technical Data Report - Coastal Tailed Frog Survey for Kitimat LNG Terminal. Link to EAO website
September 23, 2005	Technical Data Draft Report - Rare Plant Survey for Kitimat LNG Terminal. Link to EAO website
September 26, 2005	Dioxin and Furan Analysis in Soil - Lab Results dated March 4/05. Link to EAO website
September 26, 2005	Emsley Cove Sediment Chemistry Results: Dioxin and Furan Analysis dated September 22/05. Link to EAO website
September 26, 2005	Kitimat LNG Terminal - Water Management Summary. Link to EAO website
September 28, 2005	Proposed Access Road Extension to Emsley Cove; Key Plan Map - Original Route dated September 8/05. Link to EAO website
September 29, 2005	Summary of Working Group Meeting #4. Link to EAO website
September 26, 2005	Supplementary Information on Alternative Means of Carrying out the KLNG Project. Link to EAO website
October 20, 2005	Memo from Ron Byres (Moffatt & Nichol) to Kevin Miller (Kitimat LNG Inc.) regarding the need for a permanent tug berth at the marine terminal. Link to EAO website

October 20, 2005	Memorandum and maps from Ward Prystay (Jacques Whitford) to Kam Sadar (Environment Canada) regarding Dioxan and Furan Data for Sediments from Emsley Cove. Link to EAO website
October 27, 2005	Map # 5499-SK-14 from Ron Byres (Moffatt & Nichol) to Kevin Miller (Kitimat LNG Inc.) showing Relocated Barge Jetty/Tug Berth Location in Emsley Cove. Link to EAO website
October 31, 2005	Summary of Meeting with Transport Canada and KLNG Inc. regarding Marine Security for LNG terminals in Canada. Link to EAO website
November 3, 2005	Map # 5499-SK-15 from Ron Byres (Moffatt & Nichol) to Kevin Miller (Kitimat LNG Inc.) showing Vessel Manoeuvrability Limits for Propeller Wash Impact Reduction. Link to EAO website
November 3, 2005	Supplemental Drawing No. 1 showing Restricted Access/Use Areas for Emsley Cove Plant Site and Marine terminal. Link to EAO website
November 9, 2005	Revised Propeller Wash Study for Kitimat LNG Terminal. Link to EAO website
November 10, 2005	Supplemental Drawing No. 2 from Jacques Whitford showing Proposed Environmental Setbacks for Emsley Cove Plant Site. Link to EAO website
November 21, 2005	Letter from Rosemary Boulton (Kitimat LNG Inc.) to John Bones (EAO) requesting a temporary suspension of the 180 day time limit prescribed under BCEAA. Link to EAO website
November 21, 2005	Letter from John Bones (EAO) to Rosemary Boulton (Kitimat LNG Inc.) agreeing to a temporary suspension of the 180 day time limit prescribed under BCEAA. Link to EAO website
November 23, 2005	Letter from John Bones (EAO) to Rosemary Boulton (Kitimat LNG Inc.) identifying requirements for resumption of the Kitimat LNG Terminal Project review. Link to EAO website
December 15, 2005	Letter from Chief Steve Wilson (Kitamaat Village Council) to John Bones (EAO) and Jason Quigley (CEA Agency) regarding a signed Agreement in Principle with

	Kitimat LNG Inc. and support for the Project at Bees IR No. 6. Link to EAO website
December 19, 2005	Letter from Rosemary Boulton (Kitimat LNG Inc.) to EAO, CEA Agency and federal Responsible Authorities requesting a more thorough assessment of Bish Cove as part of the environmental assessment process. Link to EAO website
December 22, 2005	Letter from Rosemary Boulton (Kitimat LNG Inc.) to John Bones (EAO) confirming an estimate of the extent of possible shoreline modification at Bish Cove of approximately 2.2 hectares. Link to EAO website
January 11, 2006	Bish Cove Addendum Report to EA Certificate Application for the Kitimat LNG Terminal Project. Link to EAO website
February 2, 2006	Supplement to the January 11, 206 Bish Cove Addendum Report - Habitat Compensation Options for the Marine Terminal in Bish Cove. Link to EAO website
February 6, 2006	Updated Map of Bish Cove Tug and Tanker No-Go Zones. Link to EAO website
February 9, 2006	Revised Table of Comparison of Alternative Sites dated February 9, 2006 Link to EAO website
February 15, 2006	Summary of Working Group Meeting #5. Link to EAO website
February 24, 2006	Project Working Group Issues Tracking Table. Link to EAO website
February 28, 2006	Summary Report on January 18 to February 22, 2006 Public Consultation on Bish Cove Addendum to the Environmental Assessment Certificate Application. Link to EAO website
March 2, 2006	Updated Map of Emsley Cove Tug and Tanker No-Go Zones. Link to EAO website
March 6, 2006	Revised Restricted Access Areas map for Bish Cove Terminal.

	Link to EAO website
March 14, 2006	Revised Emsley Cove Restricted Access Areas Map.
	Link to EAO website
March 14, 2006	Updated Emsley Cove Facilities Layout Map.
	Link to EAO website
March 14, 2006	Updated Bish Cove Facilities Layout Map.
	Link to EAO website
March 14, 2006	Letter from John Bones (EAO) to Rosemary Boulton (Kitimat LNG Inc.) officially resuming the EAO environmental assessment process for the Kitimat LNG Terminal Project review.
	Link to EAO website
March 15, 2006	Updated Construction Phase Environmental Protection Plan (EPP) Overview.
	Link to EAO website
March 15, 2006	Updated Operation Phase Environmental Protection Plan (EPP) Overview.
	Link to EAO website
April 13, 2006	Letter from Haisla indicating satisfaction with the Assessment Report / Comprehensive Study Report and its conclusions.
	Link to EAO website
April 13, 2006	Letter from Haisla indicating satisfactory consultation and accommodation in the harmonized environmental assessment process.
	Link to EAO website

APPENDIX B - PROJECT WORKING GROUP MEMBERSHIP LIST

- John Bones - Environmental Assessment Office (co-chair)
- Margaret Bakelaar – Canadian Environmental Assessment Agency (co-chair)
- David Eirikson - Environmental Assessment Office
- Pat Lim - Fisheries and Oceans Canada;
- Kamuran Sadar - Environment Canada;
- Derek Nishimura and Bob Gowe - Transport Canada;
- Carl Alleyne - Health Canada;
- Heather Davis - Indian and Northern Affairs Canada
- Iannick Lamirande - Natural Resources Canada;
- Troy Larden and Craig Stewart (Ministry of Environment);
- Jim Pike (Ministry of Tourism, Sport and the Arts);
- Ian Smythe, Jill Pardoe and Eamon O'Donoghue (Integrated Land Management Bureau)
- Max Nock - (Ministry of Economic Development);
- Brent May (Ministry of Forests and Range);
- Lance Ollenberger - (BC Oil and Gas Commission);
- Stirling Bates and Michael D'Antoni (Ministry of Energy, Mines and Petroleum Resources);
- Diane Hewlett (District of Kitimat);
- Ted Pellegrino (Regional District of Kitimat-Stikine);
- Iqbal Kalsi and Russell Seltenrich (Northern Health Authority);
- Michael Gordon and Diane Barbetti – Haisla First Nation

APPENDIX C – PUBLIC ISSUES SUMMARY

found at:

Link to EAO website

http://www.eao.gov.bc.ca/epic/output/html/deploy/epic_document_244_20739.html

and

Link to EAO website

http://www.eao.gov.bc.ca/epic/output/html/deploy/epic_document_244_21474.html

SUMMARY OF ISSUES RAISED DURING JUNE 15-JULY 31, 2005 APPLICATION REVIEW PERIOD			
RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
(1) GENERAL INFORMATION REQUEST			
Emails June 17, 20, 29 and July 21	1. Cannot open PDF of Section 7.9 of EA application from web site.	PDF sent by email. Web page fixed.	No further action required
Emails June 21, 22 and 23	2. Would like copy of Kitimat LNG Terminal presentation at LNG Forum in Calgary on May 31, 2005.	Presentation sent.	
Open house attendee comments and questionnaires July 26	3. Would like a complete copy of KLNG EA Application.	Paper copies of the EA documents are available for review at the: - District of Kitimat City Hall - Riverlodge Recreation Centre - Regional District of Kitimat-Stikine - Kitimat Public Library Electronic copies are available on: www.kitimatlng.com and www.eao.gov.bc.ca.	
Phone call	4. When will construction begin? How quickly will it begin? When will the terminal be built? What is the construction schedule? Would like more information on project schedule and construction dates. When are project approvals anticipated?	Pending receipt of environmental assessment approval and applicable permits, construction will begin at the end of March 2006. Commissioning is scheduled to begin in November 2008.	**New Commitment:** KLNG will provide regular updates on the project web site regarding its project schedule.
	5. Would like to gather information for a research project		Invitation to contact

SUMMARY OF ISSUES RAISED DURING JUNE 15-JULY 31, 2005 APPLICATION REVIEW PERIOD			
RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	about partnerships between the Haisla First Nation and resource industries.	On-going meetings with the Haisla involve confidential discussions. Project information may be available once the project receives EA approval.	in January 2006. No further action required.
	6. What stage is KLNG in the EA process and what is the timing for EA approval and construction schedule?	KLNG submitted its EA application on June 6, 2005 and a 180-day review period began. The public comment period ended on July 30 2005. Pending receipt of environmental assessment approval and applicable permits, construction will begin at the end of March 2006. Commissioning is scheduled to begin in November 2008.	No further action required
(2) LNG INDUSTRY/MARKET/PROJECT VIABILITY			
Emails July 21 and 26 June 21, 22 and 23 Open house attendee comments and questionnaires July 8 and 26 BCEAO submissions Phone call	1. Who do you consider your competitors and do you have an advantage? 2. What is happening with the Prince Rupert project? 3. Where is Prince Rupert in the process of environmental studies and permitting? 4. How real is the project? How confident are you that the	Kitimat LNG views all of the proposed projects on the west coast of North America to be competitors, including the Westpac project proposed at Prince Rupert. KLNG believes that it has a competitive advantage because we have a supportive community and the Haisla First Nations has previously supported an LNG facility. The project continues to be competition for the Kitimat LNG project. Referred to Westpac for this information. Pending receipt of environmental assessment approval	No further action required

SUMMARY OF ISSUES RAISED DURING JUNE 15-JULY 31, 2005 APPLICATION REVIEW PERIOD			
RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	project will go ahead?	and applicable permits, construction will begin at the end of March 2006. Commissioning is scheduled to begin in November 2008.	
	5. What are the major obstacles? What are the biggest risks to the project not being completed?	Receipt of environmental approval and necessary permits.	
	6. How can we help move the project forward?	Public support is very important. Letters of support can be sent to the BC Environmental Assessment Office, to your MP, MLA and local government officials.	
	7. What is the District of Kitimat doing to support the project?	The District has sent a letter of support to the BC Environmental Assessment Office.	
	8. Has supply been negotiated for the terminal? Has KLNG confirmed contracts to purchase supply and sell the product?	KLNG is currently in negotiations with potential suppliers of LNG for the proposed terminal. Commercial contracts are still under negotiation.	KLNG will continue to negotiate supply contracts.
	9. Will the project reduce our residential gas costs? Will the project reduce gas costs for Methanex?	Gas prices are based on a North American market. Therefore, the project will not have a direct effect on local gas prices.	No further action required
	10. Will the gas help stabilize tolls on PNG?	Question referred to PNG.	
	11. What countries supply LNG?	The main countries that may provide LNG to the KLNG facility are Australia, Malaysia, Indonesia, Brunei, and the U.S.	
	12. What uses are being considered for use of the “cold” available from re-gasification?	KLNG has reviewed a number of options for recovery of some or all of the cold energy in the LNG. One option is to provide cold to a fish refrigeration unit. No final determination has been made.	KLNG will continue to review options for use of cold energy.

SUMMARY OF ISSUES RAISED DURING JUNE 15-JULY 31, 2005 APPLICATION REVIEW PERIOD			
RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	13. How will you supply power to the plant?	The current design basis for the LNG terminal will require approximately 18 Mwe that is supplied by BC Hydro via a high voltage aerial line extending from Kitimat to Emsley Cove. An application has been made for this line with the Oil and Gas Commission.	
	14. What is the "weight" (specific gravity) of LNG?	The weight of LNG fluctuates depending on the source of supply. The heaviest LNG being considered has a density of 460 kg per m^3.	
	15. What type of storage tank will be used?	Full containment storage tanks selected by KLNG represent the safest of all possible tank choices. They are designed in compliance with the Canadian Standards Association code requirement (CSA Z276).	No further action required
	16. How big are the tanks?	Tanks vary in size depending on capacity. KLNG tanks will be approximately 90 metres in diameter and 45 metres in height.	
	17. What does an exclusion zone mean, and how is it calculated?	The exclusion zone is defined by the governing codes in the unlikely event of a spill, fire or a release of LNG. For fire, the exclusion zone is determined by a specific heat flux: 5kW per m^2. For vapour dispersion from an LNG spill, the exclusion zone is defined by the distance to half lower flammability limit (2.5% vol methane in air).	**New Commitment:** KLNG will provide a map of exclusion zone areas and post on its web site.
	18. Where will the mercaptans be added to the gas?	Mercaptans will not be added. This is not required in a transmission pipeline.	No further action required
	19. Will the facility emit an odour?	No. Like water, LNG is odourless. None of the air emissions or water effluents from the facility will have a recognizable odour.	See EA Application Section 7.1 Atmospheric Environment

SUMMARY OF ISSUES RAISED DURING JUNE 15-JULY 31, 2005 APPLICATION REVIEW PERIOD			
RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	20. Is there a lot of heat required to convert the LNG to a gas?	Heat is required and will be generated from the LNG that is on site. Typically, a plant uses 1% to 1.5% of available LNG for the vaporizers.	
	21. Where will the natural gas go and who are the potential buyers?	The terminal will deliver gas via an 18 km pipeline lateral into the existing Pacific Northern Gas pipeline in Kitimat. The gas will then be transported to the interconnection of the existing Duke Energy's Westcoast Energy Main gas transportation system and supply the local gas markets and the growing North American gas markets located in BC, Alberta and the Pacific Northwest.	No further action required
	22. What is the rate of return on the project and how is it amortized?	This is confidential commercial information and not available for release.	No further action required
	23. What is the throughput of the terminal?	The plant is being permitted for one billion cubic feet per day but it is anticipated to have an initial volume of 610 million standard cubic feet per day.	
	24. How big are the LNG ships compared to VLCC ships?	The largest LNG ships currently in use are 145,000 cubic metres, which are slightly larger than those ships docking today at Alcan and Eurocan. They are about 290 metres in length. The largest LNG vessel expected at the KLNG terminal is 200,000 cubic metres, However, the terminal is being designed for ships of up to 250,000 cubic metres to take advantage of future changes in the LNG industry. VLCC ships are approximately twice the size of the largest LNG vessel.	
	25. How do the ships refrigerate the gas?	There is no refrigeration on board the vessels. The double-hulled ships are built like a thermos to keep the gas cold. Some gas does vaporize in transit, and these vapors are used to power the ship.	

SUMMARY OF ISSUES RAISED DURING JUNE 15-JULY 31, 2005 APPLICATION REVIEW PERIOD			
RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	26. How many ships will call on the terminal?	Vessels will call on the terminal about four or five times each month.	
	27. How long will the ships stay at the terminal?	Depending on the size of the ship, about 20 to 24 hours.	
	28. Where will the ships come from?	The LNG ships will likely come from the Pacific Basin, including countries such as Australia, Indonesia, Malaysia, Brunei and the U.S.	No further action required
	29. Where are the crews from?	The crews are international and vary from ship to ship. Most captains are from the U.K., U.S., Australia, Italy and Norway.	
	30. Will the crews have shore leave in Kitimat?	Canada Customs and Immigration will regulate whether this is permitted.	
	31. How many crew members and pilots are on the ship?	Depending on the ship, about 25 to 30 crew members. Two pilots will board the LNG vessel at Triple Island near Prince Rupert. They will share the duties over the 16-hour voyage into the terminal.	
	32. Are the ships in good working order or will maintenance be performed while at the terminal?	LNG vessels are meticulously maintained with regular trips to dry dock in their country of origin to ensure the operations are conducted at a high level. No maintenance of LNG vessels is expected at the terminal.	
	33. Will the LNG carriers use local tugboats?	New tugboats will be needed due to the requirements of the LNG industry. These tugs will be larger, with a working capacity in excess of 150 tonnes and a greater degree of maneuverability than those in the area. A TERMPOL process will confirm the size of the tugs required.	**New Commitment:** KLNG will ensure that appropriate purpose-built tugs are available when the facility is commissioned.
	34. What is the propulsion system on the LNG ships?	The larger LNG ships will have twin propellers and twin rudders for added maneuverability. They also have bow thrusters.	

SUMMARY OF ISSUES RAISED DURING JUNE 15-JULY 31, 2005 APPLICATION REVIEW PERIOD			
RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	35. Will the LNG ships give off a large wake?	The LNG ships will have a wake similar to the current deep-sea vessels that use the Port of Kitimat.	No further action required
	36. Concern that ship access routes from the open ocean to Emsley Cove are acceptable for an LNG vessel.	All large ships arriving have an agent responsible for notifying Transport Canada of the ship's schedule. The ship must make notifications of location and ETA by fax from the ship 96 hours and then again 24 hours before entering Canadian waters. In most federal ports, this information is posted on the website as well as used to dispatch the pilots to meet the ship.	**New Commitment:** KLNG will complete a TERMPOL report in conjunction with the requirements of Transport Canada.
	37. How can residents find out if a ship is arriving and are authorities notified when a ship is arriving?	Review of navigational charts with marine engineers, BC Coastal Pilots and the Canadian Coast Guard to confirm routing will not be a problem.	**New Commitment:** KLNG will post LNG vessel schedules on its web site on a regular basis.
	38. Will the butane and propane be shipped out of Kitimat in railcars?	Commercial discussions with Methanex are on-going.	No further action required
(3) EMPLOYMENT/TRAINING			
Open house attendee comments and questionnaires June 21, 22 and 23	1. What will KLNG do about training for positions to ensure locals are employed?	KLNG is committed to hiring locally wherever possible. KLNG will create a listing of jobs and required training. KLNG has held discussions with local training facilities to ensure they have the necessary training capacity. KLNG will provide LNG specific training to all employees.	**New Commitment:** KLNG will: -hire locally wherever possible, - provide on-site LNG-specific safety training to all employees, - produce a list of jobs required during construction and operation, and required training for each, and - develop a strategy

SUMMARY OF ISSUES RAISED DURING JUNE 15-JULY 31, 2005 APPLICATION REVIEW PERIOD			
RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	2. What kind of jobs may be available during operations?	A variety of technical, administrative, and managerial jobs will be filled upon completion of construction of the plant. KLNG anticipates 50 full time jobs as the plant will run 24/7. The exact nature of these jobs and the number required will be determined as the design of the plant progresses.	for on-the-job-training. **New Commitment:** KLNG will post information about job requirements during the operation of the facility and training requirements for these jobs on its web site.
(4) SITE/CHOICE OF LOCATION			
Open house attendee comments and questionnaires June 21, 22 and 23	1. Why Kitimat instead of Prince Rupert?	Kitimat has several advantages including a supportive community, existing takeaway pipeline access, as well as potential industrial customers.	See EA Application Section 3.5.1 Facilities Siting
	2. Can the arrangement of the terminal be redesigned to allow access to the beach? 3. Plant storage and buildings should be located farther down the shoreline to keep the beach for public use, reduce tsunami and landslide risks to the facilities, reduce shoreline and environmental impact and improve aesthetics from the water.	KLNG reviewed where the facilities are sited on the property and public access following the community open houses and determined that the existing layout is the safest and has the least environmental effect on the area. For geotechnical and tsunami risk considerations, there is no other location where the jetty head can be developed on the shoreline. The current design also minimizes the impact on Emsley Cove.	No further action required
(5) SITE ACCESS			
Emails June 20 and July 26 June 22 and 23	1. An Alcan staff person requested that KLNG discuss proposed road access over Alcan lands prior to sale and layout of lands for Cascadia project.	KLNG has been discussing road access and will continue commercial discussions with Alcan regarding road access and other issues.	KLNG will continue discussions with Alcan regarding road access. **New Commitment:**

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RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
Open house attendee comments and questionnaires July 8 and 26	2. How will construction and operation workers access the site? Will you bus people to the site?	During construction, KLNG is considering using water taxis to transport workers to the plant site. During the operational phase, KLNG is considering providing a bus service for employees.	KLNG will develop a transportation strategy to facilitate employees accessing the site.
BCEAO submissions	3. Why is a parking lot proposed if access is via ferry?	All LNG terminals must provide parking space. The parking lot is designed for when the terminal is operational and some employees will access the site by road, as well as delivery vehicles and services personnel.	No further action required See EA Application Section 3.6.13 Terminal Access Road
	4. How can an assessment take place if access is unresolved?	KLNG will utilize the existing West Fraser road and will construct a new 800-metre road extension to the site. A small berth is also included in the design plans and EA application to meet the needs for both construction and operating phases of the project.	**New Commitment:** KLNG will apply to BC Oil and Gas Commission for a site access road permit. See EA Application Section 3.6.13 Terminal Access Road
	5. What type of road upgrade will be needed?	The existing West Fraser logging road is shared by many users given the industrial nature of the area. KLNG's scope of upgrade is limited to the 800-metre section between the end of the West Fraser logging road and the plant site. The 800 metre section will be built to the same standard as the existing logging road.	See EA Application Section 3.6.13 Terminal Access Road
	6. Will the road to the site follow the logging road?	Yes. The existing West Fraser logging road will be used to provide site access and KLNG will add an 800- metre section at the end of the logging road to the plant site.	

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RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	7. Will there be public access to the beach?	Emsley Cove is designated for industrial use. For public safety and site security, an exclusion zone around the site, mandated by the governing standard CSA Z276, will extend past the beach, prohibiting public use.	**New Commitment:** KLNG will work with the District, local recreational groups, other industries and the Haisla regarding water access for recreational use in Douglas Channel.
	8. Will recreational boaters and kayakers be able to launch their boats from the beach at the site?	No, the beach cannot be used to launch boats or kayaks. Currently there is no boat launch road or beach access at the site. See previous comments.	
	9. Could sand be transported to the area Northeast of the site and make a public beach to replace the loss of the existing beach for security reasons?	Making a new beach could create significant environmental impacts. The KLNG project does not include such a provision.	No further action required
	10. Will I be able to tie up my boat at the terminal?	No. The facility must meet the International Ship and Port Security code regulations of the UN International Maritime Organization (IMO), of which Canada is a signatory country. The regulations do not allow for private recreational vessels to tie up at these terminals for safety and security reasons.	
	9. Will the exclusion zone prevent recreation or fishing use of Emsley Cove?	Recreational use of the site will be restricted by an exclusion zone around the site, mandated by the governing standard, CSA Z276. This exclusion zone will extend past the beach, prohibiting public use. Fishing in Emsley Cove will be affected when an LNG vessel is in dock and there is a 500-metre exclusion zone around the vessel. This also mandated by the safety code CSA Z276.	**New Commitment:** KLNG will provide a map of exclusion zone areas and post on its web site.
	11. Will we still have access to Bish Trail and other coves in the area?	Access that exists to those others areas will not be impacted by the KLNG project.	No further action required

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RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	12. Will the project restrict access to hiking trails? 13. How can you prevent people from using the beach at Emsley Cove?	Other hiking trails in the area, outside the exclusion zone around the site, will not be impacted by the KLNG project. KLNG will have security in place 24/7 to enforce the governing regulations under which it operates. Public safety is a key concern for KLNG.	No further action required No further action required
(6) ENVIRONMENT			
Open house attendee comments and questionnaires June 21, 22 and 23 BCEAO submissions July 8 and 29	1. Will the project have a significant impact on fish?	As part of the environmental assessment process, KLNG conducted a number of environmental studies that concluded it is extremely unlikely that the terminal will cause any significant adverse environmental effects on the marine and freshwater fish environments.	See EA Application Section 7.2 Marine Environment and 7.3 Freshwater Fish and Fish Habitat **New Commitment:** KLNG will provide the BCEAO Technical Working Group with mapping of the predicted seasonal distribution of each indicator species identified in the Marine Environment Section 7.2 of the Environmental Assessment Application. See EA Application Section 7.5 Avifauna

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RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	2. Will the project affect birds protected under the Migratory Birds Conventions Act?	As part of the environmental assessment process, KLNG conducted a number of environmental studies that concluded it is extremely unlikely that the terminal will cause any significant adverse environmental effects to birds protected under the *Migratory Birds Conventions Act* and the BC *Wildlife Act.*	**New Commitment:** KLNG will explore making a contribution to the Coastal Waterbird Survey program. **New Commitment:** KLNG will include a Bird Nest Survey in the Environmental Protection Plan.
	3. Will there be an effect on the Marbled Murrelet? Why wasn't a Marbled Murrelet study conducted?	Surveys were conducted in the spring of 2005 to confirm the habitat suitability ratings for the Marbled Murrelet. This portion of the Douglas Channel supports relatively low densities of Marbled Murrelet (according to existing provincial data sources). This is consistent with the habitat suitability mapping completed for the assessment area, which identified the majority (95%) of the terrestrial land area as low nesting habitat suitability. If clearing of vegetation is planned to take place during the breeding bird season, including the Marbled Murrelet nesting season, a nest survey will be conducted to identify any active nests for all bird species potentially affected.	
	4. Will there be cumulative effects from air emissions? Concern with possible air emissions and respiratory illness.	Studies indicate air emission levels are of extremely low significance. Dispersion modeling of emissions from the facility shows that cumulative effects on the air shed are not expected.	See EA Application Section 7.1 Atmospheric Environment **New Commitment:** KLNG will abide by all new emission reduction standards provided by either

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RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	5. Will there be an effect on eelgrass?	The LNG tanker berth and the tug dock are both located well away from the creek mouth. The eelgrass is established on the alluvial fan deposits around the mouths of Emsley Creek and Emsley Cove Creek. The only operational activity that could affect the eelgrass is erosion of eelgrass beds by prop-wash. Kitimat LNG has ensured that this will not happen by moving the turning radius of the ships into deeper water - it is far enough away from the shallow water around the creek mouths to ensure there is no erosion. KLNG used the work done by local naturalist Dennis Horwood to map eelgrass habitat in Emsley Cove.	the federal or provincial agencies. **New Commitment:** Kitimat LNG will conduct a second subtidal survey of eelgrass habitat near the tug/barge loading area. **New Commitment:** KLNG will continue to work with DFO to ensure the protection of eelgrass habitat in Emsley Cove. **New Commitment:** KLNG will review the prop wash study, which will provide more detailed information on possible effects on eelgrass. **New Commitment:** KLNG will work with pilots and Transport Canada to establish LNG tanker turning areas in water depths of 40m or greater to eliminate potential effects due to scour.

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RAISED BY & DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	6. Will sulphur dioxide (SO_2) emissions affect plant and animal life?	LNG terminal-related emissions of sulphur dioxide are expected to be relatively small – and are largely confined to marine vessel emission sources and construction equipment. They will be released through combustion processes of fuels that contain substantial amounts of sulphur (gasoline, diesel oil and natural gas). The imported LNG contains almost no sulphur. What little sulphur exists is in a reduced form (total reduce sulphur or TRS, and expressed as an H_2S-equivalent). It contains far less TRS than even domestic natural gas, which has an upper limit of 16 ppm.	See EA Application Section 7.1 Atmospheric Environment **New Commitment:** KLNG will undertake passive sulphur dioxide (SO_2) monitoring.
	7. Continuation of fossil fuel use contributing to climate change; overdependence on fossil fuels; lack of dedication to renewable energy sources	LNG is the cleanest-burning fossil fuel available. Environmentalists, industry and the public agree that natural gas is the best option to carry us through the transition to the alternative energy sources. This is beyond the scope of the KLNG project.	No further action required
	8. Natural gas supply pipelines off Sakhalin island can potentially impact the only feeding ground of the endangered Pacific Grey Whale.		No further action required
(7) SAFETY			
Email July 26 Open house attendee comments and questionnaires June 21 and 22	1. Will vapour from an LNG spill reach Kitimat?	No, the downwind travel distance associated with an LNG spill at the plant is confined well within Emsley Cove.	See EA Application Appendix B and Appendix C
	2. Has an LNG vessel ever exploded?	LNG is kept at atmospheric pressure and, as a result, is not explosive. The LNG industry has a legacy of safe operations, with no major incidents on the sea or in port in more than 40 years and 40,000 carrier voyages. Currently, the majority of LNG facilities are located in	See safety videos on KLNG website - No further action required No further action

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	3. Has an LNG facility ever exploded?	heavily populated urban settings – which speaks to the low safety risk of the product. In the past 40 years, only a single incident, occurring in Algeria, resulted in fatalities, but overall the safety record of LNG is excellent.	required
	4. In foggy conditions, will the LNG ships interfere with pleasure boats?	The LNG vessels will operate according to all Canadian and international marine regulations.	No further action required
	5. Is there a safety concern with gas and potential fire/explosions because of public activities?	As a liquid, LNG is not flammable. The chance of an LNG fire or explosion is extremely low because of the safety provisions and the design basis. Exclusion zones are in place to provide public safety under this most unlikely situation. Security will be provided at the facility on a 24/7 basis.	No further action required
(8) RECREATION USE			
Open house attendee comments and questionnaires June 22	1. Will recreational boating be affected by the LNG ships calling on the terminal?	No, boating in the Douglas Channel will not be affected. However, a 500m exclusion zone will be in effect around LNG vessels docked in Emsley Cove. Only four to five vessels per month will visit the terminal and they are projected to be in dock for between 20 and 24 hours, depending on their size.	**New Commitment:** KLNG will provide a map of exclusion zone areas and post on its web site.
	2 I am worried that the ships will interfere with pleasure vessels because of the additional deep-sea traffic in Douglas Channel.	KLNG will work with the Port of Kitimat, the BC Coastal Pilots, the Canadian Coast Guard and Transport Canada to establish a designated shipping route. Notice of this route will be made public to all marine users in the Kitimat Arm area.	**New Commitment:** KLNG will post LNG vessel schedules on its web site on a regular basis. **New Commitment:** KLNG will complete a TERMPOL report in conjunction with the requirements of Transport Canada.
	3. Will the LNG plant's emissions cause a disagreeable or harmful odour and will this affect the overall recreational	No. Like water, LNG is odourless. None of the air	See EA Application

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	potential of Emsley Cove and Douglas Channel?	emissions or water effluents from the facility has a recognizable odour.	Section 7.1 Atmospheric Environment
(9) NOISE			
Open house attendee comments and questionnaires June 22	1. Will noise from relief valves reach Kitimat?	With 14 km between Emsley Cove and Kitimat, there is no possibility of the noise produced by relief valve or process equipment being heard at Kitimat. In addition, the shielding provided by Emsley Point rock structure provides an additional sound barrier.	See EA Application Section 5.8.2 Noise Levels
	2. Will noise be an issue? It is with Methanex.	Noise will not be an issue. Any noise generated by the plant will be confined to the plant site.	
(10) PIPELINE			
Email July 21	1. Will PNG need to expand to accommodate KLNG?	Pipeline expansion is not part of this project and needs to be addressed by PNG.	No further action required
Open house attendee comments and questionnaires June 21, 22 and 23	2. Will the pipeline cross near Smithers?	Referred to PNG.	
	3. Why does KLNG need a 60m ROW for the pipeline?	Referred to PNG.	
BCEAO submission July 26	4. Will PNG need to expand their pipeline?	Referred to PNG.	
	5. The existing pipeline from Terrace east to Prince George is only 10" and KNG requires 30" diameter. Will more pipeline be necessary through the Tolkwa Pass?	Referred to PNG.	
	6. Will PNG's transportation rates change when the gas from KLNG comes in?	Referred to PNG.	
	7. It is not clear that agreements for either the access (to the existing natural gas grid) through private property or tie-in into the existing natural gas grid are in place.	Referred to PNG.	
	8. How wide is the pipeline right-of-way?	The pipeline lateral right-of-way is 30 metres wide.	
	9. Will the pipeline be underground?	Yes	

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	10. What are the other pipelines going from the terminal to Kitimat for?	The project includes three smaller pipelines within the pipeline lateral right-of-way to carry natural gas liquids away from the terminal.	See EA Application Section 3.5.2 Natural Gas and Natural Gas Liquids Pipeline Laterals
	11. How will the natural gas liquids be moved to Kitimat?	The preliminary site design includes three 6" diameter pipeline laterals for the natural gas liquids. All pipelines are underground.	
	12. What happens to the natural gas liquids leaving the site?	Natural gas liquids (NGLs) will be transported by underground NGL pipelines to Kitimat. The need for NGL separation depends on the composition of the LNG supplied.	
	13. Where will the natural gas liquids handling facility be located?	Commercial discussions are on-going with Methanex.	KLNG will continue discussions with Methanex regarding natural gas liquid handling.
	14. Has KLNG reached an agreement with Methanex?	Commercial discussions are on-going with Methanex.	
	15. What is the pressure in the natural gas liquids lines?	1414 pounds per square inch of gas	No further action required
(11) MISCELLANEOUS			

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Open house questionnaires and attendee verbal comments August 11	1. Have you advised project investors that Emsley Cove is under land claims? 2. This is the first opportunity for the Haisla to work directly with a company to get benefits, and you must lose something to gain something. For the Haisla to benefit they must give something up and this will benefit both the Haisla and KLNG. 3. How many people were raised in the Kitimat Valley and plan to retire here forever? When something is killed or lost, it is extinct forever. 4. I am one person of the 1500 person Haisla Nations and do not want this Project to go into Emsley Cove.	No, investors have not been advised. Comment noted. The lead consultant for KLNG lived in Terrace for 7 years and has extended family still in the area. Comment noted.	No further action required

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RAISED BY AND DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
PROJECT OPERATIONS AND VIABILITY			
Email January 18 Letter January 30	1. What are the changes to the tax benefits to the District of Kitimat from KLNG with the Bish Cove site?	KNLG will pay property tax to the Federal government, rather than directly to the District. KNLG will pay the District directly for services provided. Many jobs will be created during construction and 50 permanent jobs during operations and the District will continue to benefit from the economic spin-offs a $500 million project brings to the community.	No further action required.
Public Meeting Comments February 15	2. What part of the infrastructure of the District of Kitimat are you planning to use with the Bish Cove location?	The infrastructure targeted will be the same as with the Emsley Cove site and includes such housing, transportation, roads, schools, emergency services and medical services.	KLNG will continue discussions with the District of Kitimat.

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RAISED BY AND DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	3. What will be the fresh water source for operations at Bish Cove, the approximate volume of fresh water used daily, weekly, etc…	On average, the fresh water usage will be 50 m^3/day maximum, drawn from the collection pond. Make-up water for the collection pond will be derived from drainage and surface run-off water from precipitation, all to be quantified during detail engineering. A submersible pump installed in a well may also be considered for make-up water, if needed.	No further action required.
	4. Will there be any smell or unpleasant particles or odours from the site?	No. Like water, LNG is odourless. None of the air emissions or water effluents from the facility have a recognizable odour.	See EA Application Section 7.1 Atmospheric Environment
	5. How long are tankers in dock?	A vessel is in port from 18 to 24 hours and we are expecting 1 or 2 a week.	No further action required.
	6. On the original Emsley Cove site, there was a plan for future expansion. Is this the case at Bish Cove too? If you plan to expand, would this increase tanker traffic?	The only expansion at Emsley is related to a future third storage tank. At Bish, this would be the only expansion as well as the possibility of keeping the construction berth as a permanent structure to assist with the building of the third tank. Any expansion related to the increased capacity of a third tank would come from bigger ships serving the terminal, not more ships.	No further action required.
	7. If you increase the tanker size, will the jetty require dredging in the future?	No. The terminal is designed for a 200,000 m^3 tanker which has approximately a 12 metre draft. An additional safety margin is added so the minimum water depth used for locating the terminal 15 metres. The 15 metre	No further action required.

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RAISED BY AND DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
		barometric sounding data line is well in-shore from the berth location. A 250,000 m^3 future tanker will be longer and wider but the draft will not be significantly deeper. Therefore the water depth is sufficient for the expected life of the project.	
SITE ACCESS			
Public Meeting Comments February 15	1. With regards to public access at the two sites, are you still using resources to look at Emsley Cove or are you concentrating on Bish Cove only?	KNLG is now focusing on Bish but the "exclusion zone" and public access are the same on both sites. Foreshore and marine areas will remain available for recreational access by water, except for the required exclusion zone around an LNG tanker when it is at berth. Recreational shellfish harvesting will be restricted 125 metres from the marine terminal due to Environment Canada's regulation. The plant site is private property and will be unavailable for public access. From the EAO perspective, there is enough information on Emsley Cove with the original application to do a thorough review. Now the only additional information is required for the Bish Cove site. As well, additional information will be required on the approved site to meet provincial permitting requirements. The EAO is still evaluating both sites. (BCEAO)	**New Commitment:** A permanent exclusion zone will not be implemented by KLNG at either site, Bish Cove or Emsley Cove.
ENVIRONMENTAL EFFECTS			
BCEAO submission January 30	1. Concerns with damage done by dredging and soil removal in Bish Cove.	The proposed location of the marine terminal in Bish Cove does not require any blasting or dredging.	No further action required.

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RAISED BY AND DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
Public Meeting Comments February 15	2. Concerns with loss of eelgrass habitat loss that is important to the salmon species that frequent Bish Cove before spawning up Bish Creek.	Eelgrass disturbance has been eliminated by locating the marine terminal on the northern shore of the Cove, away from the two main eelgrass areas.	**Existing Commitment**: KLNG will continue to work with DFO to ensure the protection of eelgrass habitat in Bish Cove.
	3. Will the thermal water from the KLNG plant effect the marine environment?	No. Fresh water discharge for the project is estimated at 40 m^3 per hour, at a temperature of 18 degrees Celsius. This is not harmful to fish. The ideal water temperature for juvenile salmon is 15 degrees Celsius therefore in the summer months, the discharge water will be run through a cooling pond to bring the temperature down a few degrees.	**Existing Commitment**: KLNG will continue to work with DFO to ensure the protection of marine life in Bish Cove.
	4. Concerns with the loss of habitat along the ROW and the many stream crossings.	Studies conducted in the Bish Cove area estimate that wildlife habitat loss will not be significant and will not impact any species. Grizzly bear habitat is primarily associated with stream crossings and impacts will be mitigated by a 70 – 100 metre setback along Bish Creek and 30 metre setbacks along other streams within the plant site and a 20 metre foreshore setback.	**Existing Commitment:** Environmental Management Plans will be developed for any specific species that show a possible impact from the project. **New Commitment:**

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RAISED BY AND DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	5. Concerns with loss of fish habitat at the site and along the ROW. 6. Bilge pumping can contaminate the water and have a negative effect on the marine environment. What will be done to ensure LNG tanker bilge water is clear?	Along with the stream setbacks mentioned above, all stream culverts will be fish passable. The Canadian Coast Guard and Transport Canada have strict regulations related to bilge water that KLNG will adhere to.	KLNG will implement a minimum 70 m setback along Bish Creek, 30 m setbacks along other streams and a 20 m foreshore setback. **New Commitment:** All culverts will be fish passable. No further action required.
SAFETY			
Email January 18 Public Meeting Comments and Questionnaire January 30 BCEAO Submission February 15	1. The plant will be closer to Kitimat, without the rock bluff protection of Emsley Cove. Is this a safety problem? 2. Emsley is farther from town and I prefer the more distant location of Emsley vs. Beese as it minimizes explosion risks to the larger community. Emsley is also the preferred site from a tsunami threat perspective.	No, the site is still 14 km away from the town and population. The safety standards were developed assuming a flat, unobstructed field, and the proposed terminal well exceeds these standards. Currently, the majority of LNG facilities are located in heavily populated urban settings – which speaks to the low safety risk of the product. In the past 40 years, only a single incident, occurring in Algeria, resulted in fatalities, but overall the safety record of LNG is excellent.	See EA Application Appendix B and Appendix C. See safety videos on KLNG website - No further action required.

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RAISED BY AND DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	3. Are the berthing dolphins strong enough to hold a ship back from running into the eelgrass or shore if the vessel misses the dock or crashes into the berth?	The KLNG tankers will be escorted into the berth by 3 or 4 tug boats, secured with marine lines. KLNG will also develop an operational plan that outlines all navigational issues and will be using additional technology unique to LNG such as quick release dolphins that ensure a high level of safety and minimize incidents related to line breakage. A docking assistance display system will give pilots live feedback as they are coming into berth. Every precaution will be taken by KLNG and mandated as part of the TERMPOL risk assessment that examines all worst case but credible incidents and develops mitigation measures.	**Existing Commitment:** KLNG will complete a TERMPOL report in conjunction with the requirements of Transport Canada.
RECREATION USE			
BCEAO Submission January 30	1.Will there be public access to the beach area via water for kayakers and small craft boaters?	Foreshore and marine areas will remain available for recreational access by water, except for the required exclusion zone around an LNG tanker when it is at berth. Recreational shellfish harvesting will be restricted 125 metres from the marine terminal due to Environment Canada's regulation. The plant site is private property and will be unavailable for public access. The marine lease area may also restrict public use of the berth.	No further action required.
NOISE			
BCEAO Submission January 30	1. What is the possibility of noise pollution, now that the plant is closer to the town?	Noise will not be an issue. With 14 km between Emsley Cove and Kitimat, there is no possibility of the noise produced by any plant site equipment being heard at	See EA Application Section 5.8.2 Noise Levels.

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RAISED BY AND DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
		Kitimat. Any noise generated by the plant will be confined to the plant site.	
MISCELLANEOUS			
Public Meeting Comments and Questionnaire February 15	1.Why are there no Haisla here tonight if this project is on their land?	The Haisla are very supportive of the project and have been part of the EA process from the beginning. They are supportive of both sites, but particularly supportive with Bish as the preferred location.	KLNG will continue discussions with the Haisla First Nation.
	2. In your presentation, you mentioned that Bish site makes the project a reality. What does this mean? Is it Bish Cove or nothing?	Yes, the project will likely only go ahead at Bish. We have identified a number of factors related to the environment, such as marine issues, eelgrass impact and Aboriginal certainty that make Bish Cove a more attractive location for the project. (KLNG)	No further action required.
	3. Apparently there is enough information accumulated on Emsley Cove to make a decision. What decision do you have enough information to make?	The EAO perspective is operating on the basis that the project can go on either site. The Haisla letter of intent also states they will support the project at Emsley Cove if it is not approved at Bish. The final decision of where to locate, if both sites are suitable, is a corporate one, to be made by Kitimat LNG. (BCEAO) The EAO had enough information and enough review time to identify all the commitments that KLNG needed to make at Emsley Cove. Information is still being collected on Bish Cove. The ultimate approval decision will be made by the Ministers. (BCEAO)	No further action required KNLG will continue

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RAISED BY AND DATE	**ISSUE RAISED**	**PROPONENT RESPONSE**	**PROPOSED ACTION**
	4. You have been working with the Haisla on this but how about the District?	The District has representatives on the Technical Working Committee. The District representative has provided comments on the Bish Cove Addendum Report to the BCEAO. (BCEAO) We will soon be talking to the District about specific service requirements as well. (KLNG)	discussions with the District of Kitimat.
	5. On purely an environmental basis, the Emsley Cove site is clearly superior. I hope that the EAO recommendation concerning Emsley vs. Beese makes its decision on environmental factors alone, and does not become an exercise in First Nations accommodation alone.	Thank you for the comment.	No further action required
	6. Kitimat LNG has a good program here and the EAO will decide which site is better. I will agree with whatever the EAO says in terms of a location that is appropriate.	Thank you for the comment.	
	7. Whatever site is chosen, we, the community is supportive of the project.	Thank you for the comment.	

APPENDIX D - KEY ISSUES FROM PROJECT WORKING GROUP TRACKING TABLE

found at:

Link to EAO website

http://www.eao.gov.bc.ca/epic/output/html/deploy/epic_document_244_21415.html

KEY ISSUE/AGENCY	SUB-ISSUE	PROPONENT RESPONSE	ACTION/COMMITMENT
MARINE ENVIRONMENT			
1. Construction jetty and tug berth (DFO, TC, HFN)	The TWG has concerns about the potential size (and number of tugs) and the environmental effects of the jetty on Emsley Cove and Bish Cove.	The purpose of the construction jetty is to provide marine access to the site for materials. A tug berth is required during operation for emergency response. KLNG provided design concepts and locations for Emsley and Bish Cove that were revised through discussions and led to more stringent design and new locations acceptable to DFO. The new designs placed the tug berths optimize the balance of fill and pile structure to minimize the environmental footprint disturbance. The TERMPOL process includes review and simulation of navigation and berthing procedures and will confirm final tug requirements that in turn will be reflected in the final detailed design drawings. Experience has shown that 3 or 4 tugs are generally required. KLNG has provided the TWG with a copy of their letter of intent to initiate the TERMPOL process and the letter from TC confirming there will be a TERMPOL process.	KLNG has submitted design concepts and locations for the construction jetty and tug berth to minimize environmental effects, on the understanding that final design will be contingent upon an acceptable HADD and compensation plan for DFO. New Commitments: KLNG will work with the TERMPOL committee to establish the number of tugs required and the size of the tug berth. KLNG will continue to work with DFO in the subsequent approval/authorization processes to minimize the potential effects of the tug berth on the marine environment.
2. Potential effects of tug and tanker operation in Emsley Cove	The effect of tanker and tug navigation in Emsley Cove due to potential physical disturbance (i.e., from propeller	Eelgrass is the primary habitat type in Emsley and Bish Cove that is sensitive to tanker and tug navigation activities. Eelgrass is present in patches in the intertidal and shallow subtidal zones in Emsley and Bish Cove. Jacques Whitford has produced	New Commitments: KLNG will work with the TERMPOL review committee to ensure that preliminary commitments related to tug and tanker operation

(HFN, EAO, DFO, TC)	wash) given the cove's geometry and the size of the tankers for all phases of the project. Potential effect on eelgrass beds are of particular concern.	eelgrass maps of Emsley and Bish Cove, based on eelgrass mapping completed by Dennis Horwood (Kitimat Valley Naturalists) in September 2004, intertidal and subtidal transects conducted by Jacques Whitford in December 2004, and basic eelgrass tolerances. From these maps it is evident that there will be one eelgrass bed impacted by the proposed tug berth in Emsley Cove. A second diving survey of this particular eelgrass bed was conducted to fully determine its extent and health in September 2005. The secondary habitat type in Emsley Cove that is sensitive to disturbance by tug and tanker operation is fine sediments. These are deltaic deposits present along the entire western side of Emsley Cove and in deeper areas of the cove. These fine grained sediments could be re-suspended by propeller wash from the tugs and LNG tankers if these vessels operate under high power or operated in shallow water depths. The EA recognizes that prop wash and vessel operation could have an adverse effect on habitats in Emsley Cove. KLNG commissioned a prop wash study to determine the extent of scour that would occur due to vessel activity. While the analysis was preliminary in nature, the wash study found that the zone of influence of propeller from a typical LNG tanker was 140 m and the zone of influence for an assist tug under full power was 75 m. In 20 m water depth a LNG tanker could re-suspend up to 1 m of sediments; however, in water depths of 40 m scour from propeller wash was determined to be negligible. The prop wash analysis shows that the potential adverse environmental effects from propeller wash is tied to water depth and operational activities of the working vessels. The further the source of high velocity water is from eelgrass or fine grained sediments, the less potential for erosion of the eelgrass bed or	will be reviewed for operational feasibility by tug and tanker operators and local pilots before they are carried forward into the TERMPOL process. KLNG will conduct a habitat assessment, including an eelgrass survey, within the jetty and marine terminal footprint to determine habitat loss and establish habitat compensation requirements. Revised Commitment: • KLNG will develop a marine terminal manual for operations. The manual will be developed using local knowledge from operators and other sources to address the specific requirements for operation of the LNG facilities and off loading and transfer to storage in accordance with federal and provincial legislation and company policies. This manual will include: o a speed/thrust management plan for tugs and tankers; o identification of operating areas for tankers and tugs; o identification and physical marking of environmentally sensitive areas for restricted operation of marine vessels working at the terminal as per March 2, 2006 No-Go Zone Map for Emsley and the February 6, 2006 No-Go Zone Map for Bish Cove; and o additional TERMPOL recommendations will be fulfilled and incorporated, as appropriate in the

		suspension of the sediments. Specific procedures designed to mitigate the effects of vessel activity will include placement of marker buoys to delineate operational limits for tugs and LNG tankers, speed limits for working vessels, and thrust management recommendations. Based on the results of the TERMPOL process and TC approval for mitigation measures KLNG will develop a Marine Terminal Manual. This document will address all aspects of marine operations including navigation procedures, navigation aids (e.g., buoys), identification of areas where tanker and tug traffic is prohibited, and LNG off-loading and transfer procedures. Detailed responses to all issues raised by DFO, many of which are similar to issues raised by other agencies and the Haisla First Nation can be found in a report entitled Responses to DFO Post-Application Questions provided to the TWG (September 29, 2005).	Marine Terminal Manual (Section 3 page 3-73).
3. Marine Terminal facilities in Bish Cove (HFN, DFO, TC, DOK)	Potentially adverse effect on marine habitat from location, design and operation of ship berth and construction jetty / tug berth in Bish Cove.	KLNG prepared a Bish Cove Addendum Report (January 11, 2006) that outlined options and preferred locations and designs for the location of the ship berth, and construction jetty/ tug berth. This work included a map of tug /tanker "no go" zones. This initial configuration showed the facilities on the east side of the Cove, which would require dredging of over 600,000 m3 of sediments to provide the necessary foundation for jetty construction. DFO and other agencies requested reconsideration of these locations due to potentially adverse habitat alteration, particularly the destruction of eelgrass beds, and dredging requirements. KLNG responded to these concerns with a supplementary report on February 2, 2006 that proposed relocation of these structures to avoid eelgrass beds, eliminate dredging and blasting in water,	New Commitments: For a Bish Cove terminal site, marine structures will be designed and placed as generally depicted in Figure SK-6 "Bish Cove Site Marine Facilities General Arrangement" (Moffatt & Nicol) and shown in the February 2, 2006 Supplement to the Bish Cove Addendum Report. For a Bish Cove terminal, KLNG will utilize a vibro-densification process to compact and stabilize marine sediments for the purposes of marine facility construction. Procedures will be put in place to ensure capture and control of silt and other fine sediments displaced by this process. Marine bottom surface areas altered by

		and avoid geotechnical hazards associated with the western side of the Cove. The design approach requires use of a vibro-densification process to compact and stabilize marine sediments for marine facility construction. KLNG also provided a general proposal to DFO to initiate habitat compensation planning work, and information on fish utilization of the Cove and potential for sedimentation from the adjacent Bish Creek Estuary. Based on this information, KLNG agreed to provide a new map of "no go" areas for tugs and tankers and to commit to a number of additional measures to address this issue. The Bish Cove is also an important fish rearing and holding area due to its proximity to Bish Creek estuary. Concerns were raised about the effect of dredging for a marine facility on the east side of Bish Cove and the substantial habitat loss, loss of fishery and required compensation. KLNG's February 2, 2006 proposal to locate the marine facilities in the middle of the Cove and construct them without dredging has also included commitments to provide habitat compensation within the Cove and possibly at other sites in Kitimat Arm.	this process will be covered with a soft sediment substrate to a thickness to be determined by DFO. KLNG will conduct a habitat assessment, including an eelgrass survey, within the jetty and marine terminal footprint to determine habiat loss and establish habitat compensation requirements. For a Bish Cove terminal, KLNG will negotiate and implement a habitat compensation program for marine facility disturbance of fish and fish habitat, and commits to providing compensation at a minimum of 1:1 ratio of habitat loss/habitat compensation, and will look at other locations for any additional compensation work required. KLNG will solicit input/involvement from the Haisla and local experts (e.g. Kitimat Valley Naturalists), as appropriate during the development and implementation of the habitat compensation plan.
4. Marine spills (TC, HFN, DFO, EC)	Mitigation of potential effect on the marine environment, intertidal wetlands and tributary creeks due to accidental releases during all phases of the project.	The potential effects of an accidental spill in Emsley or Bish Cove are dependent upon what is spilled (i.e. diesel, fuel oil, LNG etc.), the size of the spill, environmental conditions at the time (i.e. wind direction, wave height, tide, flow regime in the creeks), and spill response measures. KLNG has committed to a number of measures that will firstly prevent spills and secondly ensure a rapid response to spills. To address spill prevention, the design of the regasification plant and supporting infrastructure (e.g. jetties) will incorporate containment around equipment containing fuel and oil and the stormwater	Existing Commitments: KLNG will prepare EPPs for the construction and operation phases of the Project. KLNG will provide draft EPPs to Environment Canada for review and comment prior to their completion. Revised Commitment: KLNG's EPP will include

		infrastructure will include oil/water separators and a retention pond that will capture any land-based spills. A potential LNG spill on the water is extremely unlikely and is not predicted to have significant effects as the LNG will not mix with the water and once it evaporates will not leave a chemical residue. Therefore any potential effects will be short term and primarily associated with a temporary temperature reduction at the LNG-water interface. Spill response will also be addressed in the TERMPOL review.	spill prevention and spill response provisions for construction and operation in accordance with the *Canada Shipping Act* and all other applicable provincial and federal legislation and regulations. An Emergency Response Plan will also make up part of the EPP. This plan will detail requirements for addressing potential effects on the marine environment, intertidal wetlands and streams that intersect the shoreline. It will include spill response kits (including length and type of absorbent booms), location of the kits (on the dock) etc. for marine spills, booms at the mouths of creeks, and provision for a stand-by vessel.
5. Potential erosion effects of tug and tanker operation in Douglas Channel (HFN, TC)	More information is required regarding ship traffic issues in Douglas Channel including the effect of wake on shoreline erosion particularly where it may affect archaeological sites.	KLNG has initiated a TERMPOL to establish management requirements and operational limitations for the marine shipping, berthing and tug operations at its terminal. Vessel traffic related effects on the Douglas Channel will be more thoroughly studied during the TERMPOL process. KLNG will be meeting with Transport Canada to determine the scope of the TERMPOL review. Based on the input of the TWG, KLNG commits to including an assessment of potential shoreline erosion at significant sites along Douglas Channel in the TERMPOL review. Significant sites will be determined through a review of areas that could potentially be physically affected by erosion and areas identified by First Nations as having cultural significance.	New Commitment: KLNG commits to assessing potential shoreline erosion due to shipping activity at significant sites along Douglas Channel during the TERMPOL review. Significant sites will be determined through a review of areas that could potentially be physically affected by erosion and areas identified by the First Nations and existing archaeological information as having cultural significance.
6. Ballast and bilge water management (TC, DFO, HFN)	More information is required to ensure that non-indigenous species are not introduced through the discharge and/or intake of ballast or bilge water.	At present Canada is in the process of formulating regulations governing the discharge of ballast water which will be added to the *Canada Shipping Act*. These regulations are modeled to a large extent after those guidelines and regulations put out by the International Maritime Organization (IMO) under MARPOL (pers. comm. Charles Hansen, Transport Canada, August 2005). MARPOL is the main international convention covering prevention of pollution of the marine environment by ships from	Existing Commitment: Federal and provincial regulatory processes and environmental codes of practice will be followed (Table 7.16-1, Section 7, page 7.2-67) New Commitment: KLNG commits to requiring in its shipping contracts that ships include and adhere to Transport Canada's National Ballast

		operational or accidental causes. With respect to the discharge of ballast and bilge water, ships start with the highest level of authority, the IMO and MARPOL, and work their way down to the Tokyo/Paris MOU (inspection bodies for Pacific and Atlantic waters), after which they take into account any regulations that are country specific (such as those governed by Transport Canada) which are different from those of the higher authorities. In order to ensure that all ships are aware of the country specific practices, each ship receives a published notice of all the practices for each country's waters that they must abide by while in those waters (pers. comm. Craig Jackson, Richard Whitiker, and Neil Davis, Teekay Shipping, August 2005). The proposed changes to the *Canada Shipping Act* addressing ballast waters will bring Canadian regulations into line with current international standards. As a result the LNG tanker owners will not have to make many operational changes in order to conform to the *Canada Shipping Act* amendments with regards to ballast water discharge. Furthermore, the issue of ballast water discharge is not foreseen as a problem for the Kitimat LNG terminal because the LNG tankers will be unloading their cargo in port and will therefore be taking up water, not discharging it. When taking on ballast water while in port, water inside the ship does not escape into the surrounding environment. Even if some water escapement does occur, ballast water exchanges have been performed at sea as outlined by the IMO and Canadian ballast water guidelines. These guidelines stipulate that ballast water exchange will occur outside of the 200 nautical miles mark, at depths of no less than 2,000 m (pers. comm. Craig Jackson, Teekay Shipping, August 2005). Current industry practice is to have three full flushes of	Water management guidelines and the Oil Pollution Prevention Regulation with respect to bilge water management. This will be further reviewed in the TERMPOL process. New Commitment: KLNG will modify the Port of Vancouver ballast water management guidance package to suit their terminal conditions. This package will be provided to contracted LNG carrier(s) prior to delivery of LNG. New Commitments: KLNG will ensure in its shipping contracts that no bilge water is released while LNG tankers and tugs are at berth. KLNG will Investigate current practices for tanker and tug bilge management through the Chamber of Shipping and Kitimat area industries and local government.

		the ballast tanks occur between the 200 mile limits of the supply country and the delivery country. With regards to the concern over country of origin for each incoming vessel, vessels follow regulations as stipulated by IMO and MOU regardless of whether that country has its own national regulations. Furthermore, any responsible shipping company abides by these regulations at all times (pers. comm. Neil Davis, Teekay Shipping, August 2005). With respect to release of bilge water, the *Canada Shipping Act* - Oil Pollution Prevention (pers. comm. Charles Hansen, Transport Canada, August 2005) require that any discharge from ships shall be processed through oil filtering equipment that produces an undiluted effluent with an oil content of no more than 15 ppm while in Division I waters. Effluent content that exceeds 5 ppm in inland waters of Canada or 15 ppm in fishing zones 1, 2, and 3, must immediately trigger an alarm and a discharge stopping device. Discharge must not contain chemicals or any other substances introduced for the purpose of circumventing the detection concentration of oil that exceed the oil content limits specified. Due to the young age of the global LNG fleet, LNG tankers typically have much fewer problems than other tankers when it comes to bilge water quality (pers. comm. Craig Jackson, Teekay Shipping, August 2005). Each ship is equipped with state of the art water filtration equipment that meets the water quality specifications for bilge water as set out by the Canada Shipping Act (pers. comm. Craig Jackson and Richard Whitiker, Teekay Shipping, August 2005). Furthermore, the LNG tanker industry is moving towards internal dry bilge systems which will emit zero effluent contaminated with oil.	

		Detailed responses to all issues raised by DFO, many of which are similar to issues raised by other agencies and the Haisla First Nation can be found in a report entitled Responses to DFO Post-Application Questions provided to the TWG (September 29, 2005).	
7. Effects of marine terminal construction (EAO, DFO)	More information is needed on mitigating the effects of pile driving and blasting on mobile marine mammals and fish.	The installation method of the piles is dictated by the sediment conditions and bedrock at the location of the LNG berth and tug berth. In Emsley Cove, the underlying substrate for the LNG berth location is bedrock overlain by loose and soft marine sediments, and therefore piles will be drilled and grouted into bedrock. In Emsley Cove the marine sediments would likely be dredged to expose a bedrock shelf to be used for the ship berth foundation. In Bish Cove, the February 2, 2006 supplementary report commits to using a vibro-densification process to stabilize overlying sediments for the purposes of pile drilling and construction. No rock drilling would be required for the proposed Bish Cove marine terminal, as the vibro-densification process would permit piles to be hammered into firm ground. Blasting is likely for marine facilities at Emsley Cove but will not likely be required for marine construction at Bish Cove. A number of commitments have been made by KLNG to address the effects of construction and operation activities on marine mammals and fish. Kitimat LNG proposes to undertake a marine mammal monitoring program to ensure that marine mammals will not be injured or killed in the event of blasting and that effects on marine mammals will be at the lowest level practicable. The proposed monitoring program will be based on DFO guidelines for blasting and a program the US Army Corps of Engineers has proposed to mitigate blasting impacts on dolphins. Detailed responses to all issues raised by DFO, many of which are similar to issues raised by other agencies and the Haisla	New Commitments: KLNG will drill piles for the marine facilities. The number of piles and blasting for the barge and tug berth will be minimized to the greatest extent practicable. Existing Commitments: KLNG has committed to establishing a marine mammal monitoring program. Acoustic restrictions will be implemented. Construction timing will be outside of biologically sensitive areas and periods, and critical fish life stages. The amount of blasting will be reduced through use of specialized drilling equipment. Blasting design will be detailed to minimize pressure waves and blasting will be restricted to ensure it occurs outside of biologically sensitive areas. KLNG will adhere to current DFO guidelines for blasting and pile drilling and will review the plans with DFO prior to construction.

		First Nation can be found in a report entitled Responses to DFO Post-Application Questions provided to the TWG (September 29, 2005).	
8. Marine Mammal Activity (TC, DFO, EC)	More information is needed on the movement of marine mammals in Douglas Channel and the potential for vessel collisions with marine	There is limited data regarding the population ranges, abundance, distribution and life history of marine mammals around Kitimat. Cetacean sightings data from 1989 to 2005 was provided courtesy of the BC Cetacean Sightings Network. Supplemental Drawing DFO-2 shows this data. The mammals	Existing Commitment: KLNG will develop an EPP that contains a marine mammal monitoring program during the construction phase (Table 7.16-1, Section 7, page 7.2 -53).

	mammals.	that occur most commonly in Kitimat arm and Douglas Channel have a widespread distribution along the BC Coast. The general trend for area sightings, as seen from the data, appears to be that fewer cetaceans frequent the most inland regions of Douglas Channel and Kitimat Arm than Whale Cove and Squally Channel. Killer whales, humpbacks, Dall's porpoise, and Pacific white sided dolphins appear to be the only four cetaceans that use the most easterly half of Douglas Channel. DFO's database of marine mammal strikes in Canadian waters has only one reported ship strike in the area of Kitimat Arm - Douglas Channel - Wright Sound - Lewis Pass - Squally Channel - Campania Sound - Caamono Sound. A humpback whale was struck by a seine boat traveling at 9 knots in August of 2004 in Wright Sound. The whale was seen when hit but never seen again after the collision (pers. comm. Annely Green, DFO, September 2005). Detailed responses to all issues raised by DFO, many of which are similar to issues raised by other agencies and the Haisla First Nation can be found in a report entitled Responses to DFO Post-Application Questions provided to the TWG (September 29, 2005).	New Commitments: KLNG will develop a brochure including information on seasonal marine mammal activity and provide it to shipping contractors prior to delivery of the LNG. The brochure will include critical areas to avoid (based on available data and local and traditional knowledge), mammal identification information, any relevant requirements from the *Fisheries Act Marine Mammal Regulation* and response and reporting requirements. KLNG will solicit additional information from local residents and the Haisla First Nation. KLNG will Investigate current practices of marine pilots respecting marine mammal reporting and strike avoidance.
9. Dredging effects and ocean disposal of dredged and blasted materials (EC, DOK)	Need for ocean disposal, and if so, the following information: • Rationale for choice of ocean disposal and disposal plan for any material that does not meet disposal criteria • Estimated volumes of dredge or excavated material • Preferred disposal site and	The extent of dredging for Emsley Cove would be minimal and consist of removing shallow pockets of loose sediment in the vicinity of the dolphin piles and possibly dredging small quantities of rock to enable the drilling and socketing of piles. Based on a preliminary sea bottom survey, it is estimated that dredge quantities will be in the order of 9,000 cubic metres for Emsley Cove marine facilities. The final location for the marine structures at Emsley Cove would be determined upon completion of the detailed seabed survey and dredge quantities may be minimized through that process.	Existing Commitments: Any dredging will be scheduled within DFO's marine fisheries work window to avoid key biological processes (migration, spawning, etc.). Positioning of any dredge barge will be stable for accurate sediment removal and anchoring. New Commitments: KLNG will submit a permit application to

	plans for transport • Dredging methodology • Mitigation measures	Ocean disposal is the likely disposal method for dredged sediments as it will minimize multiple handling of the dredged materials and there is no opportunity to dispose of the material on-site. Laboratory analyses of the sediments at Emsley Cove indicates that the material is compliant with EC's disposal criteria. KLNG proposes to dispose of any dredge material at the closest approved ocean disposal site to Kitimat. If dredging is required, a formal application will be submitted to EC for ocean disposal of dredge material. Dredging of loose sediment pockets will likely be carried out using on-site marine crane fitted with a clamshell bucket. For rock excavation, if required, the work may involve scraping with clam to fracture and remove loose surface rock, or using a blast charge and removing debris with clam bucket. Dredging methods will need to be determined after the offshore geotechnical drill program. The contractor may ultimately propose an alternative method to suit their equipment and experience. Dredging for a Bish Cove marine terminal was initially anticipated to be approximately 600,000m3, assuming facilities located on the east side of the Cove. However, the February 2, 2006 plan which sites the facilities in the middle of the Cove is not expected to require any dredging. According to the February 2, 2006 report on Bish Cove, maintenance dredging for Bish Cove is also considered unlikely to be required.	Environment Canada for any proposed ocean disposal after an EA certificate and a federal EA decision has been made. The dredging for the barge and tug berth will be minimized to the greatest extent practicable. Dredged material will be removed from site as required.
10. Potential interaction between Bish Cove marine	Potential for any dredging required at a Bish Cove marine	Concerns were raised about the potential dredging. Similarly, concerns were raised about the potential for the estuary	New Commitment: If the LNG terminal is located in Bish Cove, the marine structures will be

facilities and adjacent Bish estuary (DOK, DFO)	terminal to affect the stability of the Bish Creek estuary.	sediments to be transported by longshore drift currents into the Bish Cove and require maintenance dredging. KLNG's February 2, 2006 Supplementary Report indicated that the Bish Estuary is stable and there is very little longshore drift taking place. Sediments from the Creek are more likely to be deposited directly into Kitimat Arm due to its steep slope. In addition, the February 2, 2006 plan has sited the marine facilities in the middle of the Cove and dredging is not anticipated.	designed and placed as generally depicted in the February 2, 2006 Supplement to the Bish Cove Addendum Report (Moffatt & Nichol Drawing SK-6)
11. Potential for Acid Rock Drainage (TC, EC)	Has the Proponent considered the potential for acid rock and how acid rock drainage would be managed?	There is potential for acid rock to be present at both Bish and Emsley Cove sites which may be exposed during road and berth construction.	New Commitment: The presence of acid rock will be investigated during geotechnical surveys. If acid rock is found, KLNG will adhere to any federal or provincial legislation or guidelines and policies applicable to the management and disposal of acid generating rock in the marine environment.
12. Intertidal and subtidal information (DFO)	More details of the intertidal and subtidal in the areas proposed for infilling for construction of the Emsley Cove and Bish Cove tug berths are required.	KLNG 's biologists did 19 intertidal transects and are confident that all the intertidal areas covered by the transects are fully representative of dominant species and zonation in the Emsley Cove area. No additional work is anticipated in the intertidal zone at Emsley Cove. New information was provided on the subtidal eelgrass at Emsley Cove which integrates the Jacques Whitford findings of the survey completed in December 2004 with local naturalist Dennis Horwood's findings. To ensure that the Emsley Cove tug/barge loading area was fully surveyed, a second subtidal survey of eelgrass habitat near the tug/barge loading area was conducted in September 2005 and the results confirm the presence of the eelgrass. Mapping of subtidal eelgrass beds has been provided to the TWG. Existing information on the intertidal and subtidal habitats in Bish	New Commitment: For a Bish Cove terminal site, KLNG will conduct a habitat assessment within the jetty and marine terminal footprint to finalize habitat compensation requirements. This will include further information on eelgrass.

		Cove, including eelgrass beds, has been summarized in the Bish Cove Addendum to the Kitimat LNG Terminal Environmental Assessment Certificate Application (January 11, 2006). In addition, underwater video transects taken by local naturalist Dennis Horwood have been provided to DFO. The locations of the transects are indicated on Figure 3.5-2 and summarized in table 3.5-1of the Bish Cove Addendum Report.	
TERRESTRIAL ENVIRONMENT			
Pipeline, Road and Transmission Line Rights-of-Way			
1. Environmental effects of the pipeline, road and transmission line rights-of-way (HFN, TC, DFO, CEA Agency, MOE)	Need for KLNG to minimize the total ROW width.	Three ROWs are required for the KLNG terminal (road, powerline and pipeline). The road access to the terminal will include the existing Bish Forest Service Road, and the pipeline and powerline ROWs will be parallel to the Bish FSR. The FSR does not have a dedicated ROW but an approved corridor of 75 m. This total width is not necessary for the road and therefore a cleared 20 m to 30 m width is used to determine cumulative ROW widths. The pipeline ROW will be 30 m in width and the powerline ROW will be 20 m in width. For the entire length of pipeline and powerline, these ROW will be located beside each other (50 m width). Where practicable, the road, pipeline and powerline ROW will be established side-by-side. In these areas the total ROW width will be 70 m to 80 m. For an Emsley Cove terminal, the FSR road will remain in its existing approved corridor to its current end point. For a Bish Cove terminal, KLNG's January 11, 2006 Bish Cove Addendum has proposed the new access road and other ROWs leave the Bish FSR at Renegade Creek. The new access roads to either Emsley or Bish Coves will be similar in width to the Bish FSR and will parallel the pipeline and powerline ROW.	New Commitments: For an Emsley Cove terminal, KLNG will keep the pipeline, powerline and road ROW in a single corridor south of Bish Creek wherever possible, as shown in the Emsley Cove Access Road Report. For a Bish Cove terminal, KLNG will keep the pipeline, powerline and road ROW in a single corridor after the access road leaves the Bish FSR wherever possible, as shown in the January 11, 2006 Bish Cove Addendum Report.
2. Environmental effects of the pipeline, road and transmission line rights-of-way	Ensuring that the ROWs are stable given the steep terrain and potential for erosion and wash-outs that could result	Standard engineering measures to ensure that the project will not result in washouts or slope failures include geotechnical investigations, detailed road design, hydraulic analysis of culverts/bridges, and environmental protection measures during	Revised Commitment: KLNG will develop an EPP that includes ROW preparation measures, sediment control and clean-up and revegetation measures. All of these components of the EPP

(HFN, TC, DFO, CEA Agency, MOE)	from the high rainfall in the Kitimat area.	construction. The climate and topography of the lands south of Bish Creek is not uncommon in BC. There are numerous examples of road works, pipeline construction and powerline ROW development throughout coastal BC and in the Rocky Mountains which demonstrate that regulatory guidelines, engineering design standards and good construction practices for linear developments can prevent slope failures, erosion and washouts. This engineering work is undertaken at two levels. First, the Oil and Gas Commission requires (1) a formal reclamation and stabilization strategy for all ROW where gradient and/or side slopes are greater than 16%, and (2) a Terrain Stability Field Assessment conducted by a qualified registered professional if the project impacts areas of potentially unstable terrain, has slopes of 60% or greater, and/or where there are indicators of slope instability. Second, to ensure the engineering design of road and pipeline will result in stable, secure and low maintenance infrastructure, the detailed engineering design for the road improvements and pipeline will include a detailed geotechnical assessment of the routes and an engineering analysis of all creek crossings. In addition, KLNG has proposed a route for the Bish Cove terminal access in its January 11, 2006 Bish Cove Addendum that crosses relatively flat terrain and avoids building on steep and unstable sideslope conditions along Bish Creek.	will act to ensure that the risk of erosion and wash-outs are minimized. New Commitment: KLNG will ensure that all engineering design work is undertaken in accordance with all applicable codes and standards. In addition, it will ensure that the design work is supervised and approved by a Professional Engineer registered in the Province of British Columbia.
3. Environmental effects of the pipeline, road and transmission line rights-of-way (HFN, TC, DFO, CEA	Maintenance of the existing FSR and new access road.	KLNG, West Fraser and Alcan will enter into a road maintenance agreement for ongoing maintenance of the upgraded forest service road. KLNG will maintain the new access road to the same standard as the forest service road.	New Commitments: KLNG will enter into road maintenance agreements with West Fraser and Alcan for the upgraded existing road. At a minimum, KLNG will comply with any existing road maintenance standards established in the existing road use

Agency, MOE)			permit. KLNG will develop a road maintenance plan for the existing FSR and the new access road that will include the existing requirements and the following subject areas: • roadside maintenance; • road signage; • surface drainage; • surface and bridge/structure maintenance; and • winter maintenance. The Haisla Nation will be given an opportunity to review and comment on the road maintenance plan prior to finalization.
4. Environmental effects of the pipeline, road and transmission line rights-of-way (HFN, TC, DFO, CEA Agency, MOE)	More information is required on the Bish Forest Service Road improvements.	The Bish FSR has been designed in accordance with Road Use Permit R06207. The key parameters of the design standard can be generally summarized as a low speed (30 km/hr), narrow(5 m) forest service road with steep pitches (up to 21% allowed). The design standard for the proposed upgrades to the Bish FSR that would be required for an Emsley Cove terminal or for a Bish Cove terminal will be based on the BC Ministry of Transportation's Low Volume Rural standard for Category C (Industrial Resource Roads). The proposed criteria are: • Design Speed: 50 km/hr • Design Width: 8 m • Lanes: Two • Max Gradient: 12% with short pitches of 14% • Design Vehicle: L75 (75 tonne gross vehicle weight) Max 68,040 kg (exceeds legal highway loading) • Bridges: Use existing bridges with pull-outs added as necessary • Culverts: Replace as necessary to ensure proper road	New Commitments: KLNG will design its accessroad and FSR road improvements in general accordance with the BC Ministry of Transportation's Low Volume Rural standard for Category C (Industrial Resource Roads) and will incorporate design input/recommendations from a geotechnical engineer and environmental consultant. The BC MOFR, Fisheries and Oceans Canada, District of Kitimat, the Haisla Nation and relevant stakeholders will be given an opportunity to review and comment on the design prior to finalization. KLNG will ensure that designs for all culverts and bridges are reviewed and approved (where necessary) by Ministry of Environment, Transport Canada and Fisheries and Oceans Canada in accordance with the *BC Water Act*

		drainage The length of the existing Bish FSR to be upgraded would be 10.6 km for a Bish plant site, instead of the 16.8 km required if the FSR is used to access an Emsley Cove terminal site.	and regulations, *Navigable Waters Protection Act* and *Fisheries Act*. The Haisla Nation will be given an opportunity to review and comment on the design prior to finalization. KLNG will enter into a road use agreement with road operators/owners for access to the LNG terminal and will notify other road users and the public of the nature of these agreements.
5. Environmental effects of the pipeline, road and transmission line rights-of-way (HFN, TC, DFO, CEA Agency, MOE)	Protection of fish and fish habitat at streams crossed by the Bish FSR or access road.	The Emsley Cove proposed access road will cross two fish-bearing streams (Emsley Cove Creek and an unnamed tributary). Emsley Cove Creek will be crossed by a bridge and the unnamed tributary will be crossed with an open bottom arch culvert as per the OGC's *Stream Crossing Planning Guide (Northeast BC)* or other standard as negotiated with regulatory agencies. The Bish Cove access road (as proposed in the January 11, 2006 Bish Cove Addendum Report) is anticipated to require bridges at Skoda Creek and Bish Creek. Both are to be single span, single lane designed for Q100 return flood events, 6 m clearance from water levels. In addition there will be several other structures required to cross streams, some of which may be fish bearing streams. DFO has requested that the Bish terminal access road crossings be reviewed and designed with local area DFO staff to minimize fish and fish habitat effects. In addition to DFO review and approval, stream crossing methods must be selected and constructed in accordance with the OGC's *Stream Crossing Planning Guide (Northeast BC)* including the Best Management Practices outlined therein or other standard as negotiated with regulatory agencies.	Existing Commitment: If any watercourse crossing constitutes a HADD, all work will be completed under DFO authorization and KLNG will provide a fish habitat compensation plan for DFO approval. New Commitments: KLNG will ensure that designs for all stream crossings are reviewed and approved (where necessary) by Ministry of Environment, Fisheries and Oceans Canada and the BC Oil and Gas Commission in accordance with the BC *Water Act* and regulations, the *Fisheries Act* and the *Oil and Gas Commission Act*. The Haisla will be given an opportunity to review and comment on the design prior to finalization. For a Bish Cove terminal access road, KLNG will conduct a habitat assessment on the final road layout with DFO area staff to finalize habitat compensation requirements, and incorporate DFO advice into the design and location of stream crossings.
6. Environmental effects of	Prevention of impacts from	The potential effects of an accidental spill entering Emsley Cove	Revised Commitment: KLNG's EPP will include

the pipeline, road and transmission line rights-of-way (HFN, TC, DFO, CEA Agency, MOE)	road spills on fisheries resources in Emsley Cove or Bish Creek.	Creek or Bish Creek are dependent upon what is spilled (i.e. diesel, fuel oil, etc.), the size of the spill, location of the spill, precipitation conditions, and spill response measures. KLNG has committed to a number of measures that will firstly prevent spills and secondly ensure a rapid response to spills. In the event of a spill on the Bish FSR or the site access road, KLNG has committed to preparing an environmental protection plan (EPP) for the construction and operation phases of the project. The EPP will include a spill response plan that details required equipment necessary to respond to a spill.	spill prevention and spill response provisions for construction and operation in accordance with all applicable provincial and federal legislation and regulations. An Emergency Response Plan will also make up part of the EPP. This plan will detail requirements for addressing potential effects on streams and measures to prevent road based spills from entering intertidal wetlands and/or the marine environment. It will include spill response kits (including requirements for absorbent booms), location of the kits for road-based spills, and provision for spill response training.
7. Effects of pipeline lateral construction (HFN)	Section 3.7.2.7 describes the pipeline lateral construction. Are the same pre-cautions noted in 3.7.2.3 and in 3.7.2.8 to be followed?	Environmental protection provisions outlined in 3.7.2.3 and 3.7.2.8 of the Application will apply to the pipeline construction and any other component of the Project that includes earthworks. These will be fully detailed in the EPP, which is to be developed prior to construction.	New Commitment: KLNG's EPP will include the protection provisions outlined in 3.7.2.3 and 3.7.2.8 for construction of the pipeline lateral. These will be fully detailed in the EPP, which is to be developed prior to construction.
Wildlife and Wildlife Habitat			
8. Potential effects on avifauna (EC)	More information is needed on the protection of avifauna. In particular: • adequacy of seasonal information related to birds; • identification of potential Marbled Murrelet nest trees prior to commencement of vegetation clearing; • a standardized heron stick nest survey was not undertaken; • planned follow-up	Discussions with Environment Canada (CWS) and the Ministry of Water, Land and Air Protection (now Ministry of Environment) were held to ensure that every effort was made to assess the impacts based on the best existing information in the absence of specific baseline surveys at the time of the Application. A bird survey was conducted during the fall of 2004. Incidental observations of avifauna were recorded during the winter track count surveys and ungulate aerial surveys. This information was taken into account for the assessment. A spring bird survey was conducted in 2005 to document breeding birds in the Assessment Area. A supplemental report containing the results of the spring survey was provided to the TWG. According to existing information (provincial data sources), it should be emphasized that this portion of the Douglas Channel	New Commitments: KLNG commits to looking for nests (i.e. Great Blue Heron) as well as other significant wildlife features during the on-site environmental monitoring phase. This will be outlined in the EPP and would include an on-site monitor looking for heron nests prior to any forest harvesting activities regardless of time of year. If clearing overlaps the breeding bird season (April-July), then the existing commitment to conduct a nest survey prior to clearing during the breeding bird season would be conducted as required. KLNG will participate in the Coastal Waterbird

	program; and participation in the Coastal Waterbird Survey program to develop more comprehensive baseline data for its project to address gaps in the context of emergency response preparedness.	supports relatively low densities of Marbled Murrelet. This is consistent with the habitat suitability mapping completed for the Assessment Area, which identified the majority (95%) of the terrestrial land area as low nesting habitat suitability for Marbled Murrelet. Surveys were conducted in the spring of 2005 to confirm the habitat suitability ratings for Marbled Murrelet. As a result, of these surveys recommendations are being put forth to change some of the moderate ratings to low ratings. If clearing of vegetation is planned to take place during the breeding bird season, including the Marbled Murrelet nesting season, a nest survey will be conducted to identify any active nests for all bird species potentially affected. KLNG has worked with Environment Canada to agree to a series of commitments that EC is satisfied will meet their requirements with respect to this project. KLNG will apply these commitments to both Emsley Cove and Bish Cove terminal locations.	Survey Program for a period of ten years. KLNG will, prior to construction, develop and implement management and mitigation strategies for construction and operations, to meet the requirements of the *Migratory Birds Convention Act* and BC *Wildlife Act*: • KLNG will, as required by the *Migratory Birds Conventions Act* and *Migratory Birds Regulation*, ensure that clearing of vegetation will not result in the injury, molestation or destruction of a migratory bird or its egg, or the nest of a migratory bird when the nest is occupied by a bird or its egg; or the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl, as required by the BC *Wildlife Act*. • Where vegetation clearing is to be undertaken during migratory bird breeding season, estimated by Environment Canada to be between April 01 and July 31 for the KLNG area, KLNG will undertake nest surveys in advance of such vegetation clearing and, where migratory bird nests are found, provide nest survey results to the listed agencies to determine the appropriateness of clearing and the width and diameter of nest buffer zones as and where needed. • Kitimat LNG will look for heron foraging

			activity in Bish Cove during the next breeding season (spring 2006) using standard survey methods. Consistent with the assumptions outlined by the Canadian Wildlife Service, a more focused nest search will be conducted should heron activity in Bish Cove be observed during the spring breeding season. If a nest search is warranted based on the marine observations, the nest survey will be conducted prior to proposed vegetation clearing of any mature trees. For a Bish Cove terminal location, KLNG will complete a Marbled Murrelet survey to confirm absence in forested areas to be affected by the LNG facility footprint.
9. Potential effects on coastal tailed frogs (EAO, MOE)	How will the project affect coastal tailed frog habitat (SARA listed species).	The potential for loss of tailed frog habitat and individuals can be mitigated through similar mitigation measures used to mitigate potential environmental effects on fish habitat. In particular, minimizing the removal of trees and shrubs within 30 m of streams and only grubbing the within 10 m of the stream banks will protect, to the greatest extent practicable, the existing amphibian habitat. To prevent direct mortality of tailed frogs during the physical excavation and similar construction, the work area should be isolated and inspected to ensure no tailed frogs are present before commencing work. In addition, any trenches that have been open over night will be inspected for tailed frogs prior to backfilling. These mitigation measures will be detailed in the project's environmental protection plan EPP). For a Bish Cove terminal site, KLNG will apply the same commitments as for an Emsley Cove location.	New Commitments: The EPP will include mitigation measures to protect the coastal tailed frog. These will include: • minimization of the removal of trees and shrubs within 30 m; • isolation and inspection in-stream areas to ensure that no tailed frogs are present before commencing work; and • trenches that have been open over night will be inspected for tailed frogs prior to backfilling. For a Bish Cove terminal, KLNG will complete a tailed frog survey to confirm predicted absence in streams to be affected by the Plant footprint.
10. Potential effects of Bish	The Bish Cove Addendum	Bears are a highly mobile animal that have large territories and	New Commitment: KLNG will complete a

Cove terminal on wildlife (DOK)	Report indicates the Bish terminal site would have larger effects on populations of bear and other wildlife than an Emsley site. This includes permanent habitat loss including Marbled Murrelet habitat loss. Where would the misplaced animals go? What mitigation is planned? Will noise from the release valves be shielded at a Bish Cove LNG facility, and how will noise in this area impact wildlife?	can gather food from a number of sources, although salmon are particularly important food source. The riparian area adjacent to Bish Creek has been classified as important habitat for bears and therefore a variable width buffer (from 70 to 169 m wide) has been provided between the plant facilities and the creek. This is sufficient to provide a visual barrier between the plant and areas that may be used by bears for fishing. Some bears may be displaced during construction; however, managing construction activities during sensitive feeding times of the year and total exclusion of hunting and fishing during construction is intended to reduce the impact on bears. The plant area is young second growth forest. It was logged in 1980 and Marbled Murrelet are dependent on a single habitat type for nesting, old growth forests. As stated in the Bish Cove Addendum to Kitimat LNG Terminal Environmental Assessment Certificate Application, none of the sensitive nesting habitat in the vicinity of Bish Cove will be affected.	Marbled Murrelet survey to confirm absence in the forested areas to be affected by the LNG facility footprint.
Vegetation			
11. Potential ROW impacts on vegetation (DFO, TC, MOE, HFN)	Management and maintenance of pipeline and powerline ROWs during operation to reduce impacts on vegetation.	Following installation of the pipelines and powerline, KLNG will recontour the ROW, install water control features (such as cut-off ditches) to prevent erosion on the ROW, reinstate the topsoil on the ROW and seed it. Erosion and establishment of noxious weeds on the ROW will be prevented by re-vegetating quickly with high quality, weed-free seed. The seed used in the re-vegetation plan will be one that is approved by the BC Ministry of Forests and Range for re-vegetation in the Terrace-Kitimat area. Pipeline ROW - On the pipeline ROW, the location of the pipelines marked with signage. ROW maintenance activities are dependant upon the topography and location of the ROW. Generally, closer to town, the ROW will be more highly maintained than remote sections of the ROW. Based on current	New Commitment: KLNG will not use herbicides as a standard vegetation management technique on ROW that it controls and manages. Vegetation will be managed using mechanical means and herbicides will only be used around above-ground pipeline infrastructure. Revised Commitment: KLNG's EPP will include provisions for revegetation and erosion control on the ROW that it controls and manages.

		practices used by Pacific Northern Gas (KLNG anticipates that it will adopt and implement similar practices) the ROW will be patrolled twice a year to inspect for potential maintenance requirements that do not fall under its scheduled maintenance regime. Scheduled maintenance will include vegetation control. Trees will be manually removed from the ROW on an annual basis and shrubs will be slashed less frequently (possibly every three to five years). Herbicides will be used to control vegetation growth around valves and above-ground infrastructure only (i.e. within the gas plant fence-line). Power Line ROW - The power line ROW will be maintained by BC Hydro. The provincial Integrated Pest Management Act and regulations provides the Province of British Columbia statutory authority for the use of Pest Management Plans (PMPs) on public and certain private lands. Vegetation management on BC Hydro distribution line corridors requires the preparation of a PMP. BC Hydro's PMP recognizes that caution must be used when working around bodies of water, water intakes and wells, environmentally sensitive areas, and areas where food is grown or found. Pesticide-free zones, no treatment zones and buffer zones will be established and maintained adjacent to the above areas, where required. Treatment options and selection criteria are established in the PMP. Options for maintaining vegetation include: manual and mechanical methods, cultural (natural) control, biological control, and chemical control (herbicides). Where herbicides are to be used, the PMP specifies pre-treatment inspection requirements, operational information (qualifications and procedures for application of herbicides), and environmental protection strategies (BC Hydro's 2005 Integrated Vegetation Management Plan for Distribution Line Corridors).	

12. Rare Plant Communities (EAO, MOE, DOK)	Effect of the Project on rare plant communities.	The pipeline alignment for an Emsley Cove terminal has the potential to interact with the Amabilis fir – Sitka spruce / Devil's club plant community in nine locations. KLNG's January 11, 2006 Bish Cove Addendum Report indicates two plant communities identified by the Conservation Data Centre as having special conservation concern will potentially be affected by vegetation clearing at the proposed Bish Cove terminal: 20 ha of Devil's Club and 1.5 ha of Salmonberry Overall, the Emsley Cove location and ROWs would affect 16.8 ha of plant communities of conservation concern, and the Bish Cove location would affect 22.1 ha through ROW and terminal site clearing.	New Commitments: KLNG will attempt to avoid areas of the Amabilis fir – Sitka spruce / Devil's club plant community through alignment adjustments wherever possible. If disturbance of the community cannot be avoided, mitigation measures such as drainage, erosion control and vegetation restoration will be utilized to protect and promote recovery of the altered plant community. For the Bish Cove terminal, KLNG will complete rare plant surveys in May/June 2006 to confirm that no rare plants are present within road, power and pipeline ROWs or facility sites. If rare plants are found, a mitigation program to avoid or relocate the plants will be prepared and implemented prior to construction.
HERITAGE AND ARCHAEOLOGICAL RESOURCES			
1. Protection of archaeological resources (HFN, TC, MTSA, INAC, PC)	More information is needed on specific commitments to protect archaeological resources, including information on required field work to identify and protect archaeological resources, on how construction will occur and be monitored, and how any archaeological finds will be preserved.	Traditional use and heritage overview studies and archaeological investigations have all been utilized to understand the potential effects of the KLNG project. The study areas for the Emsley Cove archaeological impact assessment (AIA) included the plant site, pipeline corridor and power line corridor. The assessment area was broad enough to accommodate changes in the Emsley Cove site plan that resulted from evolution of the engineering design between September 2004 and May 2005. The Heritage Impact Assessment has been reviewed by the Haisla and was edited to include the Haisla archaeologist's comments. Recorded sites are primarily culturally modified trees but there is potential impact on a documented seasonal village site, and there is potential for additional finds including burial sites.	New Commitments: KLNG will undertake mitigative studies in consultation with the Haisla if site disturbance is required. KLNG will document all heritage and archaeological sites identified in the Project area. KLNG will retain a qualified independent project archaeologist for site preparation and construction work. KLNG will ensure a Haisla representative is present at all future heritage assessment work completed at the site and during construction

		The proposed Bish Cove terminal location was not included in the earlier AIA investigations performed for the Emsley Cove terminal. Instead, KLNG has relied upon three Archaeological Overview Assessments and one Archaeological Impact Assessment prepared as part of the studies performed to designate the Bees I.R.#6 as an Industrial Park at the Haisla's request. The AOAs and AIA did not include possible effects associated with the access road and other ROWs associated with KLNG's January 11, 2006 Bish Cove Addendum Report, nor did it include detailed site investigations on I.R.#6. The January 11, 2006 report identifies 6 previously recorded sites, of which most are culturally modified trees, and indicates a potential for disturbance or destruction of specific sites, remnants of a Haisla village, and potential burials, as well as possible disturbance of rock art along the Bish Cove shoreline. For the Bish Cove terminal location, KLNG has indicated that it will undertake an AIA for on reserve and off-reserve components of the Bish Project that have not yet been assessed, following provincial standards. The AB, MTSA has indicated that KLNG should retain an archaeologist to conduct an assessment, consistent with the BC Archaeological Impact Assessment Guidelines, for those areas not previously surveyed and which are outside of the I.R.#6 (federal jurisdiction). The assessment requires a site inspection permit, and so an amendment to the existing Permit currently held by KLNG's contract archaeologist until December 31, 2006 is recommended. For the Bish Cove location on Bees I.R#6, Parks Canada's Archaeological Services Branch is responsible for archaeological resources and has indicated that an AIA is required. KLNG and its consultant intend to work with the AB and Parks Canada's Archaeological Service Branch to complete the	monitoring (post disturbance audits). KLNG will develop a protocol for consultation with the Haisla Nation on heritage and archaeological resource assessment, monitoring and disturbance mitigation activities Proposed Project refinements, facilities additions or location changes that may require land-altering activity will be referred by KLNG to the project archaeologist, along with updated Project mapping as it becomes available, for referral to the appropriate federal or provincial agencies. KLNG will ensure that all staff and contractors are advised of legal requirements and protocols for discovery, notification and management of archaeological finds that may be made during site preparation, construction and maintenance. KLNG will design the Project to avoid disturbance of known archaeological sites wherever possible. Where this is not possible, KLNG will contact the appropriate provincial agency for necessary permits or authorizations on provincially administered lands, and consult with Parks Canada's Archaeological Services Branch for federally administered land. KLNG will assess the potential impact of tanker traffic on the rock art sites on bedrock exposures flanking Douglas Channel in the vicinity of the marine terminal and implement mitigative measures if required.

		necessary AIA work and implement appropriate mitigation measures for a Project at Bish Cove. KLNG has made a number of commitments in the AIA, conducted for an Emsley Cove terminal, and intends to apply these to the Bish Cove terminal where they are relevant. KLNG also intends to work closely with the Haisla on heritage and archaeological issues throughout the Project.	For a Bish Cove terminal, KLNG will complete an AIA for unsurveyed portions of the road, ROW and terminal site to document archaeological resources. This will be done for provincially administered lands under Site Inspection Permit, and for federally administered land in consultation with Parks Canada's Archaeological Service Branch. The requirement for additional field work will be determined in consultation with the AB for provincially administered land and Parks Canada's Archaeological Services Branch for federally administered land. For an Emsley Cove terminal, LNG will carry out (under permit) mitigative excavations of shell midden site (FlTe 30) if Project disturbance of this site cannot be avoided KLNG will undertake archival research on the location of the early village in Emsley Cove if Emsley Cove is authorized as the terminal location. This will be completed prior to Project construction to determine whether the village lies within the Project boundaries, and if so, KLNG will undertake further field investigation prior to Project construction. KLNG will undertake additional Haisla interviews regarding the burial site of a 'giant' individual reported in the AIA Study for the KLNG Project. This will be completed prior to Project

			construction to determine if the burial site lies within the project boundaries, and if so KLNG will undertake further field investigation prior to Project construction. KLNG will, prior to disturbance, undertake additional inventory and assessment for any areas affected by facility sites or road, power and pipeline route alterations that were not within the study area of the initial AIA report, and for any substantial changes to Project design. KLNG will undertake post-disturbance inventory of the bedrock areas located above the proposed ship berth site in Emsley Cove, should the marine terminal be approved at Emsley Cove.
ATMOSPHERIC ENVIRONMENT			
1. Mitigation measures for air emissions (EC)	Additional commitments to mitigation measures that will address potential for significant adverse environmental effects.	Predicted exceedances of any given ambient air quality objective do not preclude a determination of significance. Dispersion models are inherently conservative. Simplifying assumptions made in the dispersion modeling exercise often result in over-estimates. Dispersion model output is not intended to be taken literally, but used as a tool to understand the sources interaction with meteorology, terrain and receptors. Emissions of NOx and CO in the Construction and Commissioning phase exceed the arbitrary 5% threshold of significance cited on page 7.1-12. In the Operational phase emissions of SO_2 and CO exceed this threshold. This is more a function of emissions in the assessment area being small rather than project-related emissions being large. Emission modeling showed that exceedances of the 1-hour, 24-	New Commitments: KLNG will monitor SO_2 at three locations (marine jetty and two reference locations) for an appropriate period of time to both verify the dispersion modeling results and verify the conclusions of the effects assessment. On-road diesel fuel will be used by all on-road and off-road vehicles in all phases of the Project. In as much as is practicable, on-road diesel will be used by marine equipment used during construction and operation (excluding LNG vessels). The use of lower-sulphur fuel by ships as a condition of terminal use will be considered at

		hour or annual SO_2 objectives are unlikely in the ambient environment. Kitimat LNG supports the use of passive ambient SO_2 monitoring in the Operational phase of the project to test this conclusion. A more robust test of significant adverse residual environmental effect is the dispersion modeling. The modeling clearly demonstrates a lack of a significant adverse residual environmental effect. KLNG's January 11, 2006 Bish Cove Addendum Report indicated that for a plant site located at Bish Cove, the projected emissions of particulate matter, SO2, NOx, CO and natural gas and GHG are unchanged and the setting for emissions is so similar to Emsley Cove that the mitigative measures can be applied with the same predicted residual effects as for Emsley Cove.	Kitimat LNG. Prior to imposing such conditions Kitimat LNG will investigate the assumptions used in the Application respecting emissions of sulphur dioxide from the LNG Vessel fleet, and the practicability of imposing such conditions. Speed restrictions will be in place at Kitimat LNG proximate to shore where effects attributable to sulphur dioxide are predicted. The Code of Practice in the DRAFT Report Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities will be reviewed to determine those that are appropriate to add to the project Environmental Management System.
2. Dispersion Modeling Issues for Emsley Cove and Bish Cove Terminal sites. (EC)	The dispersion modelling does not take into account emissions from vessels as they approach or depart the area. In worst-case meteorological conditions, these emissions might contribute to an elevated "background" concentration of contaminants, upon which the modeled worst-case concentrations (resulting from at-berth activities) would be superposed. The elevated "background" from this source could be higher than the historical background data used as "background" in the	The dispersion modeling in the Application does not take into account emissions from vessels as they approach or depart the area. Ship-borne emissions are "estimated from the point where ships leave the navigation channel and re-enter it." All of these emissions are assumed to be discharged at the jetty where their effect is maximized. These assumptions were detailed in two letters to the Ministry of Ministry of Water, Land and Air Protection (09/02/2005 and 14/04/2005), which the Ministry accepted as part of the dispersion assessment Terms of Reference (24/04/2005). For a Bish Cove Terminal site, KLNG has confirmed with EC's Senior Air Program Engineer that additional modeling is not necessary. However, all mitigations, monitoring and commitments that were agreed upon for Emsley Cove will still be required. These mitigations, monitoring and commitments	No further action required on modeling issue. New Commitment: For a Bish Cove terminal location, all mitigations, monitoring and commitments that were agreed upon for Emsley Cove will be applied to Bish Cove.

	Application.	address all the outstanding EC concerns.	
PROJECT DESIGN			
1. Water Management (HFN, EC, DFO, CEA Agency, MOE)	More information is required on water use storage, treatment and disposal. Particularly: • sources, usage, method of extraction, treatment and disposal of freshwater and potable water during construction and operation including water used for hydrostatic testing; • characterization, treatment and disposal of wastewater generated from the submerged combustion vapourizers (SCVs); • capacity, design, treatment methods and water disposal for the settling pond; • disposal of stormwater; and • sources, timing, method of extraction and disposal of freshwater and potable water.	KLNG has provided the TWG with a Water Management Summary report that consolidates the water management issues and mitigation strategies outlined both in the Application and through additional information provided during the EA review. The Summary includes a discussion of water use and disposal during the construction and operation phases of the project. Construction and Commissioning Construction of the LNG terminal and the associated pipeline, powerline and road works will result in the development of exposed soils during the construction and commissioning phase of the project. Management of sediment generation from any Project-related construction activity will incorporate a range of techniques that will be detailed in the EPP. In general, the steeper the slopes and the finer the soils, the more effort and tools needed to prevent erosion. The EPP will provide details for the methods to be used and will draw upon proven sediment and erosion control techniques. Some of the key techniques that will be incorporated into the sediment and erosion control component of the EPP are provided in the Water Management Summary. Fresh water will be obtained off-site and delivered to site by truck. Potable water will be obtained from the District of Kitimat and non-potable freshwater for hydrostatic testing and other uses during construction will be sourced under a Section 8 *Water Act* approval (short term use of water) from either the Kitimat River or Bish Creek. Water withdrawal, water quality testing and disposal of water used for hydrostatic testing will be conducted in accordance with the following regulatory requirements and best management practices (see the Water	Existing Commitments include: Environmental Protection Plan will encompass these components of the Project (Section 3.14.1, page 3-68). Water quality monitoring will be incorporated into the EPP for the site (Section 7.2, page 7.2-55). All hydrostatic test water will be discharged in accordance with Provincial and Federal regulations and more than 100m away from any watercourse or waterbody (Section 7.3, page 7.3-24) To prevent the migration of chemicals into the aquatic environment, DFO guidelines for treatment and disposal of concrete wash water, stormwater that comes into contact with uncured concrete and hydrostatic test water will be addressed in the EPP. All high pH waters will be collected and neutralized with carbon dioxide prior disposal (Section 7.3, page 7.3-35). New Commitments: KLNG will apply for Section 8 *Water Act* approval for short term use of water to obtain water required for hydrostatic testing of the LNG tanks and pipelines. Intakes will be screened as per DFO's Freshwater Intake End of Pipe Fish Screen Guideline. KLNG will implement an automatic neutralization

		Management Summary for more details): • *Hydrostatic Test Water Management Guidelines* (1996) Prepared by Tera Environmental Consultants (Alta.) and CH2M Gore and Storrie Limited for the Canadian Association of Petroleum Producers; • Section 8 permit requirements of the BC Water Act; • DFO's *Freshwater Intake End-of-Pipe Fish Screen Guideline*; and • *Waste Management Act* Oil and Gas Waste Regulation (subsections 2(b) & 8). Concrete will be a major construction material used in the construction of the marine structures, tanks, dykes, foundations, and footings. Due to the volume of concrete that will be required, a temporary on-site concrete batch plant will be situated on the plant site. Both concrete wash waters and concrete leachate have been shown to have a pH greater than 10 for up to 72 hours after a pour. In addition, aggregate, particularly fine sand particles can be expected to be washed from spoiled concrete or discharged washwater. Similarly, spoiled concrete or washwater contains additives and agents, which may have harmful properties to aquatic life. To protect the water quality of the streams on the LNG plant site, KLNG will employ standard environmental protection procedures that are described in *Ready Mix Concrete Industry Environmental Code of Practice* (1993, published by the Fraser River Action Program, Publication No. 1993-26). These methods are commonly used in the construction industry in British Columbia. Details of the best management practices will be detailed in the EPP and are described in the Water Management Summary. Water management of watercourse crossings is required for trenched crossings (pipeline), temporary culvert installations (for	process to ensure that settling pond effluent has a pH between 6.5 and 9.0 prior to release. KLNG will have a Stormwater Management Plan developed prior to construction of the facility. KLNG will provide the draft Stormwater Management Plan to Environment Canada and the Haisla for review. KLNG will negotiate an agreement with the District of Kitimat for water supply to address any potable water requirements. KLNG will work with DFO and MOE to determine an appropriate location for the discharge ofprocesswater into the marine environment during LNG terminal operation, andto confirm acceptable water quality (pH and temperature) and discharge infrastructure requirements.

		pipeline construction) and new or replacement culvert installations for road works. To protect the aquatic resources in the creeks, DFO and the Oil and Gas Commission require instream works to be undertaken in the dry. This necessitates isolation of the work area. This is typically achieved by installing a coffer dam made of sand bags or steel sheet piles on both sides of the work area (other methods can achieve this as well) and using pumps or a flume to direct the water around the work area. *Operation* The primary water management issue during the operation phase is the characterization, treatment and disposal of wastewater generated from the Submerged Combustion Vapourizers (SCVs), which are the equipment that warms the LNG to allow vaporization (transformation of liquid to gas). The vapourizer consists of an enclosed water bath (25-30^{o}C) into which exhaust from a natural gas fired burner is allowed to percolate through and heat the water. The LNG (at -160^{o}C) passes through a heating bundle (stainless steel tubing that is surrounded by the warm water bath) where it is warmed to approximately 5^{o}C and regasified. The advantages of this system include: • no water requirement except for initial fill; • quick start up ability and tolerance for load fluctuation; and • high thermal efficiency. At commissioning stage, each vaporizer is filled with chlorine free potable water. The water specification requires the absence of dissolved matter which may cause scaling or promote corrosion. Due to the condensation of the water vapour condensed by cooling the flue gas, excess water with some	

		dissolved carbon dioxide (CO_2) is produced. The volume of water produced by this condensation process is estimated to be 10 m^3/h. In order to maintain the water level of the bath constant, an overflow rate equal to the condensing rate is maintained and the excess water is sent to a settling pond. When the natural gas is burned, the CO_2 in the flue gas will dissolve in the warm water bath and produce a low concentration of carbonic acid (H_2CO_3) making the water bath slightly acidic. Therefore, means are required to control the pH of the water bath and effluent between 6.5 and 9. This will be achieved using an automatic neutralization process. Neutralization of the acidity will be achieved using caustic soda (NaOH) from a storage tank. Products of the neutralization process include water, carbon dioxide, sodium carbonate (350 mg/L average to 380 mg/L maximum) and sodium nitrate (30 mg/L average to 100 mg/L maximum). The temperature differential between the ocean water and the discharged SCV effluent will also be controlled automatically. Using the cold temperature of the LNG, a heat exchanger will be used to adjust the temperature of the condensate water to within +/-0.5ºC of the ocean temperature prior to discharge from the settling pond into Emsley Cove. The settling pond will be covered so only SVC effluent is in the pond and continuous, automated monitoring will be used to ensure that the pH and temperature of the water is acceptable for discharge. Water quality monitoring and testing in the settling pond will be incorporated into the EPP for the site. Testing procedures will ensure that the water released from the settling pond meets provincial requirements for release.	

		Stormwater Management A stormwater management plan for the LNG terminal during operation will be developed during the detailed design phase of the project. This management plan will incorporate the following strategies: • maintenance of flow regimes in the creeks falling within the stormwater management plan; • use of perimeter drainage features such as French drains and ditching to prevent stormwater originating from off-site areas (*i.e*. upslope) from entering onto the plant site; • separation of clean stormwater that could not be contaminated by an accidental spill (*i.e*. originating from roofs) from stormwater originating from works areas; and • capture and route all stormwater originating from work areas through a sediment pond prior to discharge. The high level of precipitation at the Project site, particularly snow in winter, dictates that the plant equipment be located indoors. All equipment will be installed onto reinforced concrete pads provided with a sealed working surface. Therefore any accidental spills of lubricants will not be exposed to rain or run-off, and easily removed with absorbent pads. With the exception of the back-up diesel generator and the spare fire water pumps, all rotating machinery is powered by electrical drives thereby minimizing potential for oily wastes. For outside work areas where oily water may be generated, the stormwater management plan will designate collection and treatment requirements for the oily wastewater. For example, the jetty platform will be kerbed, trace heated and provided with a trace heated spill trench to direct any spills (or run-off water) to the main impoundment onshore.	

		The primary treatment option for removing any oil from the stormwater prior to discharge are oil/grit separators. Some new products include Vortechnics and StormCeptor separators which integrate novel treatment methods (such as incorporating absorbent products into the design) and have high flow by-pass features to ensure that the captured oil and sediment is not flushed out of the unit during major storm events.	
2. Footprint of LNG terminal (HFN, DFO)	More information is required on the footprint of the upland facilities with respect to marine foreshore and freshwater riparian habitat.	The facilities will be located above the 10 masl mark (with the exception of the spill impoundment) and will be set back from the foreshore, the marine high water mark and freshwater streams. The facility at Bish Cove will be set back from the foreshore, the marine high water mark and freshwater streams in accordance with the January 11, 2006 Bish Cove Addendum Report.	Revised Commitment: KLNG will include facility road and infrastructure maintenance in the EPP. New Commitments: With the exception of the segment of the road to the jetties, the spill impoundment, the vent stack and part of the pipe rack, no facilities or infrastructure at an Emsley Cove terminal will be located within 30 m of the stream top of bank or 20 m from the marine mean high water mark as per Emsley Cove Supplemental Drawing No. 2. With the exception of the road and pipe rack crossings, no facilities or infrastructure at a Bish Cove terminal will be located within 30 m of the stream top of bank (of streams to be maintained) or 20 m from the marine mean high water mark as per Figure 3.4.2 of the January 11, 2006 Bish Cove Addendum Report. KLNG will work with DFO and relevant agencies to develop a riparian management plan for areas within the plant fence line. KLNG will provide an opportunity for the Haisla to comment on the plan prior to finalization.
3. Effect on Haisla traditional	Is the Proponent committing to	The intent behind Application Commitment No. 182 is KLNG	Existing Commitment: KLNG will schedule

uses of ship movement (TC)	not allow ship movement to and from its berth during First Nation traditional use, regardless of costs? (section 7.16 table of commitments #182)	would develop a vessel schedule that took into consideration known periods of First Nation traditional use and, where possible, schedule vessel arrivals and departures outside of these periods. However, it is important to note that overall vessel scheduling may be affected by factors outside the control of the terminal operators, such as weather conditions, and delays or changes in the individual vessel schedules. This commitment would apply to both Bish and Emsley Cove terminal locations if desired by the Haisla.	vessel arrival/departure times outside of known times of traditional use, when possible (Table 7.16-1 #4, Section 3, page 3-44). New Commitment: KLNG will develop a protocol to notify the Haisla about LNG tanker arrivals and departures.
4. Tug size (HFN)	What size are the tugs necessary to maneuver a 250,000 cu m vessel?	The tugs required for the KLNG terminal will be approximately 38 m (125 ft) long and 10.7 m (35 ft) wide with a maximum draft of about 5.5m (18 ft). The minimum required water depth is approximately 7m (23 ft). These tugs will have 75 to 80 tonne bollard pull range. The tug size is estimated based on experience from other facilities and simulations. Tug design is a key element of the TERMPOL review and will be addressed further during that process.	New Commitment: KLNG will work with the TERMPOL committee to confirm the number of tugs required.
5. Decommissioning (HFN)	More information is required on what is meant by decommissioning. Does it mean restoring habitat to their pre-project conditions?	When a facility is decommissioned, the OGC requires that the land is restored either to its original purpose or to suit the land use proposed for the site at the time of abandonment. If at decommissioning the site is to be returned to its original purpose, KLNG would be required to develop a restoration plan that may include, but not be limited to: • removal of all facility infrastructure and debris; • restoration of surface water patterns to the original (natural) drainage patterns or to be compatible with the surrounding landscape; • ensuring or restoring site slope stability; and • revegetation of disturbed areas. If the site is to be used for another industrial purpose, KLNG would be responsible for ensuring that the land was reclaimed to	New Commitments: KLNG will consult with the Haisla on its decommissioning plans. KLNG will develop a project site abandonment and restoration plan in discussion with appropriate agencies prior to decommissioning the terminal, in order to determine and apply the most up to date practices and guidelines.

		a level appropriate for the proposed land use. Pipeline abandonment would require adherence to applicable standards at the time of decommissioning (*e.g.*, provincial, CSA, *etc.*).	
6. Clarification (CEAA)	Waste handling procedures and plans for spill impoundment are not provided in Application Section 3.6.5, (construction and tug berths, unloading berth and unloading facilities) although, there is mention of need for 'low earthen impoundment dikes (Sec. 3.10.1).	Section 3.6.5 addresses the general characteristics of the construction berth, tug berth, LNG vessel berth and unloading facilities at Emsley Cove. No wastes will be generated by these facilities on a day-to-day operational basis and regular/scheduled maintenance of tugs or other vessels will not occur at these faculties. Commitments to develop a Hazardous Spill Contingency Plan (Section 3.10.3, page 3-59 and Environmental Protection Plan (Section 3.14.1, page 3-68) include measures to address responses to an accidental event that results in the release of a hazardous material.	Existing Commitments: KLNG will ensure that the Hazardous Spill Contingency Plan (Table 7.16-1, Section 3.10.3, page 3-59). Environmental Protection Plan (Table 7.16-1, Section 3.14.1, page 3-68) encompass these components of the project.
FIRST NATIONS INTERESTS			
1. Vessel Traffic (HFN)	Other First Nations along the shipping channel may be affected by vessel traffic related to the project.	KLNG commits to assessing shoreline erosion at significant sites along Douglas Channel during the TERMPOL review. Significant sites will be determined through a review of areas that could potentially be physically affected by erosion and areas identified by First Nations as having cultural significance.	New Commitment: KLNG commits to assessing the effects of potential shoreline erosion due to shipping activity along Douglas Channel during the TERMPOL review. Effects will be determined for significant sites identified through a review of areas that could potentially be physically affected, areas identified by the First Nations as having cultural significance and areas identified through existing archaeological information.
2. Traditional Knowledge (EAO)	Commitments regarding Traditional Knowledge are required.	A TK report was prepared by the Haisla First Nation to support KLNG's preparation of the environmental assessment. The data collected was used by the assessment team in the analysis of all relevant VCs and design of the environmental protection/mitigation strategies.	New Commitment: KLNG will utilize traditional knowledge identified in the Haisla TUS during Project design and construction.
3. Aboriginal Rights	More information is needed on	The First Nations Communities and Land Use VC (Section 7.9)	New Commitments:

(HFN)	the cumulative effects of the project on Haisla way of life and implications for rights and title.	provided an overview of the First Nation communities and land and resource use in the region, as well as the results of the environmental effects analysis on the VC (including cumulative effects). Environmental effects on Haisla traditional land use activities due to the various project phases, as well as potential mitigation and/or optimization measures, were noted in Tables 7.8-4 to 7.8-7. KLNG incorporated data from the Traditional Use Study prepared by the Haisla to establish the above noted analysis. KLNG and the Haisla have an agreement in principle to negotiate an economic benefits agreement that includes financial compensation for potential loss of use by the Haisla as a result of the project.	KLNG commits to negotiating an impacts and benefits agreement with the Haisla that includes financial compensation for potential loss of use by the Haisla as a result of the Project. KLNG will work with the Haisla Nation to collect additional land use information to assist agencies with determining the effects of the project on First Nations interests. This will include additional information associated with the ROWs and resource use in Emsley Cove.
ENVIRONMENTAL ASSESSMENT PROCESS			
1. Relationship between the Environmental Assessment and the TERMPOL review (HFN , TC)	Clarification is required on the relationship between the environmental assessment process and TERMPOL specifically as it relates to the wake generated by tankers moving through Douglas Channel and the potential for shoreline erosion.	Vessel traffic and its impact on the Douglas Channel will be more thoroughly studied during the TERMPOL study. KLNG has sent a letter to Transport Canada requesting that a TERMPOL process be initiated (July 27, 2005). A copy of this letter has been circulated to the working group and TC has accepted this request. KLNG will be meeting with Transport Canada to determine the scope of the TERMPOL review and has made a commitment to assess shoreline erosion in some areas.	New Commitment: KLNG will continue to work with Transport Canada and DFO in the approval/authorization processes to minimize the potential effects of the tug berth on the marine environment. KLNG will work with the TERMPOL review committee to ensure that preliminary commitments related to tug and tanker operation will be reviewed for operational feasibility by tug and tanker operators and local pilots before they are carried forward into the TERMPOL process. KLNG commits to assessing potential shoreline erosion due to shipping activity at significant sites along Douglas Channel during the TERMPOL review. Significant sites will be determined through a review of areas that could potentially be physically affected by erosion and

			areas identified by the First Nations and existing archaeological information as having cultural significance. KLNG commits to requiring in its shipping contracts that ships include and adhere to Transports Canada's National Ballast Water Management Guidelines and the Oil Pollution Prevention Regulation with respect to bilge water management. This will be further reviewed in the TERMPOL process.
ALTERNATIVE SITES ANALYSIS			
1. Alternative site analysis methodology and further comparative information is required (HFN, TC, DFO, EC, CEA Agency, EAO)	Further analysis of the methodology for site selection is required. The Haisla prefer to have the project located in Bish Cove since it has already been designated as an industrial site by the community. Specific information that is needed includes: • clarification of statement that Bish Cove supports more fish than Emsley Cove and further comparison of potential effects on fish habitat; • comparative project footprints for each site including lengths of ROWs	KLNG has conducted a detailed assessment of alternative sites in consultation with members of the WG through a working group formed to address this issue. Additional clarification of information requests and comparative analysis has been provided to the WG. The assessment of alternative sites indicates that based on various technical, geographic, physical site characteristics, public and First Nation support, and economic criteria used; the Kitimat area was where this project could feasibly be built and operated. After determining that the Kitimat area was the preferred location for the Project, potential locations in the Kitimat area were evaluated and two were identified as most suitable. These two most suitable locations (Emsley Cove and Bish Cove) were then evaluated against a number of technical economic, social, and environmental criteria to gauge their relative suitability. These two sites are being assessed in detail at the request of the Proponent and the Haisla. The Haisla and the Proponent	KLNG will continue to work with WG members on the determination of the most appropriate location for the marine terminal and plant issue.

	and number of stream crossings; • cost comparison; and comparison of high-level engineering designs for each location.	have signed an agreement in principle which provides for the Project to be located at Bish Cove if the EA shows this site to be appropriate.	
EFFECTS OF THE ENVIRONMENT ON THE PROJECT			
1. Drift Tests for tidal effects (TC)	TC encourages the Proponent to carry out drift tests in the area of berth to determine tidal currents and record them for use by pilots bringing in vessels.	Prior to operation, KLNG will conduct drift tests. Locations in Douglas Channel and the cove approved for the marine terminal will be tested.	New Commitment: KLNG will conduct drift tests in Douglas Channel and the cove approved for the marine terminal prior to facility commissioning and will provide data to the pilotage authority.
2. Geotechnical Information (HFN)	Preliminary geotechnical information was used to make recommendations for seismic safety. Will additional geotechnical information be available for final design?	The FEED work includes carrying out a seismic risk analysis in accordance with the governing standards.	New Commitment: A seismic risk analysis in accordance with the governing standards will be conducted with the Front End Engineering Design study.
3. Wind exposure	Is the exposure to east, SSE or south winds at a Bish Cove marine facility a safety issue for the vessel pilots responsible for docking the LNG vessels?	Exposure to prevailing winds at Bish Cove is similar to that at Emsley. Wind records for the area (see pages 35-36 in the EA Addendum) suggest that the winds are less than 5.7 m/s (11 knots) for 85-90% of the time, which should not pose too much difficulty for berthing regardless of orientation. Winds exceed 11.1 m/s (21.5 knots) less than 1% of the time.	As part of the TERMPOL studies, detailed full mission bridge simulations will be carried out to examine berthing and departure maneuvers under a complete range of wind speeds and directions. The outcome of these simulations will establish the maximum safe wind speed for berthing/departure manoeuvers.
ENVIRONMENTAL EFFECTS OF ACCIDENTS AND MALFUNCTIONS			
1. Size and Firefighting Capability of Tugs (TC)	What is the tug minimum size/power and level of firefighting ability?	The tugs required for the KLNG terminal will be approximately 38 m (125 ft) long and 10.7 m (35 ft) wide with a maximum draft of about 5.5m (18 ft). The minimum required water depth is approximately 7m (23 ft). These tugs will have 75 to 80 tonne bollard pull range. The tug size is estimated based on experience from other facilities and simulations. Tug design is a	New Commitment: KLNG will ensure that appropriate tugs are available when the facility is commissioned.

		key element of the TERMPOL review and will be addressed further during that process. Tugs for this facility will have standard firefighting capability used for LNG facilities in North America. These standards are based on Society of International Gas Tanker and Terminal Operators (SIGTTO) guidelines. The primary purpose for tugs at this facility will be for berthing, with limited use for escort and use for fire fighting if required.	
2. Agency Review of EPP (EC)	The Emergencies Section of Environment Canada would like to be included in the list of appropriate agencies for the review of the EPP.	KLNG will provide the Emergencies Section of EC with a draft of the EPP for both Bish and Emsley Cove terminals for comment.	New Commitment: KLNG will provide the Emergencies Section of Environment Canada with a draft of the EPP for comment.
3. Coordination of Responders (EC, TC)	Consideration should be given to including Federal Responders when developing a plan on how to coordinate a response with Local and Provincial Responders as it is likely that a significant incident would involve all three levels of government as well as industry and the community.	KLNG will provide the Emergencies Section of EC and other relevant federal agencies (e.g., Transport Canada) with a draft of the Emergency Response Plan for both Bish and Emsley Cove terminals for comment.	New Commitment: KLNG will provide relevant Federal Responders with a draft of the Emergency Response Plan for comment.
4. Bish Cove potential for accidents and malfunctions (DOK)	The Bish Cove Addendum Report statement that the effects of accidents and malfunctions are not different than at Emsley Cove, is not substantiated and in fact the Report information suggests that the effects at Bish may be greater due to topography and	Key potential accidents or malfunctions considered for the preferred layout in either Bish Cove or Emsley Cove consist of hazardous materials spills, LNG spills, vehicle accidents, failure of sediment and erosion control measures, and animal strikes. The Bish Cove Addendum Report describes potential issues that do not apply to the preferred location. Effects of accidents and malfunctions at either location are a concern for KLNG. In order to proactively work to prevent accidents and malfunctions, KLNG will ensure that engineering for the plant, LNG tanker	Existing Commitments: Environmental Protection Plan (Table 7.16-1, Section 3.14.1, page 3-68) will address any potential accidental releases from the facility. Emergency Response Plan will include plans to respond to emergencies in the event of accidental release of a substance to the environment (Table 7.16-1, Section 3.10, page

	shoreline.	jetties and roads, construction plans and operational plans address prevention of accidents and malfunctions. Some of the construction and operational strategies will be detailed in the EPP (Environmental Protection Plan), ERP (Emergency Response Plan) and Hazardous Spill Contingency Plan documents. The Bish Cove terminal location is not situated in the same Cove as the estuary but the same attention to accidents and malfunctions proposed at Emsley Cove will apply to the Bish Cove location.	3-68). KLNG will ensure that the Hazardous Spill Contingency Plan (Table 7.16-1, Section 3.10.3, page 3-59) includes prevention and mitigation of potential releases from the facility.
CUMULATIVE EFFECTS ASSESSMENT			
1. CEAA requirements for cumulative effects	Federal agencies may have additional information requirements for the assessment of cumulative effects.	KLNG will continue to work with the federal agencies on cumulative effects.	KLNG will continue to work with the Federal Agencies to address cumulative effects.
2. Clarification (CEA Agency)	Additional direction on assessing cumulative effects related to shipping may be required.	Vessel traffic and its impact on the Douglas Channel will be more thoroughly studied during the TERMPOL study. KLNG has sent a letter to Transport Canada requesting that a TERMPOL process be initiated (July 27, 2005). A copy of this letter has been circulated to the technical working group. KLNG will be meeting with Transport Canada to determine the scope of the TERMPOL review.	Existing Commitment: KLNG will enter into a TERMPOL process to address potential issues due to shipping (Table 7.16-1, Section 3, page 3-44).
COMPLIANCE, MONITORING AND FOLLOW-UP			
1. CEAA requirement for monitoring		Monitoring is required to ensure that commitments have been met.	KLNG will continue to work with the Federal Agencies to address compliance and monitoring.
2. CEAA requirement for follow-up		Follow-up is required for mitigation measures where there is uncertainty on the effectiveness of the measures.	KLNG will continue to work with the Federal Agencies to address follow-up.
3. Environmental audits	Section 3.14.8 does not fully explain who will be undertaking	Auditing protocols will be developed when the Environment, Health and Safety Management System is developed. KLNG	Existing Commitments include: KLNG will develop a comprehensive EHS

(HFN)	the environmental audits or exactly when the audits will occur. Since these audits are likely to be a primary indicator of compliance, more information should be provided.	will not be developing the EHS System until the project moves beyond the environmental assessment process. Once EA certificates and permit approval have been granted – KLNG will proceed with that work. The EHS System will include protocols for internal and external auditing procedures.	management system for all phases of the projects (Table 7.16-1, Section 3.10.3, page 3-59). Environmental Protection Plan encompass these components of the project (Section 3.14.1, page 3-68). New Commitment: KLNG will have external audits of their Environment, Health and Safety Management System at reasonable intervals.
4. Clarification (EAO)	Information required on monitoring requirements for different Project phases (Section 7.1,.p 7.1-99)	As part of the environmental effects analysis, appropriate monitoring and follow-up are described throughout the Application, where warranted. Kitimat LNG has made monitoring and follow-up commitments in relation to each valued component studied in the environmental effects assessment. Section 7.16 (Table 7.16-1) presents a summary of these commitments. This table also presents mitigative measures and best practices that were incorporated into the effects assessment and a commitment to develop an Environmental Protection Plan (EPP) in early 2006. The EPP will outline all environmental protection measures to be employed during the construction and operation of the project. As per *CEAA* requirements to conduct follow-up monitoring in order to verify impact predictions, Kitimat LNG will design and implement a focused follow-up Environmental Effects Monitoring Program in consultation and relevant regulators.	Existing Commitments: KLNG has made monitoring and follow-up commitments in relation to each valued component studied in the environmental effects assessment (Section 7.16, Table 7.16-1). KLNG has committed to develop an EPP (Table 7.16-1, Section 3.0 page 3-66)
5. Clarification (TC)	Navigable Waters Protection Division of Transport Canada confirms KLNG's understanding of the permits required from Transport Canada.	KLNG anticipates that the required approvals from TC include approval for construction of works in navigable waters under section 5 of the NWPA. Structures requiring approval are anticipated to include the LNG carrier berth, the construction barge and tug berth, some of the pipeline crossings, any required culverts/bridges for road improvements, the fire	No further action required.

		suppression water intake in Emsley Cove, and the discharge outfall to Emsley Cove. Which structures to require NWPA approval is a regulatory decision to be made by TC.	
6. Clarification (OGC)	Additional geotechnical information is needed for the cutting permit for Emsley Cove. The cutting permit application needs archaeological impact information for the area being considered.	The existing Heritage Impact Assessment report does not reflect the new information on the protection status of a large culturally modified tree ("CMT") site at Emsley Cove, determined by recent fieldwork to contain trees with modifications pre-dating 1846. As a result, the entire site is automatically protected under the *Heritage Conservation Act*. Additional geotechnical information and the Heritage Impact Assessment were provided to the OGC for the cutting permit.	As the entire Emsley Cove site is automatically protected under the *Heritage Conservation Act*, the Proponent must apply for and obtain an *HCA* s.12 Site Alteration Permit before cutting any trees or creating any ground disturbance within the Emsley protected site .
PUBLIC HEALTH, SAFETY AND ACCESS			
1. Public Health (NHA)	Increased demand for public health services, especially for drug and alcohol abuse and sexually transmitted diseases.	The Proponent has held preliminary discussions with the Northern Health Authority (NHA) to alert them to the Project. It is anticipated that much of the construction work force and permanent labour force will be drawn from the local area and communities, which may reduce the potential for public health issues since worker social activities and patters may have already been established. However, it is acknowledged that there is a risk of increased demand on public health services, especially if construction of the Projectcoincides with other potential projectsplanned for the area.	New Commitment: KLNG will continue discussions with the Northern Health Authority to enhance the NHA's ability to plan for increased health service requirements, especially related to drug and alcohol abuse and sexually transmitted diseases.
2. Public Access (EC, TC)	What implications does this development have to access by First Nations, recreational users and members of the public?	The Canadian Standards Association's (CSA) Code Z276 provides guidance on facility siting to protect existing users from the potential effects of an unlikely accidental event with respect to heat protection from fires and distance to flammable vapour-dispersion from unignited vapour clouds.	Existing Commitment: KLNG will schedule vessel arrival/departure times outside of known times of traditional use, when possible (Table 7.16-1 #4, Section 3, page 3-44). New Commitments:

		The requirements based on heat protection from fires establish the distance a facility must be located from areas where people congregate. The requirements based on unignited vapour clouds are based on the theoretical distance a vapour cloud could travel downwind before it reaches both the Lower Flammable Limit (LFL) and the distance to ½ LFL. The CSA Z276-01 code requires that the isopleth for a ½ LFL vapour cloud should not create a distinct hazard beyond the property line. Current legislation only allows KLNG to restrict public access on leasehold land so the public will be excluded from within the plant fenceline and on the 800 m access road to the facility (which will be gated). KLNG may have the ability to exclude the public has along the foreshore if a water lot lease is secured for the site; however, KLNG does not know if such a lease will be granted. There will be a 125 m shellfish harvesting restriction around the tug and tanker berths. The *Marine Transportation Security Act* Regulations govern security requirements for the berth. The regulations only apply when the vessel is at port. Security requirements are detailed in the 31-October 2005 marine security meeting Meeting Summary held between KLNG and TC. If the terminal is located at Bish Cove, it will be situated on the Bees IR No. 6 which will require a lease from Indian and Northern Affairs Canada. The Haisla have designated Bees IR No. 6 for commercial industrial use. This IR. is currently restricted from public use and would remain so under leasehold for an LNG facility.	KLNG will manage public access on the foreshore through provisions of foreshore tenures. KLNG will develop a protocol to notify the Haisla Nation about LNG tanker arrivals and departures. KLNG will provide a map of recommended public safety areas on the website. KLNG will post the LNG vessel schedules on the website on a regular basis. KLNG commits to negotiating an economic benefits agreement with the Haisla that includes financial compensation for potential loss of use by the Haisla as a result of the project. This agreement will include compensation for loss of access and potential conflicts. KLNG will comply with the *Marine Transportation Security Act Regulations* governing security requirements related to jetty. KLNG will include a public turnaround on its access road at the perimeter of the LNG terminal.

		KLNG plans for a Bish Cove terminal include provision for a public turnaround on the access road at the LNG facility, as well as a parking lot for visitors.	
LOCAL GOVERNMENT and LAND USE			
1. Relationship to District of Kitimat development processes and issues (DOK)	Implication of the Project for: OCP and Zoning Amendments at Emsley Cove site; subdivision Application process, including Road Access/ROW and Public Access to the Water as per Land Title Act Statute; use & cost-sharing of Municipal Services (Fire/Emergency Services, Garbage/Waste Treatment, Municipal Building Permitting and Inspection.	Many of these issues are related to post EA processes. If the Project is located at Bish Cove, the terminal will not be subject to local government jurisdiction. However, the District zoning and subdivision requirements for the ROWs and foreshore tenure will be applicable. KLNG has held discussions with the District regarding municipal services, particularly for water supply, waste disposal, and emergency services. KLNG will continue to discuss and resolve these matters with the District upon successful outcome of the EA review. Service agreement discussions between the District of Kitimat and KLNG will be required for desired municipal services if the terminal is located at Bish Cove on IR#6. KLNG recognizes the possible effect of the access road location and the FSR upgrade on current and potential users of the roads, and will commence early discussions with the District of Kitimat on this issue.	New Commitments: KLNG will continue to work with the District of Kitimat to negotiate use of municipal services, such as fire, emergency services, waste treatment and disposal. KLNG will consult with and obtain input from the District of Kitimat in development of the Emergency Response Plan for the LNG facilities. KLNG will negotiate arrangements with appropriate parties regarding requirements for use of transportation, utilities, communications and municipal services. KLNG will ensure that the District of Kitimat is consulted throughout the design stage on Project components and issues that are related to Official Community Plan and zoning amendment applications; building permits and inspections; and the application of the BC Building Code and Municipal Inspection Services. KLNG will consult with the District of Kitimat on the access road and FSR road improvents contemplated for the Project, prior to finalization of design.

			KLNG will obtain any necessary local government zoning amendments.
2. Building Code (DOK)	Need clarification as to portions of the Project (if any) to be covered by BC Building Code and Municipal Inspection Service (in Section 3.6.3)	Specific components of the Project that are subject to the BC Building Code and Municipal Inspection Service will be identified in the detailed design stage of the project by the lead design engineering firm.	New Commitment: KLNG will ensure that the District of Kitimat is consulted throughout the design stage on issues that are subject to municipal by-laws.
3. Waste disposal (DOK)	Need to discuss liquid waste with Kitimat Septic system contents trucked to Municipal Treatment System in Kitimat (Section 3.8.4) (i.e. estimate of annual capacity)	KLNG will discuss the use of community infrastructure with appropriate parties prior to operation.	Existing Commitment (#209): KLNG will continue to work with the District of Kitimat to address these issues. (Table 7.16-1, Section 7, page 7.11-16).
4. Business programs (DOK)	A Joint Venture Business Program should be considered between new Haisla businesses and Kitimat Businesses through the Chamber of Commerce (Section 7.8)	Following receipt of all regulatory approvals, KLNG will meet with the District of Kitimat to discuss the benefits of a Joint Venture Business Program regardless of the location of the plant. Supporting local community economic opportunities has been an objective of KLNG since commencement of the terminal project.	New Commitment: KLNG will meet with the District of Kitimat to discuss the benefits of a Joint Venture Business Program.
5. District emergency services (DOK)	The information in section 3.1.4 of the Application on emergency response and preparedness is not complete. The District of Kitimat has unique resources for emergency response and preparedness, given its industrial nature.	The components of the Emergency Response Plan are summarized in Section 3.14.4.4 of the Environmental Assessment (p 3-72). Development of the ERP will require consultation and input from the District of Kitimat.	New Commitment: KLNG will consult with and obtain input from the District of Kitimat in development of the ERP for the facilities.
6. Visual impact (DOK)	For the Bish Cove plant site alternative, will the larger plant footprint result in visual impacts?	Areas from which the LNG terminal will be visible have been mapped and provided for both the Emsley Cove and Bish Cove locations. KLNG will provide an updated visual assessment map of the Bish Cove location based on the new layout.	Response New Commitment: KLNG will provide a visual impact map of the Bish Cove location.
7. Clarification	The Bish Cove Addendum	As with the Emsley Cove site, KLNG will be required to obtain a	No further action required.

(DOK)	Report does not acknowledge that the Land Titles Act applies to the road discussions and agreements due to other industrial development sites and proposals within the area.	road use permit for the Bish FSR and a tenure for the new access road from the BC Oil and Gas Commission. This was not discussed in the Bish Cove Addendum Report as the requirement does not change as a result of the assessment of Bish Cove as a potential site for the LNG terminal. KLNG will apply for the appropriate land use tenure(s) for the road upon completion of the environmental assessment.	

APPENDIX E – PROVINCIAL SUMMARY OF HAISLA RIGHTS AND CONSULTATION ISSUES TABLE

ISSUE	NATURE OF POTENTIAL EFFECTS	RESOLUTION EFFORT BY GOV'T & PROPONENT
1. Ownership, traditional use and occupation of proposed Project area (Emsley Cove and watershed)	• Haisla indicate infringement of aboriginal title from construction & operation of facility, and all related facilities and utilities. • Haisla indicate infringement of fishing rights from construction & operation of facility, and all related facilities and utilities. • Haisla indicate infringement of hunting rights from construction & operation of facility, all related facilities and utilities, and from increased non-Haisla access to the wildlife resource. • Haisla indicate infringement of gathering rights from construction & operation of facility, and all related facilities and utilities. • Loss of part of trapline area. • Loss of direct connection to the land.	• Proponent is attempting to negotiate a benefits agreement for potential infringements and loss of traditional uses. • Crown attempting to identify specific potential effects and address through Project design changes, commitments by Proponent, and through permitting processes. NOTE: Haisla requesting accommodation through: • Siting project on Bees I.R.#6 • Changes to Project (design, operation, etc) • Provincial regulatory changes • (i.e. ability to deal with alternate sites) • Monetary compensation by Canada & BC to Haisla • Other forms (unspecified)
2. Ownership and traditional use and occupation of Bish Creek watershed as affected by road and utilities crossings.	• Haisla indicate potential downstream impacts on Bish Creek water quality and fisheries from road and utility crossings. • Haisla indicate Bish Creek watershed held by Beaver Clan (Albert Nelson) • Haisla indicate trapline in watershed held by Albert Nelson.	• Proponent is attempting to negotiate a benefits agreement for potential effects and loss of traditional uses. • Crown attempting to determine specific potential effects in order to address. • Crown has requested KLNG to provide additional TUS information respecting the road and utilities crossings in

		Bish Creek watershed.
3. Haisla archaeological and cultural resources in Project area	• Several known CMT sites and middens will be impacted by facility and road and utility construction. • Potential sites (burial sites, village site) may be destroyed or altered by construction.	• Proponent has made commitments to discuss management / removal of sites with Haisla. • Proponent has committed to develop protocols with Haisla, ensure Haisla are present to monitor at all future archaeological work, and during construction phase. • Heritage Conservation Act requires proper management of resources found and specific notification procedures.
4. Capacity of the Haisla to participate in EA review.	• Haisla may be unable to participate in EA.	• Proponent has provided participant funding. • EAO has provided participant funding. • Haisla has applied for and received federal funding for review of the federal CSR report.
5. Consultation and accommodation on Project and related permits and authorizations		• Federal and provincial staff have held 4 meetings with Haisla to discuss R&T issues. • A lead provincial agency has been identified to coordinate consultation efforts on post-EA permits and authorizations. • Federal consultation on permits and authorizations has been initiated as part of the EA and is being coordinated with provincial consultation. • The Province has established a team to negotiate for potential infringements if required.
6. Permits and authorizations required in association with the Project		• Crown has provided the Haisla with a specific list of permits and authorizations that will be required, with timelines. • A work plan is being established to coordinate permit consultation after the EA has concluded.

		• Federal permit and authorizations required are directly connected to the EA and are to be coordinated as possible with provincial permit requirements. • Province has provided funding to Haisla for capacity to review post-EA provincial permits and authorizations.
7. Haisla community consultation		• Proponent conducted one pre-application community meeting with sanction of Haisla Council. • Proponent was required by EAO to conduct post-application consultation with Haisla community, and this-took place August 11, 2005. • Haisla working group has identified and represented community views in EA process. • Haisla community views and and comment were requested on the federal scoping document (May 2005) and will be sought on the CSR. • Accurate record of community consultation will be included in AR/ CSR reports and reviewed by Haisla before finalization.
8. Alternative sites are not adequately addressed.	• Haisla indicate potential impacts of locating project on Bish I.R. would be low since the I.R has been designated for industrial use by community. • Potential impacts lower for Bish due to anticipated shorter rights of way for roads and utilities. • Assumption is that benefits agreement and lease arrangements would be made for Bish site. • Bish Cove historically a permanent winter village site.	• A sub-group of the technical working group has worked with KLNG to further document alternative site selection, in accordance with federal and provincial requirements • Information requirements on specific impacts may necessitate additional TUS work by KLNG. • The CSR will examine alternative means of carrying out the project and will thoroughly evaluate alternatives, including locating the terminal at Bish Creek. • The EA process was expanded at the request of the Haisla and the Proponent to provide a more thorough

		evaluation of a Bish Cove terminal location.
9. Archaeological Impact Assessment (AIA)	• Potential impacts are identified in AIA for Emsley Cove as loss of 3 CMT sites and partial destruction of midden site. • AIA for Emsley Cove ndicates potential artifacts from village site and potential burial sites may be impacted by construction of plant and road and utilities.	• Proponent indicates the AIA was reviewed by the Haisla and edited to include the Haisla archaeologist's comments. • Proponent has made additional commitments, including: mitigative excavations prior to any disturbance, archival research, additional interviews for the burial site, additional inventory and assessment for any project siting changes, and post-disturbance audits. • Permits and authorizations will require potential effects to be addressed. • KLNG has committed to further archaeological work on east side of Emsley Cove to investigate former village site location. • If Bish Cove is chosen for the Project, an AIA will be prepared for the Bees IR No. 6 and will be required for other areas affected by the Project.
10. Heritage resources		• Heritage resources have been included in the scoping of the review and included in the AIA prepared for the Proponent.
11. Traditional use effects	• More information required than is provided in TUS to confirm specific impacts resulting from potential contamination due to land and water development.	• EA process is designed to avoid contamination of site and associated resources. This will include appropriate design standards to prevent potential contaminants from entering marine environment, such as buffers and spill containment areas.
12. Cumulative effects on Haisla way of life and implications or rights and title	• More information required than is provided in TUS to confirm specific impacts resulting from cumulative effects.	• Proponent provided clarification in EA Application sections on First Nations Communities and Land Use. • Haisla concerns will be assessed under the EA review process including the current use of lands and

		resources for traditional purposes.

APPENDIX F - COMPENDIUM OF PROPONENT COMMITMENTS

Number	Project Phase	Kitimat LNG Inc. Commitment	Responsible Agency or Group
1. GENERAL			
1.1	All Phases	Kitimat LNG Inc. (KLNG) will design, construct, operate and decommission the Project as described in the Application Report and modified and updated in its supplementary information, and in accordance with any subsequent leases, permits and authorizations required by federal and provincial permitting agencies.	DFO, EC, TC, INAC; MOE, OGC, ILMB, MTSA; DOK, Haisla
1.2	All Phases	KLNG will develop a comprehensive Environment, Health and Safety (EHS) Management System for all phases of the Project, and conduct external audits of its EHS Management System at reasonable intervals.	DFO, EC, TC, INAC; MOE, OGC, ILMB, MTSA; DOK, Haisla
1.3	All Phases	KLNG will provide environmental awareness training for all personnel, employees and contractors.	DFO, EC, TC, INAC; MOE, OGC, ILMB, MTSA; DOK, Haisla
1.4	Design	KLNG will implement a design quality assurance system for the LNG terminal.	TC; INAC
1.5	Design	KLNG will ensure that all engineering design work is undertaken in accordance with all applicable codes and standards, and is supervised and approved by a Professional Engineer registered in the Province of British Columbia.	TC, EC, INAC; MOE, OGC
1.6	Construction	KLNG will prepare a Commissioning Manual that will provide detailed procedures for commissioning the facility.	INAC
1.7	Construction/ Operation	Environmental Protection Plans (EPPs) will be developed for the construction and operation phases of the Project, and will outline key environmental protection measures to be employed during these project phases. KLNG will provide draft EPPs to Environment Canada for review and comment prior to their completion.[8]	DFO, TC, EC, INAC; MOE, OGC, ILMB, MTSA

[8] [8] Documents should be provided to Agencies at least 15 days in advance of proposed action for which the document is needed so that Agencies can conduct their reviews and provide written confirmation of their acceptance of those documents.

1.8	Construction/ Operation	The EPPs prepared for construction and operation phases of the Project and the associated ERPs (Emergency Response Plans) will include procedures for notification of appropriate government agencies.	DFO, EC, TC, INAC; MOE, OGC, ILMB, MTSA; DOK, Haisla
1.9	Decommissioning	KLNG will develop a Project abandonment and restoration plan in discussion with appropriate agencies prior to decommissioning the facilities, in order to determine and apply the most up to date practices and guidelines.	DFO, EC, TC, INAC; OGC, MOE, ILMB, DOK, Haisla

2. ATMOSPHERIC ENVIRONMENT

2.1	All Phases	KLNG will ensure that noise and air emission equipment is properly maintained and monitored. Equipment maintenance schedules will be followed to minimize changes to air quality.	EC; MOE; Haisla
2.2	All Phases	KLNG will abide by all new emission reduction standards provided by either the federal or provincial agencies.	EC; MOE
2.3	Design	KLNG will review the Code of Practice in the DRAFT Report Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities and will apply appropriate practices to the Project's Environmental Management System.	EC, MOE
2.4	Construction/ Operation	KLNG will undertake a Hazard Operability analysis of the terminal design to assist in minimizing the potential for spills or unintentional releases of both LNG and natural gas.	TC; INAC
2.5	Construction/ Operation	Equipment will be operated using low sulphur diesel where possible.	EC; MOE
2.6	Construction/ Operation	Noise control measures will be employed on vehicles working in the terminal (e.g. use of strobe lights in substitution for back-up beepers) where WCB rules permit. The number and frequency of deliveries will also be minimized.	DOK; WCB
2.7	Construction/ Operation	Measures will be taken to mitigate against impacts to air quality, such as dust suppression, minimum clearing of vegetation, covers on trucks carrying dust-generating material, and erosion control measures.	MOE
2.8	Construction/ Operation	Activities that generate noise within the town of Kitimat or Kitamaat Village will be conducted during regular business hours only.	DOK
2.9	Operation	KLNG will work with regulatory agencies to manage greenhouse gas (GHG) emissions from the LNG terminal. Adaptive management will be used to minimize and control GHGs. Best Available Technology that is the norm for industry (or better) will be used.	EC

2.10	Operation	KLNG will provide an annual report on greenhouse gas emissions after the operation commences and prior to the federal government's reporting deadline.	EC
2.11	Operation	KLNG will manage GHG emissions from the LNG terminal as a member of the Large Final Emitters group.	EC
2.12	Operation	KLNG will abide by all new emission reduction standards provide by either the federal or provincial agencies.	EC; MOE
2.13	Operation	A preventative maintenance and leak detection and repair (LDAR) system will be implemented to minimize and correct any leaks associated with the terminal infrastructure.	TC; INAC; DOK
2.14	Operation	KLNG will minimize fugitive emissions of particulate matter by paving high-traffic areas within the terminal.	INAC
2.15	Operation	KLNG will utilize LNG vessels powered by natural gas fired engines where possible, and use nitrogen purge of following LNG vessel unloading.	EC
2.16	Operation	KLNG will minimize impacts to air quality by ensuring steady-state operation of fuel burners in the terminal to minimize transient emissions.	EC
2.17	Operation	KLNG will undertake passive sulphur dioxide SO_2 monitoring at three locations and for an appropriate period of time (as per discussions with Environment Canada and Health Canada). Monitoring will occur at the marine jetty, and two reference locations to both verify the dispersion modeling results and verify the conclusions of the air quality effects assessment.	EC, HC
3. TERRESTRIAL ENVIRONMENT			
3.1	Design	KLNG will develop and implement a Timber Harvest Plan for clearing of the ROWs and terminal.	INAC; MOE, MOFR
3.2	Design	For the Bish Cove terminal, KLNG will complete rare plant surveys in May/June 2006 to confirm that no rare plants are present within road, power and pipeline ROWs or facility sites. If rare plants are found a mitigation program to avoid or relocate the plants will be prepared and implemented prior to construction.	EC; MOE
3.3	Construction	The construction EPP will: -include an Erosion Control Plan that addresses requirements for each stream class, crossing type, and type of water body that will be crossed; and -address site preparation measures, sediment control and clean-up and revegetation measures to be implemented on the ROWs.	DFO, INAC; MOE

3.4	Construction	Reclamation seed mixes on steep approach slopes and watercourse banks will include an annual cover crop that will provide a quick cover over exposed soils to minimize erosion.	DFO; MOE
3.5	Construction	KLNG will develop and implement a Noxious Weed Management Plan to prevent introduction or spread of weeds on the ROWs following construction. This will include use of weed control measures for construction of the ROWs such as cleaning of equipment prior to arrival, and use of high-quality, weed free seed mixtures for revegetation.	MOE, MOFR, OGC, MAL
3.6	Construction	KLNG will minimize the removal of vegetation and grubbing along ROWs.	EC; MOE, MOFR
3.7	Construction	ROW layout and engineering design will take into consideration the location of listed plant communities and make adjustments to the ROW alignment where possible. ROW alignments will also take into consideration the location of existing disturbed habitats and selectively locate ROWs in these areas to minimize disturbance to mature forest communities.	MOE, MOFR
3.8	Construction	KLNG will attempt to avoid areas of the Amabilis fir – Sitka spruce / Devil's club plant community through alignment adjustments wherever possible. If disturbance of the community cannot be avoided, mitigation measures such as drainage, erosion control and vegetation restoration will be utilized to protect and promote recovery of the altered plant community.	EC; MOE
3.9	Construction/ Operation	The operation phase EPP will include facility road and infrastructure maintenance. These aspects of the operation EPP may come into effect before Project construction construction is complete.	OGC
3.10	Construction	KLNG will implement Hazardous Spill Contingency Plan, Timber Clearing and Salvage, Clean-up, Reclamation, and Fire Prevention and Suppression sections of its EPPs.	DFO, INAC; MOE, MOFR
3.11	Operation	The operations EPP will include provisions for revegetation and erosion control on the ROW that it controls and manages.	OGC
3.12	Operation	KLNG will not use herbicides as a standard vegetation management technique on ROW that it controls and manages. Vegetation will be managed using mechanical means and herbicides will only be used around above-ground pipeline infrastructure.	OGC
3.13	Operation	KLNG will implement its pipeline and field services emergency response plan to minimize potential effects of a spill on the terrestrial environment and vegetation.	MOE, MOFR
3.14	Construction/ Decommissioning	KLNG will use native species for facility reclamation and revegetation of riparian areas affected by the Project.	MOFR, MOE, OGC; Haisla

4. WILDLIFE AND WILDLIFE HABITAT

4.1	Design	KLNG will minimize the loss of habitat by designing the LNG terminal within the smallest feasible footprint.	DFO, EC, INAC; Haisla
4.2	Design	KLNG will minimize ROW width and clearing to the greatest extent possible, and where feasible, locate ROWs adjacent to other linear disturbances (i.e. roads and other ROWs).	MOE
4.3	Design	For a Bish Cove terminal, KLNG will complete a Marbled Murrelet survey to confirm absence in forested areas to be affected by the road, ROW and LNG facility footprint.	EC; MOE
4.4	Design	KLNG will participate in the Coastal Waterbird Survey Program for a period of ten years.	EC; MOE
4.5	Design	For a Bish Cove terminal, KLNG will complete a tailed frog survey to confirm predicted absence in streams to be affected by the facility footprint.	EC; MOE
4.6	Design	KLNG will conduct reconnaissance surveys prior to vegetation clearing along proposed ROWs to confirm habitat suitability ratings as well as identify any special habitat features (dens, wildlife trees, etc.) that may be affected.	MOE
4.7	Construction	KLNG will minimize blasting activities to avoid mountain goat critical periods (winter/lambing), critical bear feeding periods (spring and fall) and will incorporate a bear safety and site management plan, including firearm restrictions, in the construction and operation EPPs.	MOE
4.8	Construction	KLNG will minimize the extent and duration of construction disturbance.	MOE
4.9	Construction	KLNG will confine clearing and grubbing activities to the ROWs and not adjacent areas.	MOE
4.10	Construction	Shrub removal will be minimized within 30 m of all streams and grubbing of the pipeline lateral trench will be limited to within 10 m of the stream banks.	MOE
4.11	Construction	KLNG will ensure maximum distance between forest patches is < 200 m where possible.	EC (CWS); MOE, MOFR
4.12	Construction	KLNG will restrict construction activities during peak grizzly and black bear foraging activities at Emsley or Bish Cove (i.e. spring and fall).	MOE
4.13	Construction	KLNG will minimize the size of temporary workspaces, and avoid establishing them within 100 m of critical bear foraging areas or within 30 m of wetland or riparian habitat areas.	MOE

4.14	Construction	Where appropriate, KLNG will establish public access control points along the ROWs using berms, doglegs, and slash rollback.	MOE
4.15	Construction	Where possible, KLNG will provide visual screen buffers for bears, moose and deer.	MOE
4.16	Construction	KLNG will facilitate wildlife movement across construction areas by installing trench plugs and gaps as required.	MOE
4.17	Construction	KLNG will avoid re-seeding of road sides with cover species preferred by bear or ungulates (i.e. grasses, clover). A wildlife biologist will be used to provide advice on the proposed re-vegetation seed mix.	MOE
4.18	Construction	The EPP will include mitigation measures to protect the coastal tailed frog. These will include: -minimization of the removal of trees and shrubs within 30 m; -isolation and inspection in-stream areas to ensure that no tailed frogs are present before commencing work; and -trenches that have been open over night will be inspected for tailed frogs prior to backfilling.	EC; MOE
4.19	Construction	Construction activities will be restricted during the peak spring migration for avifauna.	EC; MOE
4.20	Construction	KLNG commits to looking for nests (i.e. Great Blue Heron) as well as other significant wildlife features during the on-site environmental monitoring phase. This will be outlined in the EPP and will include an on-site monitor looking for heron nests prior to any forest harvesting activities regardless of time of year. If clearing overlaps the breeding bird season (April-July), then the existing commitment to conduct a nest survey prior to clearing during the breeding bird season would be conducted as required.	EC; MOE
4.21	Construction/ Operation	KLNG will develop and implement management and mitigation strategies for construction and operation to meet the requirements of the *Migratory Birds Convention Act* and *BC Wildlife Act*. KLNG will ensure that clearing of vegetation will not result in the injury, molestation or destruction of a migratory bird or its egg, or the nest of a migratory bird when the nest is occupied by a bird or its egg; or the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl.	EC; MOE
4.22	Construction/ Operation	Where vegetation clearing is to be undertaken during migratory bird breeding season, estimated by EC to be between April 01 and July 31 for the Project area, KLNG will undertake nest surveys in advance of such vegetation clearing and, where migratory bird nests are found, provide nest survey results to the listed agencies to determine the appropriateness of clearing and the width and diameter of nest buffer zones as and where needed.	EC; MOE
4.23	Construction/	KLNG will look for blue heron foraging activity in the Cove selected for the marine facilities during the next	EC; MOE

	Operation	breeding season (spring 2006) using standard survey methods. Consistent with the assumptions outlined by the Canadian Wildlife Service, a more focused nest search will be conducted should heron activity be observed during the spring breeding season. If a nest search is warranted based on the marine observations, the nest survey will be conducted prior to proposed vegetation clearing of any mature trees.	
4.24	Construction/ Operation	KLNG will maintain adequate hiding cover buffers (50 m) between access roads and important bear and ungulate habitat.	MOE
4.25	Construction/ Operation	KLNG will prohibit ATV use by industrial personnel outside the ROWs and LNG terminal footprint.	MOE
4.26	Construction/ Operation	KLNG will develop and implement a bear safety plan as part of the construction EPP.	MOE
4.27	Construction/ Operation	As part of construction and operation EPPs, KLNG will ensure safe handling, storage and disposal of food and food wastes.	MOE
4.28	Construction/ Operation	KLNG will include fire contingency plans in its EPPs to minimize wildlife habitat destruction.	EC; MOE
4.29	Operation	Where appropriate, KLNG will post wildlife crossing signs along the Bish Forest Service Road and the terminal access road.	MOE
4.30	Operation	KLNG will minimize unloading time for tankers.	MOE
4.31	Operation	Where appropriate, KLNG will create gaps in snow berms created by road plowing to allow ungulate movement.	MOE
4.32	Operation	KLNG will implement a coordinated access management plan to minimize the effect of public use on wildlife.	MOE
4.33	Operation	Requirements for hazardous materials storage and handling, equipment refueling constraints, spill reporting and containment response measures will be detailed in the EPPs.	INAC; MOE
4.34	Operation	If allowable under Transport Canada safety and navigation requirements, terminal security lighting will be down-shielded and similar to street lighting.	EC; INAC
4.35	Operation	Repair work to pipelines will be undertaken in adherence to the same mitigation measures as required during construction of the pipeline laterals. The EPP will address potential avifaunal impact issues associated with scheduled maintenance and repair.	EC; MOE

4.36	Operation	Protocols for use of scare tactics will be integrated into the EPPs. KLNG will employ scare tactics if a spill is in close proximity to marine birds, or if birds are within the projected trajectory of the spill.	EC; MOE
4.37	Decommissioning	KLNG will avoid decommissioning activities during peak grizzly and black bear foraging activities (i.e. spring and fall).	MOE

5. FRESHWATER AND FISHERIES ENVIRONMENT

5.1	Design	Buildings, tanks and facilities will be located outside of Riparian Management Areas to the greatest extent possible, as outlined in Emsley Cove Supplemental Drawing No. 2 (for an Emsley Cove terminal) or in the January 11, 2006 Bish Cove Addendum Report for a Bish Cove terminal.	DFO
5.2	Design	With the exception of the road and pipe rack crossings, no facilities or infrastructure at a Bish Cove terminal will be located within 30 m of the stream top of bank (of streams to be maintained) or 20 m from the marine mean high water mark as per Figure 3.4.2 of the January 11, 2006 Bish Cove Addendum Report.	DFO
5.3	Design	With the exception of the segment of the road to the jetties, the spill impoundment, the vent stack and part of the pipe rack, no facilities or infrastructure at an Emsley Cove terminal will be located within 30 m of the stream top of bank or 20 m from the marine mean high water mark as per Emsley Cove Supplemental Drawing No.2.	DFO
5.4	Design	If any watercourse crossing constitutes a HADD, all work will be completed under DFO authorization. KLNG will provide a fish habitat compensation plan for each stream crossing resulting in a HADD.	DFO
5.5	Design	For a Bish Cove terminal, KLNG will conduct a habitat assessment on the final road and plant footprint with DFO area staff to finalize habitat compensation requirements, and incorporate DFO advice into the design and location of stream crossings.	DFO
5.6	Design	KLNG will ensure that designs for all stream crossings are reviewed and approved (where necessary) by Transport Canada, Fisheries and Oceans Canada, BC Ministry of Environment, and BC Oil and Gas Commission in accordance with the *Navigable Waters Protection Act*, *Fisheries Act*, BC *Water Act* and regulations, and the BC *Oil and Gas Commission Act*. The Haisla will be given an opportunity to review and comment on the design prior to finalization.	DFO, TC; MOE, OGC; Haisla
5.7	Design	KLNG will develop a Stormwater Management Plan (SMP) prior to construction of the facility. KLNG will provide the draft SMP to Environment Canada and the Haisla for review. The SMP will include a site run-off control program.	EC, INAC; OGC, MOE; Haisla

5.8	Construction	All hydrostatic test water will be discharged in accordance with Provincial and Federal regulations and more than 100 m from any watercourse or water body.	DFO; MOE
5.9	Construction	Best Management Practices for stream crossings will be incorporated into the construction EPP for the Project.	DFO; MOE
5.10	Construction	All stormwater diversion ditches will be designed and constructed to convey the anticipated maximum daily flow around or through work sites and will include armouring to ensure protection from erosion during the period of construction and use of the ditch.	DFO; MOE
5.11	Construction	Any/all ditches will be completely backfilled and the area returned as closely as possible to the natural state on completion of construction works.	DFO; MOE
5.12	Construction	Removal of vegetation and soils within Riparian Management Areas will be minimized. Vegetation retention within these areas will be maximized.	DFO; MOE
5.13	Construction	All clearing and grubbing associated with site preparation activities will be conducted as soon as practical, prior to construction efforts and pipeline installation.	DFO; MOE
5.14	Construction	Upon completion of construction activities and pipeline installation, stream banks and riparian areas will be replanted with native vegetation to stabilize channel banks.	DFO; MOE, OGC
5.15	Construction	A bio-engineered (soft) approach will be used to restore disturbed banks at watercourse crossings, involving the salvage and re-planting of any existing riparian shrubs supplemented by the planting of willow clumps and/or willow staking. In general, hard erosion protection measures such as rock armour will only be considered where a bio-engineered approach cannot achieve sufficient bank/pipeline erosion protection .	DFO; MOE, OGC
5.16	Construction	All S1 and S2 streams will be crossed using bridges (roads) and horizontal directional drilling or aerial methods (pipeline). Within the plant site boundaries, aerial pipeline crossings and open bottom arch or over-sized/countersunk road culverts will be used.	DFO; MOE
5.17	Construction	All stream crossings will be completed during the period of least risk to fish and fish habitat (i.e. the freshwater in-stream work window) or within windows approved by DFO. Work areas will be isolated and fish will be salvaged before stream crossing work commences.	DFO; MOE, OGC
5.18	Construction	Streambeds disturbed by pipeline or road works will be restored to pre-construction status, with large woody debris and boulders replaced in stream channel.	DFO; MOE

5.19	Construction	Topsoil and subsoil stockpiles will be stored away from riparian areas. Trench spoil from instream excavation will be stored upland and be encompassed by secured siltation fencing in such a way that sediment-laden water does not flow back into the water course. Erosion control measures such as siltation fencing, temporary diversion berms, timber sandbags, rock or straw bales will be installed and maintained as determined appropriate by an environmental inspector during construction.	DFO; MOE
5.20	Construction	Erosion control measures and structures will be implemented to mitigate potential sedimentation related environmental effects to adjacent and downstream fish habitats. Measures such as silt fences, interception ditches, check dams, mulch covers, filtration cloth, straw bales, and sediment ponds will be used as appropriate to minimize or prevent potential entry of sediment-laden water into any streams affected by the Project.	DFO, INAC; MOE
5.21	Construction	All pipeline crossings with flowing water will be constructed using either trenchless methods or an isolated crossing technique.	DFO; MOE, OGC
5.22	Construction	Disruption of water flow during stream channel trenching will be prevented through implementation of standard temporary diversion procedures.	DFO; MOE, OGC
5.23	Construction	Prior to construction of any trenched stream crossing or culvert placement/replacement, a fish and amphibian salvage program will be undertaken.	DFO; MOE, OGC
5.24	Construction	During road widening activities, all replacement culverts will be oversized, bottomless or countersunk below existing stream grade with appropriate flow reduction techniques implemented (e.g. in-culvert baffles or large cobbles).	DFO; MOE
5.25	Construction	Stream channel trenching (temporary diversion) will be used for all flowing non-fish bearing (S5-S6) and small, fish bearing watercourses (S4 and small S3 streams) to be crossed by the pipeline lateral. Precautionary sedimentation barriers will also be established immediately downstream from all dry (ephemeral) channel crossings.	DFO; MOE, OGC
5.26	Construction	The construction EPP will include requirements for isolated watercourse crossings to prevent fish mortality and will include typical drawings.	DFO; MOE, OGC
5.27	Construction	To prevent the migration of chemicals into the aquatic environment, guidelines for treatment and disposal of concrete wash water, stormwater that comes into contact with uncured concrete and hydrostatic test water will be addressed in the construction EPP. All high pH waters will be collected and neutralized with carbon dioxide prior to disposal.	DFO

5.28	Construction	Environmental effects to fish and fish habitat from blasting will be minimized through: • exclusion of fish from the blasting area using appropriate • methods (e.g., installation of barrier nets on either side of the work area and removal of fish from between the nets); • use of non-propagating explosives; use of time-delay blasting caps for detonation of multiple, smaller charges; • no use of ammonium nitrate-fuel oil mixtures in or near water due to the production of toxic ammonia; • recovery of all residual blasting components (e.g., shock tubes and detonation wire); and, • no detonation of explosives that are likely to produce an instantaneous pressure change greater than 100 kPA in the swimbladder of a fish in or near fish habitat.	DFO; MOE
5.29	Construction	Blasting in or near fish bearing watercourses will be undertaken in the fisheries window (between July 15 and September 1) to avoid critical life stages and potential fish/ova mortality.	DFO; MOE
5.30	Construction	KLNG will work with DFO and relevant agencies to develop a riparian management plan for areas within the LNG terminal fenceline. KLNG will provide an opportunity for the Haisla to comment on the plan prior to finalization.	DFO; Haisla
5.31	Construction	KLNG will apply for Section 8 *Water Act* approval for short term use of water to obtain water required for hydrostatic testing of the LNG tanks and pipelines. Intakes will be screened as per DFO's Freshwater Intake End of Pipe Fish Screen Guideline.	DFO; OGC; MOE
5.32	Construction	Stream crossings and repairs will not be undertaken while heavy, sustained precipitation is forecasted. Pumping capacity for stream diversions will be sufficient to convey a 1:2 year storm event.	DFO; MOE
5.33	Construction	All construction activities will be inspected and monitored to ensure erosion and sediment control structures are appropriately installed, maintained and removed.	DFO; MOE
5.34	Construction/ Operation	KLNG will ensure that treatment and discharge equipment for waste water and runoff management is properly maintained and monitored.	DFO; MOE
5.35	Construction/ Operation	Spill response procedures to protect fish and fish habitat will be incorporated into the construction and operation EPPs.	DFO; MOE
5.36	Operation	Dedicated refueling areas will be established >100 m from fish habitat.	DFO; MOE

6. MARINE ENVIRONMENT AND MARINE MAMMALS

6.1	Design	Marine structures will be designed and placed as generally depicted in the February 2, 2006 Supplement to the Bish Cove Addendum Report, or as in Figure 3.6-1 developed for the the Emsley Cove terminal.	DFO; TC
6.2	Design	KLNG will conduct a habitat assessment within the jetty and marine terminal footprint, including an eelgrass survey, to determine habitat loss and establish habitat compensation requirements.	DFO
6.3	Design	KLNG will negotiate and implement a habitat compensation program under authorization of the *Fisheries Act* for marine facility disturbance of fish and fish habitat. KLNG commits to providing compensation at a minimum of 1:1 ratio of habitat loss/habitat compensation and will look at other locations for any additional compensation work required.	DFO
6.4	Design	KLNG will solicit input/involvement from the Haisla and local experts (e.g. Kitimat Valley Naturalists) as appropriate, during the development and implementation of the habitat compensation plan.	DFO; Haisla
6.5	Design	KLNG will work with the TERMPOL committee to confirm the number of tugs required.	TC**, DFO
6.6	Design	KLNG will develop a marine terminal manual for operations. The manual will be developed using local knowledge from operators and other sources to address the specific requirements for operation of the LNG facilities and off loading and transfer to storage in accordance with federal and provincial legislation and company policies. This manual will include: • a speed/thrust management plan for tugs and tankers; • identification of operating areas for tankers and tugs; • operating procedures for tugs; and • identification and physical marking of environmentally sensitive areas for restricted operation of marine vessels working at the terminal as per the March 2, 2006 No-Go Zone Map for Emsley Cove or the February 6, 2006 No-Go Zone Map for Bish Cove. Additional TERMPOL recommendations will be fulfilled and incorporated, as appropriate in the Marine Terminal Manual.	TC**, DFO
6.7	Design	KLNG will investigate current practices for tanker and tug bilge management through the Chamber of Shipping and Kitimat area industries and local government.	TC**
6.8	Design	The construction EPP will include: • marine sediment control measures; • a marine water quality monitoring program; • a marine mammal monitoring program; and	DFO

		• marine life salvage measures.	
6.9	Design	The construction and operation EPPs will include spill preparedness, prevention and response provisions in accordance with the *Canada Shipping Act* and all other applicable provincial and federal legislation and regulations. An Emergency Response Plan will also make up part of the EPP. The ERP will address planning and response for a LNG spill, and detail requirements for addressing potential effects on the marine environment, intertidal wetlands and streams that intersect the shoreline.	DFO, TC**; MOE
6.10	Construction	The number of piles, dredging and blasting for the barge and tug berth will be minimized to the greatest extent practicable. Dredged material will be removed from site as required. Dredging and blasting are not anticipated for the Bish Cove marine facilities.	DFO, EC
6.11	Construction	KLNG will adhere to current DFO guidelines for blasting and pile drilling and will review the plans with DFO prior to construction.	DFO
6.12	Construction	Any future blasting requirements for the LNG jetty will be minimized through engineering design and construction methods. Blasting methods will be selected to minimize pressure waves. Blasting in water is not anticipated for the Bish Cove marine facilities.	DFO
6.13	Construction	Any in-water and near-water blasting, as well as any dredging or vibro-densification processes will be scheduled within DFO's marine fisheries work window to avoid key biological processes (migration, spawning, etc.).	DFO
6.14	Construction	Positioning of any dredge barge will be stable for accurate sediment removal and anchoring. Dredging is not anticipated for the Bish Cove marine facilities.	DFO
6.15	Construction	A grab dredge will be utilized to minimize sedimentation, where dredging is required.	DFO
6.16	Construction	For a Bish Cove terminal, KLNG will utilize a vibro-densification process to compact and stabilize marine sediments for the purposes of marine facility construction. Procedures will be put in place to ensure capture and control of silt and other fine sediments displaced by this process. Marine bottom surface areas altered by this process will be covered with a soft sediment substrate to a thickness to be determined by DFO.	DFO
6.17	Construction	For an Emsley Cove terminal, KLNG will drill piles for the marine facilities.	DFO
6.18	Construction	For an Emsley Cove terminal, casements will be utilized during drilling to encapsulate drill material from the water column.	DFO

6.19	Construction	Admixtures with underwater concrete application will be utilized to avoid increased sedimentation and pH levels.	DFO
6.20	Construction	To provide additional habitat, pilings will provide hard attachment surfaces for invertebrates and algae.	DFO
6.21	Construction	Berth orientation and design will minimize potential shade effects of decking and eelgrass habitat.	DFO
6.22	Construction	KLNG will submit a permit application to Environment Canada for any proposed ocean disposal of dredged material after an EA certificate and a federal EA decision has been made.	EC
6.23	Construction	The presence of acid generating rock will be investigated during geotechnical surveys. If acid generating rock is found, KLNG will adhere to any applicable federal or provincial legislation and guidelines respecting management and disposal of acid generating rock into the marine environment.	EC
6.24	Operation	Construction vessels will operate outside of biologically sensitive and fisheries sensitive timing windows.	DFO
6.25	Operation	Use of night lighting will be minimized.	DFO, TC
6.26	Operation	Federal and provincial regulatory processes and environmental codes of practice will be followed.	DFO, EC, TC**
6.27	Operation	KLNG will require in its shipping contracts that ships include and adhere to Transports Canada's National Ballast Water Management Guidelines and the Oil Pollution Prevention Regulation with respect to bilge water management. This will be further reviewed in the TERMPOL process.	TC**,DFO
6.28	Operation	KLNG will modify the Port of Vancouver's ballast water management guidance package for the LNG terminal and provide it to contracted carriers prior to delivery of the LNG.	TC**, DFO
6.29	Operation	Through its contracts with the LNG carriers and tug operators, KLNG will ensure in that no bilge water is released by vessels at berth.	TC**, DFO
6.30	Operation	KLNG will develop a brochure including information on seasonal marine mammal activity and provide it to shipping contractors prior to delivery of the LNG. The brochure will include: • critical areas to avoid (based on available data and local and traditional knowledge); • mammal identification information; and • any relevant requirements from the *Fisheries Act* Marine Mammal Regulation and response and reporting requirements. KLNG will solicit additional information from local residents and the Haisla.	DFO; Haisla; DOK

6.31	Operation	KLNG will investigate current practices of marine pilots respecting marine mammal reporting and strike avoidance.	DFO, TC**
6.32	Operation	KLNG will implement an automatic neutralization control process to ensure that vapourizer discharges have a pH between 6.5 and 9.0. Water will be held in a cooling pond and discharged at a maximum temperature of 15^{o}C in summer and 9^{o}C in winter.	DFO, INAC
6.33	Operation	KLNG will work with DFO and MOE to determine an appropriate location for the discharge of process water into the marine environment during LNG terminal operation, and to confirm acceptable water quality (pH and temperature) and discharge infrastructure requirements.	DFO; MOE
7. HERITAGE AND ARCHAEOLOGICAL RESOURCES			
7.1	All Phases	KLNG will document all heritage and archaeological sites identified in the Project area.	PC; MTSA, OGC; Haisla
7.2	All Phases	KLNG will design the Project to avoid disturbance of known archaeological sites wherever possible. Where this is not possible, KLNG will contact the appropriate provincial agency for necessary permits or authorizations on provincially administered land and consult with Parks Canada for federally administered land.	PC; MTSA, OGC; Haisla
7.3	All Phases	KLNG will undertake mitigative studies in consultation with the Haisla if site disturbance is required.	PC; MTSA, OGC; Haisla
7.4	Design	KLNG will undertake additional Haisla interviews regarding the burial site of a 'giant' individual reported in the AIA Study for the KLNG Project. This will be completed prior to Project construction to determine if the burial site lies within the Project boundaries, and if so, further field investigation will be undertaken prior to Project construction.	PC; MTSA, OGC, Haisla
7.5	Design	The requirement for additional field work will be determined in consultation with the AB for provincially administered land and Parks Canada (Archaeological Services Branch) for federally administered land.	PC; MTSA, OGC; Haisla
7.6	Design	For an Emsley Cove terminal, KLNG will carry out (under permit) mitigative excavations of shell midden site (FlTe 30) if Project disturbance of this site cannot be avoided.	MTSA, OGC; Haisla
7.7	Design	For a Bish Cove terminal, KLNG will complete an AIA for unsurveyed portions of the road, ROW and terminal site to document archaeological resources. This will be done for provincially administered lands under a Site Inspection Permit, and for federally administered land in consultation with Parks Canada (Archaeological Services Branch).	PC; MTSA, OGC; Haisla

7.8	Design	KLNG will undertake archival research on the location of the early village in Emsley Cove, if this Cove is approved as the terminal location. This will be completed prior to Project construction to determine whether the village lies within the Project boundaries, and if so, further field investigation will be undertaken prior to Project construction.	MTSA, OGC; Haisla
7.9	Design	KLNG will, prior to disturbance, undertake additional inventory and assessment for any areas affected by facility sites or road, power and pipeline route alterations that were not within the study area of the initial AIA report, and for any substantial changes to Project design.	PC; MTSA, OGC; Haisla
7.10	Design	KLNG will assess the potential impact of tanker traffic on the rock art sites on bedrock exposures flanking Douglas Channel in the vicinity of the marine terminal and implement mitigative measures if required.	PC; MTSA
7.11	Design/ Construction	KLNG will retain a qualified independent project archaeologist for site preparation and construction work.	INAC; MTSA, OGC; Haisla
7.12	Construction	Proposed Project refinements, facilities additions or location changes that may require land-altering activity will be referred by KLNG to the project archaeologist, along with updated Project mapping as it becomes available, for referral to the appropriate federal or provincial agencies.	PC; MTSA, OGC; Haisla
7.13	Construction	KLNG will undertake post-disturbance inventory of the bedrock areas located above the proposed ship berth site in Emsley Cove, should the marine terminal be approved at Emsley Cove.	MTSA, OGC; Haisla
7.14	Construction	KLNG will develop a protocol for consultation with the Haisla on heritage and archaeological resource assessment, monitoring and disturbance mitigation activities.	PC; MTSA; Haisla
7.15	Construction	KLNG will ensure a Haisla representative is present at all future heritage assessment work completed at the terminal and during construction monitoring (post disturbance audits).	Haisla
7.16	Construction/ Operation	KLNG will ensure that all staff and contractors are advised of legal requirements and protocols for discovery, notification and management of archaeological finds that may be made during site preparation, construction and maintenance.	PC; MTSA; OGC; Haisla
8. COMMUNITIES AND ECONOMY			
8.1	All Phases	KLNG will continue to work with the District of Kitimat to negotiate use of municipal services, such as fire, emergency services, waste treatment and disposal.	DOK
8.2	All Phases	KLNG will hire people with appropriate qualifications and skills from the local community or region when practical.	MLCS

8.3	All Phases	KLNG will provide training opportunities to facilitate local hiring, where appropriate.	MLCS
8.4	Design	KLNG will negotiate a service agreement with the District of Kitimat for water supply to address any potable water requirements of the Project.	DOK
8.5	Design	KLNG will consult with and obtain input from the District of Kitimat in development of the Emergency Response Plan for the LNG terminal.	DOK
8.6	Construction	KLNG will use local education facilities where possible for delivering training programs and work with facilities on developing programs and delivery schedule.	MED, MLCS
8.7	Construction	KLNG will work with local professional and trade associations to encourage local hiring for construction of the terminal and for delivery of training programs.	MLCS, MED
8.8	Construction	KLNG will develop a listing of available accommodation options for construction workers in conjunction with the District of Kitimat and other applicable agencies.	DOK
8.9	Construction/ Operation	KLNG will make arrangements with appropriate parties regarding requirements for use of transportation, utilities, communications and municipal services.	DOK; MOT; BC Hydro
8.10	Construction/ Operation	KLNG will develop a transportation strategy to facilitate employee access to the terminal, including bussing and car pools.	DOK; MOT; Haisla
8.11	Construction/ Operation	KLNG will provide advance notice to local businesses about goods and services necessary for the Project.	MED
8.12	Construction/ Operation	KLNG will advise the local business community of any changes in operations relating to goods and services required.	MED
8.13	Construction/ Operation	KLNG will meet with the Kitimat Chamber of Commerce to discuss the benefits of a Joint Venture Business Program between new Haisla businesses associated with the Project and Kitimat businesses.	MED; Haisla; DOK
8.14	Construction/ Operation	KLNG will produce a list of jobs required during construction and operation, and required training for each and post these on its website.	MLCS
8.15	Operation	KLNG will develop a strategy for on-the-job training.	MLCS

9. PUBLIC SAFETY AND HEALTH / ACCIDENTS AND MALFUNCTIONS			
9.1	All Phases	KLNG will develop and implement health and safety plans and provide training to all personnel, employees and contractors.	WCB; DOK; Haisla
9.2	Design	KLNG will continue discussions with the Northern Health Authority to enhance the NHA's ability to plan for increased health service requirements, especially related to drug and alcohol abuse and sexually transmitted diseases.	NHA; DOK; Haisla
9.3	Design	KLNG will develop an Emergency Response Plan (ERP) to document measures and procedures to be implemented in response to an accidental release of a substance to the environment.	TC, EC; MOE; DOK
9.4	Design	KLNG will provide relevant federal and provincial agency responders with a draft of the ERP for comment, and consult with and obtain input from the District of Kitimat in development of the ERP for the facilities.	EC; MOE; DOK
9.5	Design	KLNG will install and / or have on site all necessary emergency response equipment and provide responder training.	TC, EC;OGC, MOE; DOK;Haisla
9.6	Design	KLNG will utilize Safety by Design - stringent adherence to applicable design codes and standards for the design of LNG equipment and facilities. Intrinsically safe designs, effective emergency planning and preparedness, and operational procedures and training will be incorporated into every aspect of the proposed facility.	TC; OGC; DOK; WCB
9.7	Design	The Front End Engineering Design (FEED) conducted by KLNG will include a seismic risk analysis for the terminal in accordance with governing standards.	INAC, NRCAN; OGC
9.8	Design	KLNG will install wind anemometers at the entrance to the cove selected for the marine terminal, should Transport Canada determine that they are advantageous to berthing of LNG vessels.	TC**
9.9	Design	KLNG will ensure that the tugs required for the marine terminal will have the appropriate firefighting capabilities when the LNG facility is commissioned.	TC**
9.10	Construction	Delivery of large and heavy materials and equipment will occur by marine vessels where possible, to avoid potential safety hazards on access roads.	TC; Haisla
9.11	Construction	KLNG will post notices at the start of the access road and along the route, where necessary, to inform vehicle operators about construction work.	MOT; DOK; Haisla
9.12	Construction/	The construction and operation EPPs will include a Hazardous Spill Contingency plan that will detail	TC**, EC;

	Operation	measures to be implemented in the event of a spill including: initial response, spill containment procedures, management of spills, clean-up and reporting.	MOE; DOK
9.13	Construction/ Operation	Operational procedures will be prepared to ensure the LNG transport, handling and process systems are operated within the design parameters and with the highest regard for safety.	TC**, EC; OGC, MOE; DOK;
9.14	Construction/ Operation	All waste will be placed in proper containers and regularly removed for disposal at the Kitimat landfill.	DOK; Haisla
9.15	Construction/ Operation	Waste management will be included in environmental awareness training for all personnel, employees and contractors.	DFO, EC, CWS; MOE; OGC; Haisla
9.16	Operation	KLNG will implement a comprehensive security program to ensure public safety.	TC**; OGC; DOK
9.17	Operation	KLNG will establish a marine exclusion zone for terminal and vessel access.	TC**; Haisla
9.18	Operation	KLNG will maintain a map of recommended public safety areas on its website.	TC
9.19	Operation	KLNG will implement a Worker Health and Safety Plan.	All Agencies
9.20	Operation	KLNG will limit industrial vehicle movements to times of lowest worker travel to and from the terminal, and will schedule shifts during peak labour force periods to minimize traffic peaks.	MOT; DOK
9.21	Operation	Employee awareness and driver safety training will be provided to ensure workers observe posted speed limits.	MOT; DOK
9.22	Operation	KLNG will provide on-site LNG specific safety training and operator training to its staff.	MLCS
9.23	Operation	The Marine Terminal Manual will address the specific requirements and operations of the LNG facilities and off loading and transfer to storage in accordance with federal and provincial legislation.	TC**; EC

10. LAND AND RESOURCE USE

10.1	All Phases	KLNG will continue to inform the public, local communities and the Haisla community of its Project schedule, permit approvals and construction schedules.	DOK; Haisla
10.2	All Phases	KLNG will continue to work with the District, local recreational groups, other industries and the Haisla to address public recreational access issues in Douglas Channel.	DOK; Haisla

10.3	Design	KLNG will maintain a public consultation program that provides interested parties with an opportunity to participate in further design, planning and review stages. Sample opportunities include: website, toll free phone line, newspaper advertisements, and interest group meetings.	DOK; Haisla
10.4	Design	KLNG will ensure that the District of Kitimat is consulted throughout the design stage on Project components and issues that are related to Official Community Plan and zoning amendment applications; building permits and inspections; and the application of the BC Building Code and Municipal Inspection Services.	DOK
10.5	Design	KLNG will obtain any necessary local government zoning amendments.	DOK
10.6	Design	For an Emsley Cove terminal, KLNG will keep the pipeline, powerline and road ROW in a single corridor south of Bish Creek wherever possible, as shown in the Emsley Cove Access Road Report.	DFO, TC; OGC
10.7	Design	For a Bish Cove terminal, KLNG will keep the pipeline, powerline and road ROW in a single corridor after the access road leaves the Bish FSR wherever possible, as shown in Figure 2.4-2 of the January 11, 2006 Bish Cove Addendum Report.	DFO, INAC, TC; OGC
10.8	Design	KLNG will enter into an agreement with road operators / owners for access to the LNG terminal and will notify other road users and the public of the nature of these agreements.	INAC; MOFR; DOK
10.9	Design	KLNG will include a public turnaround on its access road at the perimeter of the LNG terminal.	MOFR, OGC; DOK
10.10	Design	KLNG will design its access road and FSR road improvements in general accordance with the BC Ministry of Transportation's Low Volume Rural standard for Category C (Industrial Resource Roads) as per Appendix D of the August 2005 Access Road Report , and will incorporate design input/recommendations from a geotechnical engineer and environmental consultant. The Ministry of Forests, DFO, the District of Kitimat, the Haisla and relevant stakeholders will be given an opportunity to review and comment on the design prior to finalization.	OGC, MOT; Haisla; DOK
10.11	Construction/ Operation	KLNG will enter into road maintenance agreements with West Fraser and Alcan for the upgraded existing FSR road. At a minimum, KLNG will comply with any existing road maintenance standards established in the existing road use permit.	MOFR; OGC
10.12	Construction/ Operation	Plant facility road and infrastructure maintenance programs will be addressed in the EPP.	INAC; MAL

10.13	Construction/ Operation	KLNG will develop a road maintenance plan for the existing FSR and the new access road that will include the existing requirements and the following subject areas: • roadside maintenance; • road signage; • surface drainage; • surface and bridge/structure maintenance; and • winter maintenance (including a salt management plan and the use of BMPs). The Haisla will be given an opportunity to review and comment on the road maintenance plan prior to finalization.	OGC; Haisla; DOK
10.14	Construction/ Operation	KLNG will inform local communities and the public of plans regarding vehicle traffic.	MOT; DOK; Haisla
10.15	Operation	KLNG will manage public access on the foreshore through provisions of its foreshore tenures.	ILMB
10.16	Operation	KLNG will post and regularly update the LNG vessel schedules on its website on a regular basis.	TC; Haisla
11. NAVIGABLE WATERS			
11.1	Design	KLNG has committed to undertaking a TERMPOL Review to eliminate or minimize potential adverse effects on environmental components of value to First Nations and the public that may arise from physical disturbances or releases resulting from tanker movements.	TC**
11.2	Prior to Operation	KLNG will work with Transport Canada on establishing a designated route for shipping between shipping lanes and the marine terminal.	TC**
11.3	Design	KLNG will work with the TERMPOL review committee to ensure that preliminary commitments related to tug and tanker operation will be reviewed for operational feasibility by tug and tanker operators and local pilots before they are carried forward into the TERMPOL process.	TC**
11.4	Design	KLNG will ensure that appropriate purpose-built tugs are available when the facility is commissioned.	TC**
11.5	Design	KLNG will conduct drift tests in Douglas Channel and the cove approved for the marine terminal, prior to facility commissioning and will provide data to the pilotage authority.	TC**
11.6	Design	KLNG commits to assessing the effects of potential shoreline erosion due to shipping activity along Douglas Channel during the TERMPOL review. Effects will be determined for significant sites identified through a review of areas that could potentially be physically affected, areas	TC**; Haisla

		identified by the First Nations as having cultural significance and areas identified through existing archaeological information. Appropriate measures will be undertaken, as recommended by the TERMPOL committee.	
11.7	Operation	KLNG will inform vessel operators and related organization of its plans for marine work and give notice of marine work and schedule to CCG for Notice to Mariners.	TC; Haisla
11.8	Operation	KLNG will schedule LNG vessel arrival/departure times outside known times of traditional use of marine resources where possible.	TC; Haisla
11.9	Operation	Kitimat LNG will provide the necessary notification to the CCG (Marine Communications and Traffic Services) in Prince Rupert, and consult with local fishers, recreational users, the Port of Kitimat, harbour pilots and relevant regulatory agencies to further reduce the potential for incidents.	TC**
11.10	Operation	KLNG will comply with the *Marine Transportation Security Act Regulations* governing security requirements related to the marine terminal.	TC**
11.11	Decommissioning	KLNG will remove large and heavy materials and equipment by marine vessels where possible.	TC; Haisla
12. FIRST NATIONS			
12.1	Design	KLNG commits to negotiating an economic benefits agreement with the Haisla that includes financial compensation for potential loss of use by the Haisla of traditional lands affected by the Project footprint and associated road, powerline and pipeline ROWs.	Haisla
12.2	Construction/ Operation	KLNG will include in its agreement with the Haisla, provision for advance notice to local First Nations organizations about employment opportunities and qualifications required, and the hiring of Haisla with appropriate qualifications and skills, from the local community or region where available.	Haisla
12.3	Construction/ Operation	KLNG will include in its agreement with the Haisla, provision for working with local professional and trade associations to ensure Haisla are considered for jobs.	Haisla
12.4	Construction/ Operation	KLNG will purchase goods and services from First Nation businesses where such goods and services are available on a competitive basis.	Haisla
12.5	Construction/	KLNG will provide advance notice to First Nations businesses about goods and service	Haisla

	Operation	requirements for the Project.	
12.6	Operation	KLNG will provide cultural awareness training for all personnel, employees and contractors.	Haisla
12.7	Operation	KLNG will develop a protocol to notify the Haisla about LNG tanker arrivals and departure.	Haisla
12.8	Construction/ Operation	KLNG will utilize traditional knowledge identified in the Haisla TUS during project design, construction and operation.	Haisla
12.9	Decommissioning	KLNG will consult with the Haisla on its decommissioning plans.	Haisla

13. MONITORING AND FOLLOW UP PROGRAM			
13.1	Construction	An on-site environmental inspector will be present during construction to ensure that the EPP and approval conditions are met, including construction of all pipeline watercourse crossings and culvert and bridge upgrades.	All Agencies
13.2	Construction/ Operation	KLNG will continue to work with the federal agencies to address compliance, monitoring and follow-up to determine the accuracy of predicted effects and the efficacy of mitigation.	Federal Agencies
13.3	Operation	KLNG will implement any follow-up monitoring program required for potential impacts on the terrestrial environment (including vegetation).	EC; MOE; MOFR
13.4	Operation	After completion of any fish habitat compensation plans, the habitat compensation will be monitored for its effectiveness, thereby providing DFO with information to determine if the objectives of the plan were achieved.	DFO; MOE
13.5	Construction	The ROWs will be monitored during and following construction to assess the effectiveness of sediment control measures and make repairs as required.	DFO; MOE, MOFR, OGC
13.6	Operation	Watercourse crossings will be inspected routinely during the first year of operation to ensure that erosion and sedimentation control measures are successful.	DFO; MOE
13.7	Operation	Any further marine environment monitoring required by regulatory authorities will be implemented as required.	DFO

**This commitment will also be addressed through the TERMPOL Review Process lead by TC. TERMPOL includes participants from federal (DFO, INAC, EC, PC, CCG) and provincial (MOE, MEMPR) agencies.

KLNG= Kitimat LNG Inc. (Proponent); DFO= Fisheries & Oceans Canada; TC= Transport Canada; CCG= Canadian Coast Guard; EC=Environment Canada; PC= Parks Canada; INAC= Indian and Northern Affairs Canada; HC=Health Canada; NRCAN= Natural Resources Canada; MOE= Ministry of Environment; OGC= Oil & Gas Commission; MEMPR= Ministry of Energy, Mines and Petroleum Resources ; MTSA= Ministry of Tourism, Sport & the Arts, Archaeological Branch; ILMB= Integrated Land Management Bureau, Ministry of Agriculture and Lands; MED= Ministry of Economic Development; MOT= Ministry of Transportation; MOFR= Ministry of Forests & Range; MLCS = Ministry of Labour and Citizens' Services; DOK= District of Kitimat; NHA= Northern Health Authority; WCB=Workers Compensation Board.