

Joint venture companies



Controlled Document

## LNGC Tug Berth – FEED Amendment Assessment for Amendment #4 to Environmental Assessment Certificate #E15-01

Document Number	L001-00000-HE-7180-1273
DCAF Control ID	---
Document Revision	D
Document Status	Issued for Review
Discipline Document Type	HE7180 Other Report
Author Organization	Advisian
Revision Date	15/Jul/2022
Export Control	Not Subject to EAR – No US Content
Security Classification	Unrestricted
Approving Organization	---

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# REVISION CONTROL PAGE

Revision Status				Approving Organization		
Rev	Date	Document Status	Author	Reviewer	Approver	Review Code
A	17/May/2022	Issued for Review	Advisian (Worley Canada Services Ltd.) E. Grebeldinger	Advisian (Worley Canada Services Ltd.) R. Bracken	LNG Canada Development Inc	N/A
B	17/Jun/2022	Issued for Review	Advisian (Worley Canada Services Ltd.) E. Grebeldinger	Advisian (Worley Canada Services Ltd.) R. Bracken	LNG Canada Development Inc	N/A
C	30/Jun/2022	Issued for Review	Advisian (Worley Canada Services Ltd.) E. Grebeldinger	Advisian (Worley Canada Services Ltd.) R. Bracken	LNG Canada Development Inc	N/A
D	15/Jul/2022	Issued for Review	Advisian (Worley Canada Services Ltd.) E. Grebeldinger	Advisian (Worley Canada Services Ltd.) R. Bracken	LNG Canada Development Inc	N/A
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# ABBREVIATIONS

AIS	Automatic Identification System
AQMP	Air Quality Management Plan
BC	British Columbia
BCEAA 2002	BC Environmental Assessment Act [SBC 2002] c.43 [Repealed]
BCEAA 2018	BC Environmental Assessment Act [SBC 2018] c.51
ENV	Ministry of Environment and Climate Change Strategy
BMP	Best Management Practice
CAC	criteria air contaminant
CCME	Canadian Council of Ministers of the Environment
CD	chart datum
CCG	Canadian Coast Guard
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
DoK	District of Kitimat
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office
ECCC	Environment and Climate Change Canada
EM	Environmental Monitor
EMLI	Ministry of Energy, Mines, and Low Carbon Innovation
FLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
GHG	Greenhouse Gas
HWL	high water line
IAAC	Impact Assessment Agency of Canada
Indigenous Interest	Aboriginal rights, including title, or treaty rights of an Indigenous nation that may be impacted by a proposed project.
ISQG	Interim Sediment Quality Guidelines
Km	kilometre
LNG	liquefied natural gas

LNG Canada	LNG Canada Development Inc.
LSA	Local Study Area
m	metre
MAP	Marine Activities Plan
MATP	Marine Access Traffic Plan
MCTS	Marine Communication and Traffic Services
MMEZ	Marine Mammal Exclusion Zone
MMMZ	Marine Mammal Monitoring Zone
MMP	Marine Monitoring Plan
MOF	Materials Offloading Facility
MRP	Marine Response Plan
MTBE	methyl tert-butyl ether
O&M	Operations and Maintenance
OCP	Official Community Plan
OGC	Oil and Gas commission
PAH	polycyclic aromatic hydrocarbon
PEL	probable effects level
PVM	Proactive Vessel Management
RFR	Request for Review
ROV	remotely operated vehicle
RT	Rio Tinto
TAC	Technical Advisory Committee
TERMPOL	Technical Review Process of Marine Terminal Systems and Transshipment Sites
TC	Transport Canada
VC	Valued Component

# 1. INTRODUCTION

LNG Canada Development Inc. (LNG Canada) is currently constructing a liquefied natural gas (LNG) export facility in Kitimat, British Columbia (BC), on the traditional territory of the Haisla Nation. The LNG Canada Project (The Project) includes the construction, operation, and decommissioning of an LNG export terminal, which includes an LNG processing facility with LNG storage, power generation, a marine terminal supporting infrastructure and temporary construction infrastructure, and shipping. The Project received an environmental assessment certificate (EAC) under the BC *Environmental Assessment Act* 2002 (BCEAA 2002) issued by the Minister of Environment and the Minister of Natural Gas Development on June 17, 2015 (#E15-01) (EAO 2015a). Since EAC #E15-01 was issued by the Environmental Assessment Office (EAO), the Project has received the following additional decisions:

- On August 5, 2016, Amendment #1 to EAC #E15-01 was issued by the EAO to authorize relocation of temporary construction facilities, relocation of the Kitimat River water supply intake and pump station, realignment of water intake pipelines, upgrade of North Haul Road and connection to Sandhill Materials quarry, conformation of soil stockpile location, and reconfiguration of tree clearing at facility site perimeter.
- On October 18, 2019, Amendment #2 was issued by the EAO to change the maximum total combined production of LNG referenced in the Certified Project Description to a volume measurement (as natural gas equivalent) per year.
- On June 17, 2020, the EAO determined that the Project is being constructed in accordance with the Certificate and has been substantially started.
- On February 24, 2021, Amendment #3 was issued by the EAO to amend the Certificate to authorize construction of temporary access trails and upgrade and use of existing roads as supplementary haulage routes.

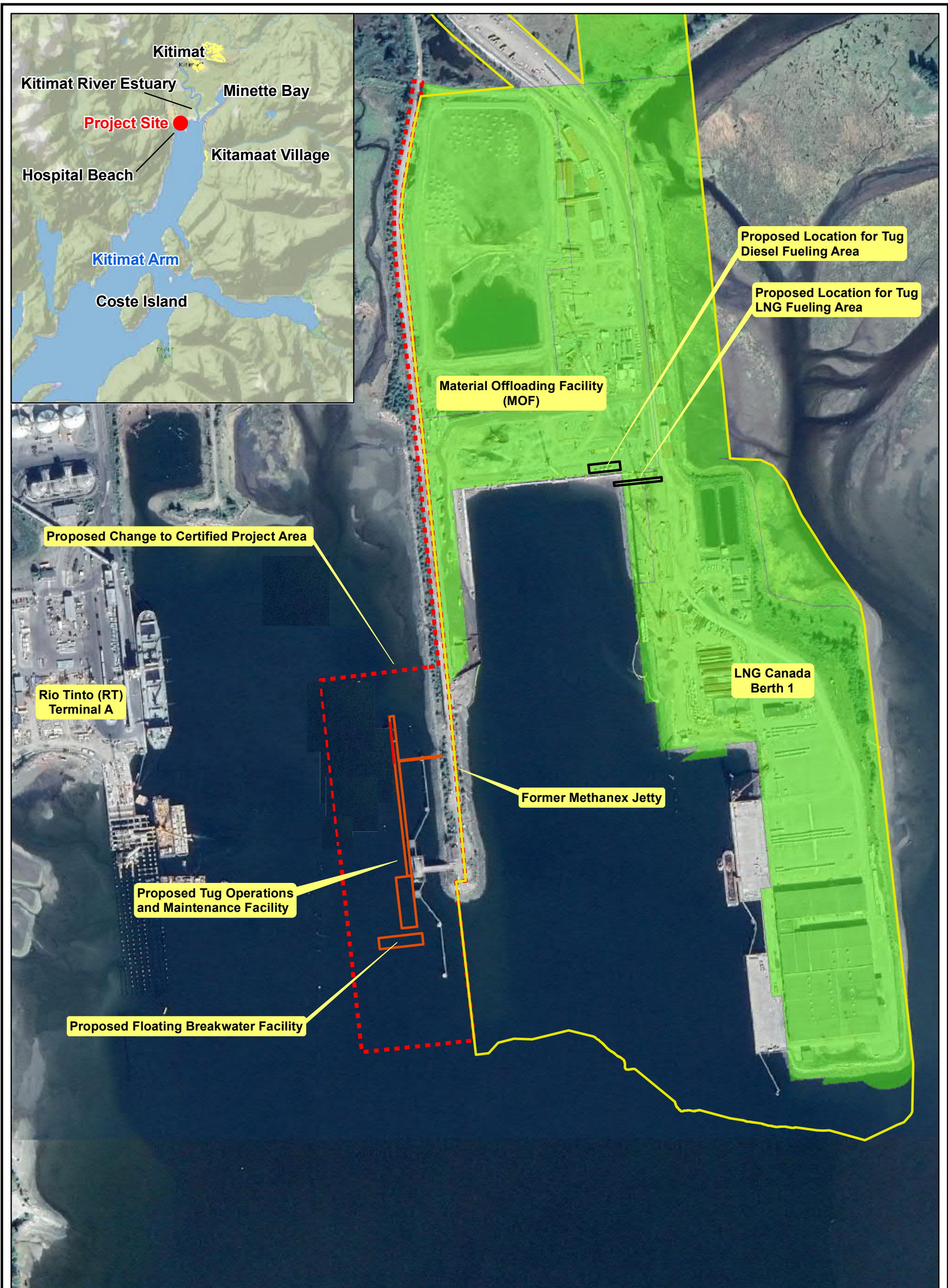
The purpose of this assessment is to provide an assessment of the proposed changes through a fourth amendment (Amendment #4) to EAC #E15-01 as communicated to the EAO through an application on March 31, 2022. Amendment #4 proposes the following additions to the Certified Project Description:

- i. Construction of a tug berth facility to accommodate six chartered boats (tugs), three (3) escort tugs and three (3) harbour tugs, at the existing non-operational jetty (formerly operated by Methanex and owned by Rio Tinto [RT]) as part of the terminal operational and navigational requirements to receive the LNG carriers.
- ii. Construction of a diesel and LNG fuelling area for tug vessels allocated at the northeast corner of the current under-construction Materials Offloading Facility (MOF).

These are referred to collectively as the “proposed changes”. The proposal of a tug berth facility follows a recommendation from Transport Canada’s (TC) Technical Review Process of Marine Terminal Systems and Transshipment Sites (TERMPOL) review (Transport Canada 2015) that a suitable berth location for tug vessels should be provided near the Project berths to improve operational safety through closer availability and access to maintenance.

This amendment assessment considers the matters outlined in Section 25 of the BC *Environmental Assessment Act* 2018 (BCEAA 2018). It provides a description of the proposed changes and an assessment of potential effects of the proposed changes on valued components (VCs) and Indigenous Interests (i.e., asserted Aboriginal rights, including title, or such determined Aboriginal or treaty rights).

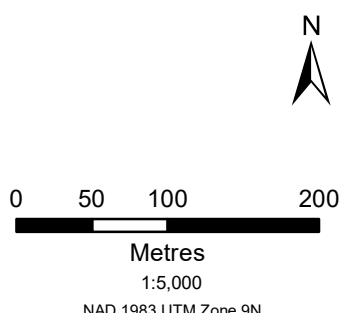
In relation to marine traffic, the proposed changes will not result in an increase in LNG carriers and escort tug movements entering and exiting the port of Kitimat. Further to this, the six chartered tug vessels were included within the original EA approval. This amendment assessment focuses on potential impacts from tug vessels within the port of Kitimat.



Imagery Source: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

**Legend**

- Certified Project Area
- Proposed Change to Certified Project Area
- Certified Marine Terminal Area



Aerial Image: Google Earth, September 2020

<b>LNG CANADA EXPORT TERMINAL KITIMAT, BRITISH COLUMBIA</b>			
<b>LOCATION OF PROPOSED PROJECT COMPONENTS</b>			
Date:	15-JUL-22	Drawn by:	KR
Edited by:	KR	App'd by:	EG
Project No.	317086-39884		
FIG No.	1	REV	0
"This drawing is prepared solely for the use of our customers as specified in the accompanying report. Worley Canada Services Ltd. assumes no liability to any other party for any representations contained in this drawing."			



## 2. PROPOSED CHANGES AND RATIONALE

The proposed changes and rationale for the amendment are outlined, below. A summary of the requested changes to the Certified Project Description is provided in Section 12. Refer to Figure 1 for locations of existing and proposed infrastructure.

### 2.1 Construction of a Tug Berth Facility

LNG Canada requests a change to the Certified Project Area in the Certified Project Description to authorize the construction and operation of a tug berth facility to accommodate six chartered tugs (three escort tugs and three harbour tugs). The Certified Marine Terminal Area boundary would require expansion to include the footprint of the new facility (Figure 1).

The tugs will be dual fuel, with three escort tugs operating on LNG and diesel and three harbour tugs will be electric with diesel back-up. The proposed tug berth location is at the existing non-operational jetty (formerly operated by Methanex and owned by RT). The proposed option is to redevelop the former Methanex jetty and marine structures to support and provide access to the floating tug berths located seaward of the jetty. Supporting structures include a floating Operations and Maintenance (O&M) facility and a floating breakwater which will be located adjacent to the tug berth.

The use of both escort tugs and harbour tugs are key mitigations to manage LNG carrier risks in the EAO Assessment Report (EAO 2015b). The planned upgrade will improve operational safety through closer availability and access to maintenance. Re-use of existing facilities (i.e., the Methanex jetty) substantively reduces the required in-water marine construction work and is the most proximal location available for limiting the tug movements in support of the LNG carrier berthing, arrival, and departure. This location and nearby availability of electrical grid power is also critical to successfully implementing the battery-powered operation of the harbour tugs to further create additional mitigations by reducing associated emissions. LNG Canada has secured the long-term use of the existing jetty and marine facilities, including the adjacent previously dredged area required to support the tug berth movements.

Marine works will include the following:

1. Floating tug dock moored to existing trestle, to safely accommodate the design vessels and to provide safe access
2. Marine piling to secure the floating pontoons
3. Access ramp, gangway, and catwalks
4. Floating O&M facility
5. Floating breakwater to achieve the permissible downtime requirements and reduce wave loads on structures
6. Removal of fenders and piles
7. Shoreline protection replacement and installation

Although some removal of existing aboveground infrastructure on the jetty is expected to take place to facilitate construction, it is not an activity subject to the amendment, given that Rio Tinto, as owner of the land and existing facilities, could complete this work separate to the scope (timing) of the tug berth and tug fuelling activities proposed. There will also be associated electrical works, wet utilities, and civil works that will upgrade the existing road along the jetty, abutments and roadside barriers. The electrical works include installation of 2km of new overhead power lines and wood power poles along existing roadways to bring power from the Cedar Valley Lodge connection to the tug berth facility. It is anticipated that marine piles will be driven with both impact and vibratory hammer, with the former method only being applied as required (i.e., soil resistance, subsurface obstructions, etc.).



Construction equipment will likely include the following:

- Barge with crane (likely 250-300 ton)
- Support barge
- Up to two tugs for construction
- Landside crane
- Concrete truck, excavators, and graders

At decommissioning, the floating components would first be removed, followed by the piles.

## 2.2 Construction of a Diesel and LNG Fuelling Area

LNG Canada requests a change to the Certified Project Area in the Certified Project Description to authorize the construction and operation of a diesel and LNG fuelling area for tug vessels, allocated at the NE corner of the MOF which is currently under construction. Diesel would be brought in by truck and transferred directly to tug vessels on an as-needed basis. LNG would be transferred onto tug vessels for use as fuel through installation of additional pipework on the wharf.

Marine works will include the following:

1. An upgrade of the MOF and Berth 2 fenders
2. Tug mooring arrangement

Both of these items will be secured to the MOF/Berth 2; with no components requiring interaction with the seabed.

Land-based works include concrete slabs or similar for spill containment for the diesel loading area, piling (4 piles) to support the new section of the LNG pipe rack, fencing, and regrading of the area for vehicle manoeuvring and parking. There will be electrical and process related works and wet utility installation.

One of the key benefits of this proposed change is how the expected availability of LNG fuelling and the secure marine fuelling location will support the emission-reducing capability of escort tug design. The secure marine fuelling location is also optimized to allow the periodic fuelling of the tugs with diesel as a back-up fuel and in proximity to the LNG Canada marine operations supervision and response.

It is expected that the volume of diesel supply required for tug usage will result in an average of one tanker truck (30 m<sup>3</sup>) per week during construction, and one tanker truck (30 m<sup>3</sup>) per month during operations. The proposed changes will not result in additional on-site diesel storage.

At the time of decommissioning, the fuelling facilities would be removed as the same time as other marine facilities as described in LNG Canada's Application for an EAC (LNG Canada 2014a).

## 2.3 Summary of Physical Works and Activities

The proposed physical works and activities, including anticipated timing and duration, are provided in Table 1. Activities are proposed to occur from Q4 2022 to Q1 2024.

**Table 1 Proposed Activities, Physical Works, and Schedule**

Proposed Activities and Physical Works	In-water/ out of water	Anticipated Timing and Duration
<b>Tug Berth Facility</b>		
Pile driving (marine)	In-water	December 1, 2022 to February 14, 2023
Removal of fender panels and H piles (32) – 4 fender panels	In-water	July 1, 2023 to February 14, 2024

Proposed Activities and Physical Works	In-water/ out of water	Anticipated Timing and Duration
Installation of floating pontoon, maintenance floating facility and floating breakwater	In-water	April 16, 2023 to February 14, 2024
Topside walkway and gangway required for personnel access from the shore to the floating pontoons	Out of water	July 1, 2023 to March 1, 2024
Install poles for overhead electrical wires	Out of water	March 1, 2023 to March 1, 2024
Road surfacing (gravel) at the causeway	Out of water	July 1, 2023 to March 1, 2024
Foundation for modular substation and transformers at the causeway	Out of water	May 1, 2023 to March 1, 2024
Cabling works, light posts, firewater pipe supports, and cable tray supports	Out of water	May 1, 2023 to March 1, 2024
Shoreline protection replacement	In-water/out of water	December 1, 2023 to February 14, 2024
<b>Diesel and LNG Fueling Area</b>		
Pile driving (land)	Out of water	March 1, 2023 to March 1, 2024
Concrete slabs or similar containment for diesel fueling area	Out of water	March 1, 2023 to March 1, 2024
Steel and piping work for the pipe rack extension	Out of water	March 1, 2023 to March 1 2024
Upgrade to existing fenders and tug mooring system	In-water/out of water	April 15, 2023 to March 1 2024

## 2.4 Land and Marine Use

The LNG Canada Project is located on privately owned lands within the District of Kitimat (DoK), acquired through a commercial agreement with RT. Approximately 10% of the LNG processing and storage site was previously developed for methanol production, storage, and trans-shipment (former Methanex Corporation facility), and for condensate trans-shipment (Cenovus Energy Inc.).

The land is predominantly designated Zone M1 (manufacturing), with permitted uses detailed under Part 9, Division 6 (industrial zoning) of the Kitimat Municipal Code (District of Kitimat 2021). A small portion of land along the east side of the LNG processing and storage site is in an area identified in the Municipal Code as G6-A (special area, environmentally sensitive). There are no land-based parks or protected areas near the LNG facility; however, there are five Class A Provincial Parks accessible by land located in the general area between Kitimat and Terrace.

## 2.5 Alternative Options

### 2.5.1 Tug Berth

An alternative options analysis was undertaken by Advisian for the tug berth to validate the optimal location for the facility to support future LNG operations (Advisian 2022a). The main factors for the location selection were based on a need for dredging and disposal as part of the design in addition to the construction and permitting schedule. Figure 2 presents the location of proposed alternatives (Options A through F) with indications of the exclusion zones at Berth Numbers 1 and 2 for the Phase 1 and Phase 2 LNG projects. Table 2 provides a summary of the evaluation.

From a biological perspective, the re-use of an existing area (Option F) that was previously an active wharf (Methanex jetty) is the preferred option as it is an existing disturbed area where existing piles, platform and jetty will be utilized in the new tug berth design; and does not require dredging and disposal of dredged sediment. The existing Methanex jetty was originally constructed in 1981 and went into service in 1982 for the shipment of methanol. Since then, it has undergone several modifications and upgrade programs. It was expanded in the late 1980s for ammonia shipments and again in 1992 for methyl tert-butyl ether (MTBE) (Advisian 2022a). In 2005, it was converted for import of condensate shipments. The existing Methanex jetty is shown in Figure 2 below.

**Figure 2: Tug Berth Option Locations (Yellow Circles Indicate Exclusion Zones)**



**Photograph 1: LNGC Facilities - Existing Methanex Jetty**



## **2.5.2 Tug Fuelling**

An alternative options analysis was undertaken by Advisian for the LNG tug fuelling facility to validate the optimal fuelling system for the facility to support future LNG operations (Advisian 2021). Note that the basis for diesel and LNG fuelling is that they are to be done at a single facility located at the MOF in order that only a single mooring space is required. The MOF location is shown in Figure 1.

The alternatives analysis focused on LNG fuelling location as this was considered as having greater potential impact across all criteria than diesel fuelling. The analysis provided the benefits and challenges of six locations for the new facility including options that have been provided by LNG Canada as part of the Decision Basis Package that has been previously assessed. The main factors for the selection were technical (safe operations, logistics, cost, schedule) and potential effects on the physical environment. Table 2 provides a summary of the evaluation.

**Table 2 Evaluation Summary – Alternative Means**

<b>Evaluation Criteria</b>	<b>Proposed Change</b>	<b>Alternative A</b>	<b>Alternate B</b>	<b>Alternate C</b>	<b>Alternate D</b>	<b>Alternate E</b>
<b>Tug Berth Facility</b>						
Technical Feasibility (i.e., safe operations, logistics, cost, schedule)	No interference with LNG carriers, minimum piling, outside of exclusion zone, minimizes marine traffic near LNG berths	Close to exclusion zone, tugs more exposed to wind and waves	Inside exclusion zone, higher collision risk at Berth 1, impacts Phase 2 development	Close to exclusion zone, impacts development of Berth 1, tugs more exposed to wind and waves, would impact MOF development	Close to exclusion zone, impacts development of Berth 2, unusable during LNG offloading operations	Close to exclusion zone, impacts development of Berth 2, narrow land area available
Potential Effects on the physical environment	No dredging, some piling	Dredging required, no piling	No dredging, potential piling	No dredging, potential piling	No dredging, potential piling	Potential dredging
Selection	<b>Preferred</b>	Not preferred	Not preferred	Not preferred	Not preferred	Not preferred
<b>Escort Tug LNG Fueling Facility</b>						
Technical Feasibility		Requires bunkering (storage)	Requires bunkering and significant permitting	Pipeline construction required	Impact on other operations, limited flow rates	Requires construction and operation of LNG vessel
Potential Effects on the physical environment	All construction on existing industrial area - no significant impacts	All construction on existing industrial area - no significant impacts	All construction on existing industrial area - no significant impacts	Impacts from new pipeline	All construction on existing industrial area; impacts relating to road safety	Potential marine vessel impacts
Selection	<b>Preferred</b>	Not preferred	Not preferred	Not preferred	Not preferred	Not preferred

### 3. PERMITS AND APPROVALS

An existing *Fisheries Act* Authorization has been issued (HPAC-00585) for previous marine construction works; however, it did not consider the construction activities associated with the proposed tug berth facility.

In addition to this proposed amendment to the Certificate, other significant permits and authorizations anticipated for the scope of work include the following:

- i.* For marine construction, a Fisheries and Oceans Canada (DFO) Request for Review (RFR) has been submitted (22 HPAC-00897). It is anticipated that DFO will provide a Letter of Advice outlining avoidance and mitigations for the construction activities. A *Fisheries Act* Authorization application is not anticipated
- ii.* A Notice of Works application under the *Canadian Navigable Waters Act* for approval from TC for construction and operation of the proposed marine structures
- iii.* Building permits from the DoK

Permit authorizations that may be required, but are yet to be confirmed, include:

- Decision Statement Amendment from the Impact Assessment Agency of Canada (IAAC)

Construction activities associated with both facilities will also comply with TC approval conditions associated with the Notice of Works to be submitted under the Navigation Protection Program.

Other approvals potentially anticipated for this scope of work relate to requirements under the *Canada Shipping Act* for the operation of an oil handling facility; however, LNG Canada has confirmed that approvals are not required for facilities that do not have fixed fuel storage.

## 4. REQUIRED ASSESSMENT UNDER BCEAA 2018

Section 25 of the BCEAA identifies the required assessment matters for every EA. This includes an assessment of the effects of a project on Indigenous nations and rights, which are recognized and affirmed by Section 35 of the *Constitution Act*, 1982 as well as a consideration of the information provided below. Table 3 below lists the considerations of matters detailed in Section 25(2) for this amendment application.

**Table 3 Consideration of Section 25(2) Matters in the Amendment Application**

Section 25(2) Matters	Consideration in Amendment Application
(a) positive and negative direct and indirect effects of the reviewable project, including environmental, economic, social, cultural and health effects and adverse cumulative effects	Potential effects and cumulative effects will be considered as part of the assessment of the VCs (i.e., Freshwater and Estuarine Fish and Fish Habitat) carried forward for further assessment in the amendment application.
(b) risks and uncertainties associated with those effects, including the results of any interaction between effects	Risks and uncertainties of potential effects, including any interactions identified between effects, will be considered as part of the assessment of the VC carried forward for further assessment in the amendment application, including Marine Resources (Section 7.1), Freshwater and Estuarine Fish and Fish Habitat (Section 7.2), and Marine Transportation and Use (Section 7.3).
(c) risks of malfunctions or accidents	The addition of new tug berth and refuelling areas introduce additional risks. For the tug berth there is an existing commitment as part of the TERMPOL study to provide a Port Information Guide and Terminal Operations Manual to TC six months prior to operation. These documents are based on outcomes of HSE workshops and tug transit simulations. For the tug fuelling area this is covered under the and the Marine Response Plan (MRP) with reference to the Oil Handling Facility requirements
(d) disproportionate effects on distinct human populations, including populations identified by gender	The proposed changes are not anticipated to have disproportionate effects on distinct human populations, including populations identified by gender.
(e) effects on biophysical factors that support ecosystem function	A summary of how the proposed changes could affect biophysical factors that support ecosystem function is provided in Section 8. The changes will not result in meaningful effects.
(f) effects on current and future generations	A summary of how the proposed changes could affect current and future generations is provided in Section 9. The proposed changes are not anticipated to have effects on current and future generations.
(g) consistency with any land-use plan of the government or an Indigenous nation if the plan is relevant to the assessment and to any assessment conducted under section 35 or 73	The proposed changes are located within industrial land as designated in the DoK Official Community Plan (OCP) 2008 (amended November 2021). The amendment application assessment is not being conducted under Section 35 (Regional assessments) or 73 (Strategic assessments).
(h) greenhouse gas emissions, including the potential effects on the province being able to meet its targets under the <i>Greenhouse Gas Reduction Targets Act</i>	The changes in construction greenhouse gas (GHG) emissions as a result of the proposed changes are anticipated to be negligible from what was assessed in the original Certificate application. There is no change in volumes of material to be moved relative to what was considered in the original Certificate application and therefore no material change in the overall GHG emissions associated with trucking activity. During operations, reduced GHG emissions are anticipated relating to tug usage as escort tugs will be fuelled primarily by LNG and travel less distance, and harbour tugs will be electric.

Section 25(2) Matters	Consideration in Amendment Application
(i) alternative means of carrying out the project that is technically and economically feasible, including through the use of the best achievable technologies, and the potential effects, risks and uncertainties of those alternatives;	The amendment application describes the alternative means of carrying out the proposed changes that are technically and economically feasible, including the use of best achievable technologies, and the potential effects, risks and uncertainties of those alternatives.
(j) potential changes to the reviewable project that may be caused by the environment;	Potential changes caused to the Project by the environment were assessed as part of the original Certificate application and the proposed changes will not alter that assessment.
(k) other prescribed matters.	Potential changes caused to the Project by the environment were included in the EAO Assessment Report in 2015 and the proposed changes will not alter that assessment. No other prescribed matters have been identified.



## 5. ASSESSMENT METHODS FOR VALUED COMPONENTS

The amendment assessment will identify the valued components (VCs) previously assessed in LNG Canada's application for an EAC (LNG Canada 2014a) that have the potential to interact with the proposed changes (Section 6). For those VCs carried forward, the assessment will evaluate residual effects of the proposed changes and whether the proposed changes will alter the characterization of residual or cumulative effects and/or conclusions presented in the EAO Assessment Report (EAO 2015b) and the previous amendment assessment reports (EAO 2016a, 2019, 2021) (Section 7). Any applicable new mitigation measures as well as a description of risks and uncertainties associated with the amendment assessment will be included under each VC. The assessment will evaluate the following:

- Mechanisms of potential effects: a description of how the proposed changes could result in interactions with the VCs addressed in the EAO's Assessment Report (EAO 2015b) and the previous amendment assessment reports (EAO 2016a, 2019, 2021).
- Mitigation: identification of mitigation measures to reduce or eliminate potential negative effects of the proposed changes and identify any new mitigation measures applicable to this amendment.
- Assessment of residual effects (project and cumulative): a description of the residual effects of the proposed changes and a description of if and how the proposed changes alter the characterization of project residual effects set out in the EAO Assessment Report (EAO 2015b) and the previous amendment assessment reports (EAO 2016a, 2019, 2021). For each VC, a cumulative effects assessment has been completed if the proposed changes result in residual effects that have the potential to interact with residual effects from other past, present and reasonably foreseeable future projects and activities.

## 6. POTENTIAL INTERACTIONS OF PROPOSED CHANGES ON VALUED ECOLOGICAL COMPONENTS

Table 4 shows the VCs previously assessed in the LNG Canada Certificate application (October 2014) and identifies those VCs which have the potential to be affected by the proposed changes.

**Table 4 Potential Interactions with Valued Components**

Proposed Changes	Valued Components (VCs) assessed in LNG Canada's Certificate application (October 2014)														
	Air Quality	Greenhouse Gas Management	Acoustic Environment	Vegetation Resources	Wildlife Resources	Freshwater and Estuarine Fish and Fish Habitat	Marine Resources <sup>a</sup>	Surface Water Quality	Economic Conditions	Infrastructure and Services	Visual Quality	Marine Transportation & Use	Community Health and Wellbeing	Archaeological and Heritage Resources	Human Health
Construction, operations and decommissioning of a tug berth facility to accommodate six chartered boats (tugs) at the existing (non-operational) Methanex jetty.	1	1	1	1	1	2	2	1	1	1	1	2	1	0	1
Construction of a diesel and LNG tug fuelling area allocated at the NE corner of the MOF.	1	1	1	0	1	2	2	1	1	1	1	2	1	0	1

Legend:

- (0) No effect expected. Excluded from further consideration and not carried forward in Table 5.
- (1) Negligible change relative to the potential effects previously assessed in the Certificate application. Potential effects can be appropriately managed via existing mitigation measures and Project commitments. Rationale for exclusion from further assessment provided in Table 5.
- (2) Potential to be affected by proposed changes with potential to result in changes to previously assessed effects or require implementation of new mitigation measures. Warrants further assessment and carried forward in the amendment application, as outlined in Table 5.

Notes: <sup>a</sup>Marine Resources includes marine fish and fish habitat and marine mammals.

The rationale for the inclusion or exclusion of each VC for further assessment based on their potential to be affected by the proposed changes is summarized in Table 5.

**Table 5 Valued Components to be Included/ Excluded in the Amendment Application**

Valued Component	Initial Interaction Identified	Assessment Approach	Rationale for Inclusion or Exclusion
Air Quality	Yes	Excluded from further assessment – Negligible change	The change in criteria air contaminant (CAC) emissions from the proposed changes to construction and operation activities is anticipated to be negligible relative to those previously assessed and will not result in a meaningful change to air quality as a result of construction and operation of the LNG facility. The EAO Assessment Report acknowledged that the highest areas of interaction resulting in project effects were associated with LNG production and LNG shipping. The proposed changes will not affect these two activities. CAC emissions due to construction of the Project will be managed according to the Air Quality Management Plan (AQMP) (LNG Canada 2015a).
Greenhouse Gas Management	Yes	Excluded from further assessment – Negligible change	The EAC Application estimated Phase 1 marine construction to make up 2.1 % of overall GHG emissions for the Project. The scale of proposed marine construction is significantly less than Phase 1 marine construction (no dredging or construction associated with dredge disposal site, material offloading facility or Berth 2; and significantly less piling). These proposed changes are therefore anticipated to be negligible in relation to what was previously assessed and will not result in a meaningful change to GHG emissions.
Acoustic Environment	Yes	Excluded from further assessment – Negligible change	The change in potential effects on the acoustic environment from the proposed construction activities are considered negligible relative to the previously assessed effects and can be managed using Best Management Practices (BMPs) and mitigation measures identified in the existing management plans.  The Traffic Management Plan (LNG Canada 2015b) outlines measures to manage speed limits and shift changes which will mitigate noise effects from construction related traffic.  The change will not result in a meaningful change to acoustic environment as a result of construction and operation of the LNG facility.
Vegetation Resources	Yes	Excluded from further assessment – No effect expected	The proposed changes to the former Methanex jetty will not impact existing vegetation resources. Vegetation removal is considered minimal and limited to removal of sparse vegetation on the jetty. This will be managed using BMPs and mitigation measures identified in the existing management plans.  As a result, the evaluation provided in the EAO's Assessment Report will not change.
Wildlife Resources	Yes	Excluded from further assessment – Negligible change	The proposed changes due to construction of the tug berth and fuelling facility are less extensive than those activities assessed in the original assessment; thus, effects from construction noise, removal of nesting or roosting habitat, temporary or permanent lighting, and accidents and malfunctions are anticipated to be negligible compared to that previously assessed. Potential effects can therefore be managed and mitigated during construction and operations through existing mitigation measures and Project commitments approved for the Project.

Valued Component	Initial Interaction Identified	Assessment Approach	Rationale for Inclusion or Exclusion
			The Construction Environmental Management Plan (CEMP) (LNG Canada 2021), Wildlife Management Plan (LNG Canada 2015c) and Marine Activities Plan (MAP) (LNG Canada 2018a) outline measures to manage encounters with wildlife should they occur and mitigate impacts to wildlife and wildlife habitat.
Freshwater and Estuarine Fish and Fish Habitat	Yes	Carried forward for further assessment	The proposed changes in project footprint and construction activity may interact with estuarine fish and fish habitat through marine pile installation (no dredging anticipated). The potential effects are carried forward in the assessment.
Marine Resources	Yes	Carried forward for further assessment	The proposed changes in project footprint and construction activity may interact with marine fish and fish habitat (including marine mammals) through marine pile installation (no dredging anticipated). The potential effects are carried forward in the assessment.
Surface Water Quality	Yes	Excluded from further assessment – Negligible change	The proposed changes in footprint and construction activity (including in-water and land-based activities) are not anticipated to impact surface water quality. Management and monitoring of Project-related effects for similar activities during construction and operations are well developed at the LNG facility. With the application of mitigation measures, a negligible change to surface water quality is anticipated. As a result, the evaluation provided in the EAO's Assessment Report will not change.
Economic Conditions	Yes	Excluded from further assessment – Negligible change	Expenditures and workforce changes required as result of the proposed changes are expected to be negligible in comparison to overall project expenditures; the materials required to construct the Project have not changed. As a result, the evaluation provided in the EAO's Assessment Report will not change.
Infrastructure and Services	Yes	Excluded from further assessment – Negligible change	The proposed tug berth and fuelling facilities have the potential to affect marine traffic within the LNGC and RT harbours but no changes are expected outside the harbours. Land traffic is not expected to change compared to the EAO's Assessment Report.
Visual Quality	Yes	Excluded from further assessment – Negligible change	The proposed construction of the tug berth and fuelling facility are not expected to alter visual quality from terrestrial and marine based viewpoints. Any effects will be negligible, and the visual quality evaluation provided in the EAO's Assessment Report will not change.
Marine Transportation and Use	Yes	Carried forward for further assessment	The proposed tug berth and fuelling facilities have the potential to affect marine traffic within the LNGC and RT harbours but no changes are expected outside the harbours. Potential additional effects will be carried forward in the assessment.
Community Health and Well-being	Yes	Excluded from further assessment – Negligible change	The proposed changes will lead to a negligible change on community health and wellbeing. The new facility will not significantly alter the number of workers, demands on healthcare services or access to country foods. Therefore, the proposed changes will not alter the community health and well-being evaluation provided in the EAO's Assessment Report.

Valued Component	Initial Interaction Identified	Assessment Approach	Rationale for Inclusion or Exclusion
Archaeological and Heritage Resources	No	Excluded from further assessment – No effect expected	The proposed changes do not have the potential to interact with archaeological or historical resources during construction. Construction will follow the mitigation measures detailed in the Archaeological and Heritage Resources Management Plan (LNG Canada 2015d).
Human Health	Yes	Excluded from further assessment – Negligible change	<p>Potential effects on Human Health related to the proposed changes including, construction and use of the tug berth and fuelling facility have been assessed qualitatively. In relation to country foods, the EAO Assessment Report noted that the potential impact to country foods from marine construction related to disturbance of contaminated sediments during dredging. The proposed tug berth location was selected to avoid the requirement for dredging.</p> <p>As the change will not result in a meaningful increase in air emissions or another chemical conditions of the environment (water,soil, sediment and country foods), effects on Human Health will also be negligible and not lead to a change in the evaluation provided in the EAO's Assessment Report.</p>

## 7. CHANGES TO THE EFFECTS ASSESSMENT ON VALUED COMPONENTS

The following section provides an assessment of the potential effects of the proposed changes for those VCs carried forward in the amendment assessment.

### 7.1 Marine Resources

This section considers potential effects to marine resources, including marine fish, fish habitat and marine mammals, due to the construction, operation and decommissioning of the tug berth and tug fuelling facility.

#### 7.1.1 Existing Conditions

The proposed tug berth and tug fuelling facility is located within the Industrial port of Kitimat that contains the RT Terminal A, former causeway and trestle (herein referred to as Methanex jetty), and the LNG Canada terminal. The tug fuelling facility is proposed to be constructed on the MOF at the existing LNG Canada terminal. The tug berth is proposed at the existing non-operational Methanex jetty (leased by LNG Canada from RT). The tug berth location is outside of the Certified Project Area; however, it is within the Marine Resources (facility) Local Study Area (LSA)<sup>i</sup> described in the Environment Certificate Application report (LNG Canada 2014a). The LSA was extensively studied to support the EAO Assessment and described the marine resources existing conditions (LNG Canada 2014a).

Over the past 60 years, industrial, municipal, and residential inputs to watercourses have impacted marine and estuarine resources at the head of Kitimat Arm. In the LNG Canada Environmental Assessment application (LNG Canada 2014a), subtidal habitat at the head of Kitimat Arm is described as primarily mud flats (58%), mud depressions (15%), mud ridges (15%), and mud slopes (11%) with limited structural complexity (i.e., lacking rock substrates and biogenic habitats). Water depths range from 0 m chart datum (CD) to greater than 100 m CD. Marine sampling from various studies conducted within, and adjacent to, the LSA confirmed contamination in sediment and tissues of shellfish, Dungeness crab and fishes (LNG Canada 2014a). Sediment samples analysed for total polycyclic aromatic hydrocarbons (PAHs) contained concentrations greater than the disposal at sea screening criteria for sediment quality. Individual PAH concentrations also exceeded the BC CSR standards and/or Canadian Council of Ministers of the Environment Water Quality Guidelines (CCME) probable effects levels (PEL) and Interim Sediment Quality Guidelines (ISQG) guidelines across the MR-LSA. The highest total PAH concentrations were recorded between the RT Terminal and the Methanex jetty. Metals (copper, cadmium, zinc) and dioxin and furan concentrations were above CCME ISQG in some of the samples tested (LNG Canada 2014a). Relevant to the proposed Project activities is that the highest potential for a change in fish health as a result of toxicity is potential disturbance of the PAHs in the sediments. However, studies in Kitimat Arm indicate that the PAHs have low bioavailability and effects on fish and invertebrates is limited (LNG Canada 2014a). Further to this and due to the risk of sanitary contamination in Area 6-1 Kitimat Arm, bivalve shellfish harvesting is closed and an annual biotoxin closure is also in effect for waters from the foreshore of Kitimat Arm to 400 m north of the mouth of Bish Creek (north of Coste Island) (DFO 2022).

To understand the existing fish habitat site conditions at the proposed tug berth location, a habitat assessment was conducted of the seabed using a remotely operated vehicle (ROV) in December 2021 (Advisian 2022b). A total of eight (8) transects overlapping with the proposed tug berth infrastructure were completed that ranged from 68 to 214 m in length and between 11.3 and 7.3 m below CD. The seabed characteristics including sediments and occurrence of sessile and motile invertebrates and fish were documented and quality of habitat were evaluated.

Results of the survey indicated that the substrates were primarily silt and sand with wood debris with scattered occurrence of cobble or boulders. Marine vegetation including brown bladed kelp (e.g., laminarian species), algae or

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<sup>i</sup> The facility LSA was defined in LNG Canada (2014a) as a 500 m buffer around the marine terminal footprint that would include the potential effects from construction, operation and decommissioning activities.

eelgrass (*Zostera* spp.) were not observed in the Project area. Marine invertebrates observed were in low abundance and were commonly occurring species including Dungeness crab (*Metacarcinus magister*) and plumose anemone (*Metridium farcimen*). Fish observed were common benthic species including goby (Order Gobiiformes) and flatfish (Order Pleuronectiformes). Sand depressions and holes were observed on the sediment surface with infrequent occurrence of empty clam shells. A portion of the holes observed may have contained live clams. The overall habitat was characterized as soft sediments with wood debris, low abundance of marine organisms, and lack of marine vegetation. The assessed area was considered to have low value habitat. Although the ROV survey occurred in the winter (December), the assessment of low value habitat is unlikely to change in summer (i.e., peak growing season) because of the lack of hard substrates in which macroalgae/ marine vegetation could grow.

At least 12 species of marine mammal occur within Douglas Channel; however, eight of these species have potential to occur within the area from the head of Kitimat Arm to Coste Island (LNG Canada 2014a). The most common species that has the highest likelihood of being present during construction, decommissioning and operation of the tug berth are harbour seals (*Phoca vitulina richardii*).

### **7.1.2 Mechanisms of Potential Effects**

Potential effects to marine resources during marine construction and decommissioning of the proposed facilities include local seabed disturbance and loss of soft sediment habitat from installation of piles (estimated total area of 52 m<sup>2</sup>). Installation of the piles may change the underwater acoustic levels during construction which could change the behaviour of fish and/or marine mammals or mortality risk to fish and/or marine mammals. Existing fender panels and steel H-piles will be removed from the Methanex jetty to accommodate the tug berth floats. The removal of piles may change the underwater acoustic levels in a similar way as the pile installation depending on the pile removal methods employed. The removal of piles will be assessed with pile installation to capture acoustic effects from this activity.

The causeway consists of coarse material (i.e., riprap) as shoreline protection that has been in place for several decades. The condition of the shoreline protection on the west side and south side (i.e., roundhead) of the causeway has deteriorated over time and it is proposed to be potentially remediated (estimated total area of 1,500 m<sup>2</sup>) as part of the proposed changes. The remediation activities would consist of placement of riprap over the existing material on the west side and interlocking concrete blocks (i.e., Loc-Blocs) on the south side with no additional impact outside of the current footprint. The current shoreline protection footprint extends from the high-water line (HWL) to approximately -2 m below CD. Placement of new materials has potential to change water quality from release of trace fines from the material. The placed coarse material will not extend past the current shoreline protection footprint (i.e., no additional impact).

The limited riparian vegetation will be maintained or any removal will be at a minimum. However, there may be potential for removal of sparse vegetation required for removed for access to the catwalk onshore footings.

Considering operations, the tug berth facility will not increase the overall frequency of harbour or escort tug movements within the port of Kitimat over what was considered in the EAC Application (LNG Canada 2014a), but it will result in a localised increase in tug movement between the LNG Canada and RT industrial harbours. However, the increase in tug movement within the LNG Canada harbour is not anticipated to change the behaviour or mortality risk of marine mammals. Sound levels due to harbour tugs using electric drives are expected to be negligible on the behaviour of marine mammals.

### **7.1.3 Mitigations**

The following measures and standards will mitigate the adverse effects of construction and decommissioning for the proposed tug berth on marine resources. Condition 4 of the EAC requires that LNG Canada develop a fish management and monitoring plan in consultation with DFO and the OGC. Based on the Conditions of the EAC and the Conditions within the *Fisheries Act* Authorization(s) issued for the Project (i.e., 15-HPAC-00585), LNG Canada have prepared and implemented a Marine Activities Plan (MAP, LNG Canada 2018a) and a Marine Monitoring Plan (MMP, LNG Canada 2019) to mitigate, manage and monitor project-related effects. These plans, as well as adaptive management, will be implemented to mitigate effects for construction activities.

LNG Canada has been compiling acoustic data during marine construction activities during the last three years to verify acoustics for pile driving for size of pile and distance from the sound source. Acoustic effects from pile driving are therefore well understood at the LNG Canada site and within the Certified Project Area. These data have been used to verify predicted acoustic levels based on pile diameters that are part of the tug berth design. Mitigation measures relating to pile installation includes, but are not limited to, the following:

Pile driving will be performed during the least risk work window of November 30, 2022 to February 14, 2023 for the protection of the marine environment. Pile activity will not occur during the sensitive Oolichan window between February 15 and April 15. In the event that pile installation cannot be completed in the least risk window, LNG Canada may seek to pile between April 16 and November 30 in consultation with the Haisla Nation. In the event that Oolichan or Pacific herring are observed in the work area, in-water works will be stopped.

Underwater acoustic and marine mammal monitoring and exclusion zones will be implemented as outlined within Sections 6.8 and 6.9 of the MMP (LNG Canada 2019), Section 7.1.9 of the MAP (LNG Canada 2018a), and include the following:

- An underwater acoustic monitoring program will be implemented during pile driving activity and LNG Canada will develop marine mammal exclusion zones (MMEZ) based on previous data from the site. For cetaceans, a 160 dB rms MMEZ acoustic threshold re 1uPa will be implemented. For pinnipeds, a 180 dB re 1uPa or 150 m MMEZ will be implemented, whichever is greater. Underwater acoustic monitoring will initially occur 10 m from the pile driving activity with a threshold of 30 kPa. Upon commencement of pile driving, underwater acoustic monitoring will be conducted daily for the first seven days or first seven piles (whichever comes first) for validation of the MMEZ. Following this, the acoustic monitoring will be performed once per week.
- Establishment and monitoring of the Marine Mammal Monitoring Zone (MMMZ) and MMEZ for marine mammal presence by a qualified marine mammal observer (MMO). The MMMZ will be established at a distance 20% greater than the MMEZ. A 30-minute pre-piling observation period will be conducted to confirm absence of marine mammals within the MMMZ/MMEZ.
- If a marine mammal is observed in the MMEZ during pile driving, work will be stopped until the marine mammal is observed leaving the zone, or that 30 minutes has passed with no sighting.
- Acoustic monitoring equipment used will allow for real-time monitoring so sound level exceedances can be immediately identified and the MMO notified. Pile driving will be suspended, and the cause of exceedance assessed and mitigated before pile driving can resume.
- A soft-start strategy will be implemented for impact pile driving, and pile driving may commence only if no marine mammals have been observed in the MMEZ for 30 minutes. The soft-start procedure may consist of, for example:
  - For vibratory hammer: initiation of a noise at 40-60% reduced energy for 15 seconds, followed by a 1-minute waiting period.
  - For impact hammer: perform an initial set of three strikes at 40% energy, followed by a 1-minute waiting period, then two subsequent three strike sets.
- Use of bubble curtains during impact pile driving to reduce underwater noise levels.
- Work will be delayed or stopped if visibility limits the MMO's ability to observe the entirety of the MMEZ
- A combination of vibratory and impact hammer pile driving will be utilized to reduce the number of strikes required for impact pile driving, resulting in an overall noise reduction. A vibratory hammer will be used wherever practical.
- An Environmental Monitor (EM) will be onsite during pile driving to implement shutdown (if required) should observations of aquatic species indicate impacts (e.g., fish kills) or sensitive life-history events (e.g., fish spawning/schooling activity). Work will be suspended immediately and will not resume until the cause of



impacts has been identified and corrective actions implemented. If spawning occurs, all in-water work will be suspended.

Other mitigation measures employed for in-water work will follow BMPs and those outlined in the MMP (LNG Canada 2019) and the MAP (LNG Canada 2018a). Fender panel removal will primarily be completed in out-of-water tidal conditions (i.e., in the dry). Steel H-piles will be removed via line-pull or vibratory hammer. Pile removal activities will follow mitigations outlined for pile installation, as above. Any materials generated by fender and pile removal activity will be collected for disposal offsite at appropriate facilities.

Loss of subtidal fish habitat is limited to the footprint of piles and is estimated at a total area of 52 m<sup>2</sup>. The pile locations are at the former Methanex jetty that is a disturbed area with low quality soft marine habitat (Advisian 2022b) and contaminated sediments (LNG Canada 2014b). The re-use of a degraded habitat versus potentially building a new facility in an undisturbed area is the preferred option to limit potential effects to marine resources. No additional seabed impacts are anticipated.

Although overall tug movements will not change, there will be a localized increase in tug movements between the LNG Canada and RT industrial harbours during operations. However, the tugs will be locally based and serviced which will decrease the need for the tugs to leave the harbour area to be maintained. Therefore, tug interactions with marine mammals are not significant due to the low likelihood of a marine mammal occurring in the LNG Canada harbour. Harbour seals are more likely to interact with the project compared to all other marine mammals and they are not anticipated to be affected by the marginal increase in localised tug movements within the LNG Canada harbour. Behavioural changes in marine mammals or fish due to underwater noise levels during operations are anticipated to be not significant for the localised area.

In relation to the diesel and LNG fuelling area, the following mitigation measures will be implemented:

- Development of an emergency plan with reference and to meet requirements set out in the Environmental Response Regulations under the *Canada Shipping Act*
- Arrangements for a spill response organization, with reference to the *Oil Handling Facilities Standards 1995 TP 12402 E*.

As noted in Section 3, a RFR has been submitted (file # 22 HPAC-00897) to DFO. The draft RfR outlines measures to mitigate serious harm to fish as well as adaptive management measures including: an underwater acoustic monitoring program, establishment and monitoring of a MMEZ, use of a combination of vibratory and impact hammer to reduce overall noise, soft start procedure for piling, a turbidity monitoring program based on visual observations with compliance monitoring completed as needed, use of an Environmental Monitor, and standard BMPs for concrete work near water.

#### **7.1.4 Assessment of Residual Effects**

The Methanex causeway shoreline protection has deteriorated over time and any potential remediation will provide similar substrate as what is currently in place. The shoreline protection extends from the riparian area where sparse young trees and shrubs occur, to the subtidal zone (approximately -2 m CD). Approximately 1,500 m<sup>2</sup> of existing riprap shoreline may be remediated, of which 1,000 m<sup>2</sup> would be below the HWL. The remediation will consist of placement of riprap over the existing material with no additional impact outside of the existing material footprint. The EAC Application (LNG Canada 2014a) indicated that approximately 4,970 m<sup>2</sup> of new constructed intertidal habitat (i.e., rock riprap/boulder) would be installed along RTA Wharf "B" and the Methanex jetty to provide slope protection and that marine vegetation, fish, and invertebrate communities are expected to become established in the newly created habitat within six months to two years of disturbance (LNG Canada 2014a). Given that the west side and south side of the Methanex jetty consists of degraded or otherwise unstable riprap, the additional coarse material is anticipated to promote habitat stabilization to support the growth and establishment of marine vegetation.

Considering the fuelling facility, LNG Canada commits to having operational plans in place that meet the requirements of oil pollution prevention plan and an oil pollution emergency plan set out in the *Oil Handling Facilities Regulations* and to put in place an arrangement with a spill response organization, that can operate in accordance with the Oil

Handling Facilities Standards 1995 TP 12402 E. With these commitments and Marine Response Plan (MRP), the Project is not anticipated to have residual effects on marine water quality due to spills from the fueling facility.

The anticipated residual effects to marine resources are summarized in Table 6.

**Table 6: Residual Effects on Marine Resources**

Potential Effects	Mitigation Measures	Residual Effects from Proposed Changes	Potential Changes to Assessment Report and Amendment Assessment Report
Change in fish habitat	<ul style="list-style-type: none"> <li>-The pile locations are at an existing disturbed and degraded habitat (Methanex jetty).</li> <li>-Habitat was described as low quality (Advisian 2022b) with contaminated sediments (LNG Canada 2014a). No additional seabed impacts are anticipated.</li> <li>-Adhere to mitigations outlined in Section 5.6.3 of the EAO's Assessment Report (EAO 2015b) and as described in the MAP (LNG Canada 2018a) and MMP (LNG Canada 2019).</li> </ul>	<ul style="list-style-type: none"> <li>-Negligible loss of fish habitat (52 m<sup>2</sup>) for subtidal pile installation.</li> <li>-Negligible and temporary disturbance to intertidal habitat from shoreline protection remediation (1,500 m<sup>2</sup>) with potential encroachment to subtidal zone (not exceeding -2 m below CD).</li> </ul>	<ul style="list-style-type: none"> <li>-The proposed changes will result in a loss/ temporary disturbance of existing degraded fish habitat.</li> <li>-With the application of mitigation measures, the proposed changes are not anticipated to change the characterization of residual effects to fish habitat presented in Section 5.6.4 of the EAO's Assessment Report (EAO 2015b) or Section 3.5 of the Amendment Assessment Report (EAO 2016a).</li> </ul>
<p>Change in risk of physical injury or mortality of fish or marine mammals</p> <p>Change in behaviour of fish and/ or marine mammals due to underwater noise</p>	<ul style="list-style-type: none"> <li>-Adhere to mitigations outlined in Section 5.6.3 of the EAO's Assessment Report (EAO 2015b) and as described in the MAP (LNG Canada 2018a) and MMP (LNG Canada 2019).</li> <li>-Underwater acoustic monitoring, marine mammal monitoring and exclusion zones will be implemented as outlined within Sections 6.8 and 6.9 of the MMP (LNG Canada 2019), Section 7.1.9 of the MAP (LNG Canada 2018a).</li> </ul>	<ul style="list-style-type: none"> <li>-Negligible and temporary disturbance from project-generated underwater noise is predicted to be within guideline thresholds as implemented for work within the Certified Project Area and outlined in 5.6.4 of the EAO's Assessment Report</li> <li>-No change within harbour area of tug movements within LNG Canada harbour with reduced movements outside of the LNG Canada harbour. No change in risk of physical injury or mortality of fish or marine mammals are anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>-No change in risk of physical injury or mortality to fish or marine mammals are anticipated.</li> <li>-With the application of mitigation measures, the proposed changes would not change the characterization of residual effects to risk of physical injury or mortality of fish or marine mammals presented in Section 5.6.4 of the EAO Assessment Report (EAO 2015b).</li> </ul>
Change in fish health	<ul style="list-style-type: none"> <li>-Adhere to mitigations outlined in Section 5.6.3 of the EAO's Assessment Report (EAO 2015b) and as described in the MAP (LNG Canada 2018a) and MMP (LNG Canada 2019).</li> </ul>	<ul style="list-style-type: none"> <li>-No change in fish health.</li> </ul>	<ul style="list-style-type: none"> <li>The proposed changes would not change the characterization of residual effects to fish health presented in 5.6.4 of the EAO's Assessment Report because this was related to dredging and disposal effects (EAO 2015b).</li> </ul>

With the implementation of existing mitigation measures, residual effects to marine resources due to proposed changes will be limited to a direct impact to the seafloor from support piles with a total footprint of 52 m<sup>2</sup> and temporary disturbance below the HWL from shoreline protection remediation (1,500m<sup>2</sup>) of the existing riprap shoreline at the Methanex causeway. The proposed changes do not alter the characterization of residual effects set

out in the EAO Assessment Report (EAO 2015b) and the previous amendment assessment reports (EAO 2016a, 2019, 2021).

The residual effects will not change the cumulative effects assessment conclusions provided in the EAO Assessment Report (EAO 2015b) and the previous amendment assessment reports (EAO 2016a, 2019, 2021). Following the placement of coarse material on the Methanex causeway there will be no net change in functional fish habitat area following natural regrowth of trees and shrubs. The risks and uncertainties related to this assessment are negligible because the proposed changes are temporary and localized and temporary loss and subsequent replanting of tree/shrub species is expected to have little impact on riparian function.

## 7.2 Freshwater and Estuarine Fish and Fish Habitat

This section considers potential effects to freshwater and estuarine fish and fish habitat due to the construction, operation and decommissioning of the tug berth and tug fuelling facility. This assessment does not consider effects from roadways or haulage routes that may cross watercourses as there are no changes to what was assessed in the EAC Application (LNG Canada 2014a).

### 7.2.1 Existing Conditions

Freshwater and estuarine fish and fish habitat include anadromous and non-anadromous fishes, shellfish, crustaceans and their respective habitats (EAO 2015b). The proposed tug berth is located outside of the spatial boundaries of the LSA for the freshwater and estuarine habitat component of the VC. However, anadromous fishes are included in the VC and have potential to transit the tug berth location to the Kitimat River mainstem, side channels, and direct tributaries to Kitimat Arm, and estuarine habitats. Therefore, for the purposes of this amendment assessment, anadromous fishes will be considered. The tug fuelling facility is located within the LNG facility footprint and LSA. The LSA was extensively studied to support the EAO Assessment and existing conditions (LNG Canada 2014a).

The Kitimat River drains into Kitimat Arm, forming an estuary at the head of the Inlet that is used by resident and migratory fish species. The tug berth facility is located approximately 750 metres (m) west of the Kitimat estuary at the former Methanex jetty. Freshwater or estuarine fish habitat has not been identified at the proposed tug berth facility or diesel and LNG fuelling area. Some anadromous fish species migrate between freshwater spawning habitat and marine foraging habitat and have the potential to migrate past or through the proposed tug berth area during construction, decommissioning or operations. Of particular ecological, biological and Indigenous importance, Eulachon/ Oolichan (*Thaleichthys pacificus*), Pacific salmon (*Oncorhynchus* spp.) and trout (steelhead [*O. mykiss*]) are considered in the amendment assessment.

Oolichan are an anadromous fish species that spend the majority of their life history in the marine environment, returning to their natal rivers to spawn. Spawning locations may vary annually as they are strongly dependent on flow rates (Stables et al. 2005). The Central Pacific Coast Eulachon Population is designated as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (COSEWIC 2011) as rivers within the region have experienced declines of over 90% since the 1990s. However, they are not a federally listed species under the *Species at Risk Act* ([SARA], BC CDC 2022). The Haisla Nation have been monitoring Oolichan in the Kitimat River watershed and have observed adults in Moore Creek and Anderson Creek (Advisian Pers. Comm 2022a). Therefore, there is potential for Oolichan to transit the Kitimat Arm in low numbers to these tributaries.

Five species of Pacific salmon (chum [*Oncorhynchus keta*], coho [*O. kisutch*], Chinook [*O. tshawytscha*], sockeye [*O. nerka*], pink [*O. gorbuscha*]) and steelhead trout occur in Kitimat Arm and are likely to migrate between the marine environment of Kitimat Arm into the estuary of Kitimat River or tributaries during their life cycle (MacDonald & Shepherd 1983, LNG Canada 2014b). Salmonids use both marine and freshwater habitats during their life cycle but must return to freshwater to spawn. Spawn timing is run-dependent, but typically for Pacific Salmon occurs between mid-June and late November with the peak spawning period in the month of August (BC ENV 2020). Steelhead trout typically return to the Kitimat River for spawning from March to May (BC MoE 1990). Out-migrating juvenile salmon typically rear using nearshore habitats of the river, estuary and nearby tributaries for food and cover. There are

observational data of all five species of salmon from 2013 (Chinook, chum, pink, coho and sockeye) within the LSA (iMapBC 2021). Therefore, it is possible for salmonids to transit the intertidal and subtidal environment in the proposed tug berth area. However, the existing habitat quality is low and unlikely to provide food or shelter to juvenile salmonids given the soft substrate and lack of vegetation (Advisian 2022b).

## 7.2.2 Mechanisms of Potential Effects

Potential effects on anadromous fish species during marine construction and decommissioning of the proposed tug berth facility could include a change in the underwater acoustic levels during pile installation which could change the behaviour of anadromous fish or mortality risk of anadromous fish. Existing fender panels and steel H-piles will be removed from the Methanex jetty to accommodate the tug berth floats. The removal of piles may change the underwater acoustic levels in a similar way as the pile installation depending on the pile removal methods employed.

The Methanex causeway consists of coarse material (i.e., riprap) as shoreline protection that has been in place for several decades. The condition of the shoreline protection on the west side and south side (i.e., roundhead) of the Methanex causeway has deteriorated over time and these areas are proposed to be remediated (estimated total area of 1,500 m<sup>2</sup>). The remediation will consist of placement of riprap over the existing material on the west side and interlocking concrete blocks (i.e., Loc-Blocs) on the south side with no additional impact outside of the current footprint. The current footprint extends from the HWL to approximately -2 m below CD. Placement of new materials has potential to change water quality from release of trace fines from the material or a loss of habitat (i.e., existing riprap) that will be covered with the placement of new materials.

No potential effects to freshwater or estuarine habitat are anticipated.

## 7.2.3 Mitigation

The following measures and standards will mitigate the adverse effects of construction, decommissioning and operation at the proposed tug berth and fuelling facility on freshwater and estuarine fish and fish habitat. Condition 4 of the EAC requires that LNG Canada develop a fish management and monitoring plan in consultation with DFO and the OGC. Based on the Conditions of the EAC and the Conditions within the *Fisheries Act* Authorization(s) issued for the Project, LNG Canada have prepared and implemented a MAP (LNG Canada 2018a) and a MMP (LNG Canada 2019) to mitigate, manage and monitor project-related effects. These plans, as well as adaptive management, will be implemented to mitigate effects for construction activities. As stated above, LNG Canada has been compiling acoustic data to verify acoustics for pile driving for size of pile and distance from the sound source. Acoustic effects from pile driving are well understood at the LNG Canada site and within the Certified Project Area. These data have been used to verify predicted acoustic levels using the size of pile that are part of the tug berth design. Mitigation measure relating to pile installation will be implemented as described in Section 7.1.3 for the protection of migratory and resident fish species.

Other mitigation measures employed for in-water work will follow BMPs and those outlined in the MMP (LNG Canada 2019) and the MAP (LNG Canada 2018a). Fender panel removal will primarily be completed in out-of-water tidal conditions (i.e., in the dry). Steel H-piles will be removed via line-pull or vibratory hammer. Any underwater noise generated by pile removal activities will follow mitigations outlined for pile installation (Section 7.1.3). Any materials generated by fender and pile removal activity will be collected for disposal offsite at appropriate facilities.

Specific to mitigations for Oolichan, LNG Canada and EMs will actively monitor for Oolichan during Project construction. This includes observations for migration as well as freshwater spawning. In addition to EMs, LNG Canada also works closely with Haisla Fisheries to share information related to Oolichan presence and observations. In the event of an observation of Oolichan, LNG Canada will notify Haisla Nation and work with the Nation to develop acceptable mitigations (LNG Canada 2019).

A Fisheries and Oceans Canada (DFO) Request for Review (RFR) has been submitted (file # 22 HPAC-00897). It is anticipated that DFO will provide a Letter of Advice outlining avoidance and mitigations for the construction activities. The draft RfR outlines measures to mitigate serious harm to fish as well as adaptive management measures including: an underwater acoustic monitoring program, establishment and monitoring of a MMEZ, use of a

combination of vibratory and impact hammer to reduce overall noise, soft start procedure for piling, a turbidity monitoring program based on visual observations with compliance monitoring completed as needed, use of an Environmental Monitor, and standard BMPs for concrete work near water.

## 7.2.4 Assessment of Residual Effects

The anticipated residual effects to freshwater and estuarine fish and fish habitat are summarized in Table 7.

**Table 7: Residual Effects on Marine Resources**

Potential Effects	Mitigation Measures	Residual Effects from Proposed Changes	Potential Changes to Assessment Report and Amendment Assessment Report
Change in fish habitat	-Adhere to mitigations outlined in Section 5.5.3 of the EAO's Assessment Report (EAO 2015b) and as described in the MAP (LNG Canada 2018a) and MMP (LNG Canada 2019).	-No change in freshwater and estuarine fish habitat.	The proposed changes would not change the characterization of residual effects to freshwater and estuarine fish habitat presented in 5.5.4 of the EAO's Assessment Report because this was related to dredging and disposal effects (EAO 2015b).
Change in risk of physical injury or mortality of fish  Change in behaviour of fish due to underwater noise	-Adhere to mitigations specific to Oolichan that are outlined in MMP (LNG Canada 2019). Mitigations will be implemented to protect Oolichan that will be confirmed with the Haisla Nation.  -Underwater acoustic monitoring will be implemented as outlined within Sections 6.8 and 6.9 of the MMP (LNG Canada 2019), Section 7.1.9 of the MAP (LNG Canada 2018a).	-Negligible and temporary disturbance from project-generated underwater noise is predicted to be within guideline thresholds as implemented for work within the Certified Project Area and outlined in 5.6.4 of the EAO's Assessment Report  -No change in risk of physical injury or mortality of fish.	The proposed changes would not change the characterization of residual effects to risk of physical injury or mortality of fish presented in Section 5.5.4 of the EAO Assessment Report (EAO 2015b).
Change in fish health	-Adhere to mitigations outlined in Section 5.5.3 of the EAO's Assessment Report (EAO 2015b) and as described in the MAP (LNG Canada 2018a) and MMP (LNG Canada 2019).	-No change in fish health.	The proposed changes would not change the characterization of residual effects to fish health presented in 5.5.4 of the EAO's Assessment Report because this was related to dredging and disposal effects (EAO 2015b).

With the implementation of existing mitigation measures, it is anticipated that there will be no residual effects to freshwater or estuarine fish or fish habitat. The residual effects will not change the cumulative effects assessment conclusions provided in the EAO Assessment Report (EAO 2015b) and the previous amendment assessment reports (EAO 2016a, 2019, 2021).

## 7.3 Marine Transportation and Use

This section considers potential effects to marine transportation and use due to the construction, operation and decommissioning of the tug berth and tug fuelling facility. This assessment does not consider effects from LNG carriers and escort tugs as there are no proposed changes to this activity and therefore no change to what was assessed in the EAC Application (LNG Canada 2014a).

The tug berth location is outside of the original Certified Project Area; however, it is within the Marine Transportation LSA described in the Environment Certificate Application report (LNG Canada 2014a). The LSA was extensively studied to support the EAO Assessment and described the existing marine transportation and use conditions (LNG Canada 2014a).

### 7.3.1 Existing Conditions

The project lies within the private industrial port of Kitimat. There are currently four existing marine structures within the port: the RT Terminal A, the former Methanex jetty with its associated methanol loading trestle, and the LNG Canada terminal, consisting of the MOF, the LNG Canada Berth 2 and Terminal B. There are on average 203 commercial vessel visits per year (between 1978 and 2011) with a peak of 250 vessels per year between 1987 and 1995, based on information from Prince Rupert Port Authority and DoK (LNG Canada 2014a).

Haisla Nation do not use the port area for harvesting of shellfish due to the risk of sanitary contamination in Area 6-1 Kitimat Arm, closure of bivalve shellfish harvesting and an annual biotoxin closure (DFO 2022). However, some shoreline harvesting does occur in the Kitimaat Village area. Oolichan fishing has not occurred because of low Oolichan returns (LNG Canada 2014a).

Public use of the port area includes limited use for crabbing due to perceptions of contamination from previous industry practices and the closures listed previously. Fishing for salmon and halibut occur along the east side of the channel in deeper water and some shoreline fishing occurs. Recreational vessels are occasionally used in the area outside of the working harbour (Advisian Pers. Comm 2022b).

LNG Canada and its marine contractors are required to use the Canadian Coast Guard's (CCG) Marine Communication and Traffic Services (MCTS) to manage potential navigation conflicts. Ships obtain clearance through Vessel Traffic Services prior to beginning a voyage in or through Canadian waters. Government-approved navigational aids are in place within the port to increase marine safety around the three existing structures. The CCG track the location and condition of these aids and provides information to the public via Notices to Mariners and Notices to Shipping. Radio aids including Automatic Identification System (AIS) are required on every ship under the *Navigational Safety Regulations*, that is over 500 gross tonnage, other than a fishing vessel. In addition, safety zones have been set up which specify "no go" areas around the marine terminal for the safety of the public marine traffic, during construction and operation in accordance with TERMPOL recommendations (Transport Canada 2015).

A Port Information Guide is under development and will act as a guide for visiting commercial vessel operators and to outline unique aspects of passage into the port of Kitimat including reduced speeds for marine mammal protection, locations of communities along the route, and fishing areas. A requirement of the TERMPOL review is to provide this Guide and a Terminal Operations Manual to Transport Canada six months prior to operation.

It is noted that one of TC's recommendations from the TERMPOL review was for the Project to provide a suitable berth location for tug vessels near the Project berths to improve operational safety.

Assumptions made in the EAC Application (LNG Canada 2014a) that are relevant to tug vessel traffic include:

- Tug use is common in the port of Kitimat and the persistence of industrial marine activity in the area suggests that local mariners are accustomed to their presence.
- Shipping traffic during construction and operation are estimated to be similar and shipping mitigation measures will apply during all phases of the Project.
- The EAC application focused on operational shipping traffic as it included a greater number of large vessels (e.g., LNG carriers) with greatest potential for adverse effects.

There has been no material change in marine transportation and use within the port of Kitimat since the EA application (LNG Canada 2014a) was completed and therefore no new information was collected to support this amendment process.

Use of the existing methanol trestle as part of the proposed tug berth facility reduces marine construction requirements (e.g., in-water works such as piling) and eliminates the need for dredging, due to the existing dredge

pocket at this location. Floating structures (marine floats, O&M facility and breakwater) for the tug berth and associated piling will be located within 100 m (west) of the existing Methanex trestle.

The tug fuelling facility will be constructed on the MOF which is an existing industrial area that is currently under construction.

### **7.3.2 Mechanisms of Potential Effects**

Potential effects to marine transportation and use during marine construction and decommissioning of the proposed facilities, and from tug vessel movements during operations, include interference with marine navigation, interference with marine fisheries and shoreline harvesting, and interference with marine recreation and tourism. Construction of the tug berth and tug fuelling facility will have no change on access to marinas and moorage facilities from what was previously assessed (LNG Canada 2015e) as there is no public access to the LNG Canada site. Therefore, the assessment of marinas and moorage facilities is not carried forward in this amendment assessment.

Construction of the tug berth facility will not increase the overall frequency of harbour tug movements within the harbour over what was considered in the EAC Application (LNG Canada 2014a), but it will result in a localized change in how tugs move between the RT harbour and the LNG Canada harbour and therefore potential interference with marine navigation in that specific area.

### **7.3.3 Mitigations**

Condition 17 of the EAC requires LNG Canada to prepare a MAP (LNG Canada 2018a) for construction and operational activities that requires identification of construction and operational activities that may impact navigation, identify existing and traditional fishing areas, harvesting areas, recreational and tourism use, Indigenous Group's use and any associated timing windows, specific actions to inform affected stakeholders and Indigenous Groups of potential interference with marine navigation as result of Project activities, specific activities to monitor the effects of shipping activities on marine users during construction and operations, specific actions to coordinate activities with other marine users, particularly with RT, specify mitigations to reduce disruption of marine navigation as a result of construction and operations.

#### **7.3.3.1 Construction Phase**

The current construction phase MAP will be updated as required to account for the proposed facilities. Specific mitigations in the current MAP include requirements for:

- Harbour tugs to use MCTS system to provide planned times when they will be transiting to manoeuvre LNG carriers.
- Regular communication with marine users.
- Use of a safety zone around the tug berth for the safety of marine traffic during construction and operation.
- Installation of additional navigational aids as determined by TC.
- Providing notification to the Canadian Hydrographic Service to include updated information for the tug berth on future navigational charts.

A MRP (LNG Canada 2018b) and Marine Access Traffic Management Plan (MATMP) (LNG Canada 2018c) were also prepared for construction phase activities. Specific mitigations relevant to tug vessel traffic management during construction include:

- Implementation of a communications protocol in consultation with Indigenous Groups.
- Required use of MCTS system.
- Use of safety zones.
- Provide updated information to Canadian Hydrographic Services in order to update navigational charts.

Construction activities associated with both facilities will also comply with TC approval conditions associated with the Notice of Works to be submitted under the Navigation Protection Program.

### 7.3.3.2 Operations Phase

The MAP and MATMP for operations phase are in development and will be structured to include the two new proposed activities. These two plans are being developed in line with the Proactive Vessel Management (PVM) initiative lead by TC. This management approach is part of the Oceans Protection Plan and aims to reduce conflicts between local waterway users and protect environmentally and culturally sensitive areas; and includes input from Indigenous groups, BC Coast Pilots and the Pacific Pilotage Authority.

The operational plans will follow recommendations in the TC's TERMPOL review (Transport Canada 2015), including:

- Submitting a tug operation plan and updated Port information Handbook (six [6] months before operations)
- Confirm to TC that navigation aids are sufficient, and outcomes from simulations have been taken into account (three [3] months before operations).
- Provide training for tug pilots on operational plans, emergency procedures and areas where other users may be encountered.

The operations phase MRP is also in development and will include management of potential fuelling risks associated with the tug fuelling facility. This will include incorporation of the aspects of an oil pollution prevention plan and an oil pollution emergency plan that would meet requirements set out in the *Oil Handling Facilities Regulations* and to put in place an arrangement with a spill response organization, that can be deployed and operate in accordance with the Oil Handling Facilities Standards 1995 TP 12402 E.

In summary no additional mitigation measures are proposed to manage potential effects of the proposed changes on marine transportation and use.

### 7.3.4 Assessment of Residual Effects

The anticipated residual effects to marine transportation and use are summarized in Table 8.

In relation to marine navigation, overall tug traffic volume in the port of Kitimat will not change over what was considered in the EAC, but residual effects include a change in tug movements in the RT harbour area. These effects will be localized to the area surrounding the Methanex jetty given and will have negligible impact on RT vessel operations based on:

- Tug movements are only required between the LNG Canada berth and the proposed tug berth.
- LNG Canada tug vessel movement in the RT harbour will be physically restricted to the area immediately adjacent to the proposed tug berth due to the presence of a higher (un-dredged) area between the two dredged areas for RT Terminal A and the Methanex causeway.
- Tug use is common in the port of Kitimat and the persistence of industrial marine activity in the area suggests that local mariners are accustomed to their presence.

With existing mitigations in place, including coordination of vessel movements with RT and placement of navigational aids, there is no change to the overall characterization of residual effects on marine navigation presented in the EAO's Assessment Report (EAO 2015b) as a result of the proposed changes. The proposed construction of the tug berth on the existing Methanex jetty and the tug fuelling facility at the MOF results in a negligible change to marine navigation.

The EAO's Assessment Report (EAO 2015b) evaluated residual effects to marine fisheries and shoreline harvesting, and marine recreation and tourism and concluded there would be no significant adverse residual effects. The proposed changes will be localized to areas within the port of Kitimat where there is not a significant overlap with fishing activities due to the frequency of industrial vessel traffic and familiarity of local users with shipping traffic and procedures for navigation around large vessels. With the implementation of existing mitigation measures in Section



7.3.3 such as the MCTS communication system and safety zones, construction of the proposed facilities will not change the Report's conclusion.

In summary, the proposed changes do not result in changes to the characterization of residual effects in the EAO Assessment Report (EAO 2015b). The residual effects will not change the cumulative effects assessment conclusions provided in the EAO Assessment Report (EAO 2015b) where potential adverse cumulative effects on marine transportation and use related to vessel movements in Principe and Douglas Channels rather than the port of Kitimat.

**Table 8: Residual Effects on Marine Transportation and Use**

Potential Effects	Mitigation Measures	Residual Effects from Proposed Changes	Potential Changes to Assessment Report and Amendment Assessment Report
Interference with marine navigation	Implement the MAP during construction and operations as required by EA Certificate Condition 17. Implement the MATP and MRP during construction and operations including use of safety zones, communication protocol and navigational aids.	Minor changes in vessel traffic in port of Kitimat.	The proposed changes would not change the characterization of residual effects in Section 7.3.4 of the EAO's Assessment Report (EAO 2015b)
Interference with marine fisheries and shoreline harvesting	Implement the MAP during construction and operations as required by EA Certificate Condition 17. Implement the MATP and MRP during construction and operations including use of safety zones, communication protocol and navigational aids.	No change in interference with marine fisheries and shoreline harvesting.	The proposed changes would not change the characterization of residual effects in Section 7.3.4 of the EAO's Assessment Report (EAO 2015b)
Interference with marine recreation and tourism	Implement the MAP during construction and operations as required by EA Certificate Condition 17. Implement the MATP and MRP during construction and operations including use of safety zones, communication protocol and navigational aids.	No change in interference with marine recreation and tourism.	The proposed changes would not change the characterization of residual effects in Section 7.3.4 of the EAO's Assessment Report (EAO 2015b)

## **8. BIOPHYSICAL FACTORS THAT SUPPORT ECOSYSTEM FUNCTION**

The Project area is located in marine waters at the head of Kitimat Arm and on the western side of the Kitimat River estuary. Kitimat Arm supports numerous ecological communities, including marine vegetation, marine mammals, birds, fishes, and invertebrate species. Biophysical factors that support ecosystem function in the vicinity of the proposed Project area include soft bottom habitat and resident and migratory fish species that transit the area to freshwater and estuarine habitats (Sections 7.1 and 7.2). The marine and freshwater habitats are connected through the estuarine interface of the estuary.

The proposed changes were designed to avoid effects to these biophysical factors. The tug berth will be built onto the existing Methanex trestle thereby avoiding the need for dredging and reducing the requirement for piling. An area of riparian vegetation will be cleared (approximately four to five trees/shrubs) to accommodate the catwalk footings.

Based on the small area of disturbance associated with pile installation and shoreline protection work at the existing Methanex jetty, the construction and decommission work is predicted to be negligible and temporary. The tug fuelling facility will be located on a pre-disturbed industrial area. Mitigation measures that will be implemented are expected to limit residual effects and the proposed changes are not predicted to result in changes to biophysical factors that support ecosystem function in the vicinity of the Project, nor are they expected to alter water and nutrient flow for the marine environment.

## 9. EFFECTS ON CURRENT AND FUTURE GENERATIONS

The proposed changes have limited potential to affect current and future generations. As presented in Section 7.3, no changes to residual effects to marine transportation and use are anticipated due to construction and operation of the tug berth and tug fuelling facility. Unforeseen effects to marine resources, fish and fish habitat would be addressed through existing mitigation and monitoring requirements. Unforeseen effects on marine navigation during construction would be addressed through use of the CCG's MCTS and similar operational plans and procedures currently being developed by LNG Canada in consultation with marine stakeholders and in line with the PVM initiative lead by TC.

The tug fuelling facility will operate in accordance with requirements set out in the *Oil Handling Facilities Regulations* and will have in place an arrangement with a competent spill response organization. With these commitments and MRP, the Project is not anticipated to have residual effects on marine water quality due to spills from the fuelling facility that will impact current or future generations.

Table 9 addresses the assessment criteria set out in the EAO's Effects Assessment Policy (EAO 2020).

**Table 9: Potential for Changes to Effects on Current and Future Generations**

Criteria	Description of Change
1. How are existing conditions being protected, maintained, enhanced and/or degraded as a result of the proposed changes?	The proposed changes will result in minor modifications to existing infrastructure. Changes to the Methanex jetty will prevent future degradation of the existing causeway and marine structure. The changes proposed to the MOF to facilitate tug fuelling are minor in relation to the proposed industrial uses in that area. Changes in vessel traffic are minor and limited to the immediate area between the LNG Canada and Methanex jetty berths. The location of the tug berth near the LNG Canada berth will improve operational safety in line with TC recommendations. With the implementation of existing mitigations, the proposed changes will not change the overall characterization of residual effects in the EAO's Assessment Report (EAO 2015b).
2. How are the positive and negative project effects distributed temporally (i.e., across generations)? And are there differences in distribution within the population (for example is there one distinct population that will benefit while another will be adversely affected)?	Changes in effects to subtidal fish habitat and intertidal habitat, and to vessel operations will have a negligible impact to current generations which will be limited to the area within and adjacent to the port of Kitimat. These effects will not be felt by future generations. The limited effects of the proposed changes would affect marine users in the immediate vicinity of the port of Kitimat.
3. What type(s) of economic growth does the project create and how is this growth distributed?	The proposed changes would result in negligible changes to economic growth compared to investment by the Project in the Kitimat region to date, and employment of individuals resident within the Project's economic conditions LSA.
4. How is the project aligned or not with any relevant regional or provincial growth strategies?	The proposed changes are in line with the DoK's OCP which identifies the port of Kitimat and adjacent waters as Industrial future land use (District of Kitimat, 2021)

## 10. CHANGES TO INDIGENOUS INTERESTS ASSESSMENT

The EAO defines Indigenous interests as “Interests related to an Indigenous nation and their rights recognized and affirmed by Section 35 of the *Constitution Act*, 1982, including Treaty rights and Aboriginal rights and title, that may be impacted by a proposed project” (EAO 2020).

The following Indigenous nations are participating Indigenous nations in the amendment assessment process:

- Haisla Nation
- Gitga’at First Nation
- Gitxaala Nation
- Kitsumkalum First Nation

In addition, the following Indigenous nations were notified of the amendment assessment process:

- Kitselas First Nation
- Lax Kw’alaams First Nation
- Metlakatla First Nation
- Métis Nation BC

The potential interactions presented in this amendment assessment are localized, limited to occurring in the traditional territory of the Haisla Nation and are likely to only interact with interests and rights related to Haisla Nation recognized and affirmed by section 35 of the *Constitution Act*, 1982, including Treaty rights and Aboriginal rights and title (LNG Canada 2022).

Potential effects from the proposed changes, mitigation measures and changes to the characterization of residual effects on Haisla Nation’s Indigenous Interests are summarized in Table 10 and reflect best available information, including the outcomes of engagement with Haisla Nation to date.

No effect is expected in relation to potential changes to cultural identity and traditional governance systems, and changes to use of sacred or culturally important sites and landscape features and/or spiritual places. This assessment therefore focusses on potential changes to harvesting-related Indigenous interests related to fishing.

**Table 10: Potential Effects, Mitigation or Enhancement and Changes to the Characterization of Residual Effects on Indigenous Interests**

Potential Effects	Mitigation Measures	Residual Effects	Changes to the Characterization of Residual Effects
Potential changes to harvesting-related Indigenous interests (fishing, trapping, hunting)	- Mitigation measures will be implemented as outlines in respective VC Sections (7.1, 7.2, 7.3)	- Proposed amendment activities may result in loss of fish habitat (52 m2 of marine soft bottom habitat) as described in Section 7.1 (Marine Resources). - No changes to use or access of estuarine or freshwater traditional use (TU) locations are not expected. - No changes to culturally important species (fish, wildlife), including harvested species.	<b>Change to Harvesting-related Indigenous interests:</b> No changes to access or use compared to the EAC Application (LNG Canada 2014a) is anticipated. As such, the proposed changes are not expected to change the conclusions in the EAO Assessment Report (EAO 2015b). With implementation of the mitigation measures, potential residual effects on important species are not anticipated as the

Potential Effects	Mitigation Measures	Residual Effects	Changes to the Characterization of Residual Effects
		- No changes to access or usage within the harbour from EAC conditions.	activities are localized and short-term (e.g., in-water activities).

There are no changes anticipated to the characterization of residual effects in the EAO Assessment Report (EAO 2015b) and the previous amendment assessment reports (EAO 2016a, 2019, 2021) as they relate to the VCs assessed in Section 7. The limited extent of the proposed changes is anticipated to be managed through mitigation measures and the proposed changes would not alter the analysis in Section 19 of the EAO's Assessment Report (EAO 2015b) and the previous amendment assessment reports (EAO 2016a, 2019, 2021) on Haisla Nation's Indigenous Interests.

Since the EAO's Assessment Report (EAO 2015b), no additional potential or residual effects have been identified. Given the localized loss of soft sediment marine seabed at the former Methanex jetty (estimated area: 52 m<sup>2</sup>), the residual effects are not anticipated to interact cumulatively with residual effects of other past, present and reasonably foreseeable future projects and activities in a way that would change conclusion in the EAO Assessment Report (EAO 2015b) or the previous amendment assessment report (EAO 2016a, 2019, 2021). LNG Canada is committed to continuing to work with the Haisla Nation and other interested Indigenous nations to understand and address Indigenous Interests that may change over time and will continue to respond to questions and concerns through ongoing consultation efforts.

# 11. SUMMARY OF ENGAGEMENT ON THE AMENDMENT

LNG Canada conducted the following engagement to support this proposed amendment:

- Draft copy of the Initial Amendment Application was shared with Haisla Nation for review and comment on 3 March 2022. An updated version of the initial application was sent on 22 March 2022 (LNG Canada 2022).
- Email notification was sent to Gitga'at, Gitxaala, Kitselas, Kitsumkalum, Lax Kw'alaams, Metlakatla and Métis Nation BC on 1 April 2022 to inform of the pending Amendment assessment and provide an overview of the proposed changes.
- Email notification has been sent to the DoK, OGC, Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), Environment and Climate Change Canada (ECCC) and DFO to provide an overview of the proposed changes.
- Consultation with TC regarding works that may affect navigable waters on 14 April 2022.
- Conference call with Technical Advisory Committee (TAC) on 27 April 2022 to provide an overview of the proposed amendment. The meeting was led by EAO with invitations sent to all stakeholders identified by the EAO. Attendees included ECCC, BC Ministry of Environment and Climate Change Strategy (BC ENV), Ministry of Energy, Mines and Low Carbon Innovation (EMLI), IAAC, and EAO.

As part of the TAC review of the Request to amend Environmental Assessment Certificate #E15-01 – Tug Berth and Diesel/LNG Bunkering, ECCC requested:

- an estimation of GHG emissions through all phases,
- summary of impact on carbon sinks based on area of disturbance,
- clarification on how land-based works may affect marine water quality,
- inclusion of recommendations in the CEMP to mitigate and monitor sediment dispersion during pile driving given the potential presence of contaminated sediments,
- to assess potential effects on wetlands through Vegetation Resources VC or Wetlands VC,
- to carry forward with Wildlife Resources VC to assess noise, lights nesting habitat, accidents and malfunctions, and
- to provide further justification for not assessing Human Health VC, e.g., for noise impacts.

To address these concerns meetings were held with both Health Canada and Canadian Wildlife Service to clarify questions; and a formal response will be provided in a supplemental document. These agreed responses are reflected in this amendment assessment. [Note: consultation is in progress. Updates will be provided in the final amendment assessment]

To date, no concerns or objections have been raised by Indigenous nations, government agencies, or stakeholders in response to these initial engagement activities. LNG Canada will continue with engagement throughout the amendment assessment review process.

## 12. SUMMARY OF REQUESTED CHANGES

LNG Canada is requesting the following changes to the Revised Certified Project Description (EAO 2016b):

1. Figure 1 Certified Project Area to be replaced with Revised Certified Marine Terminal Area in this amendment assessment (Figure 1).
2. Section 2 (LNG Facility and Supporting Infrastructure) of Schedule A to include the following text “The marine terminal includes the access road extending from the north end of the DDS on its west side to the southern end of the Methanex jetty, and includes, the tug berth as shown on Figure 1.”
3. Section 2 (LNG Facility and Supporting Infrastructure) of Schedule A to include the following text “Supporting permanent infrastructure in the marine terminal area includes a diesel and LNG fuelling facility for tug vessels as shown on Figure 1.”

## 13. CONCLUSION

Presented in Table 11 is a summary of the residual environmental effects from the proposed changes relative to those presented in the EAO Assessment Report (EAO 2015b) and the previous amendment assessment reports (EAO 2016a, 2019, 2021). The assessment has identified that the proposed changes would not alter the characterization of residual effects of the VCs assessed in Section 7. Residual effects of the proposed changes are not anticipated to result in changes to VCs or other factors that support ecosystem function, or the potential effects to current or future generations. In addition, changes to Indigenous Interests are not anticipated with the VCs assessed due to the limited nature of the proposed changes. The amendment assessment has not identified any additional mitigation measures from those already enabled through the Project's EAC.

**Table 11: Summary of Changes to the Residual Effects from the Changes in this Amendment**

<b>Valued Component</b>	<b>Section of EAO's Assessment Report (EAO 2015b) and the Previous Amendment Assessment Reports (EAO 2016a, 2019, 2021)</b>	<b>Change to Characterization of Residual Effects</b>	<b>Changes to Characterization of Cumulative Effects</b>	<b>Potential Changes to Assessment Report and Amendment Reports</b>
Marine Resources	Section 5.6 Marine Resources (EAO 2015b)	No	No	None
Freshwater and Estuarine Fish and Fish Habitat	Section 5.5 Freshwater and Estuarine Fish and Fish Habitat (EAO 2015b) Section 3.5 Freshwater and Estuarine Fish and Fish Habitat (EAO 2016a) Section 3.0 Freshwater and Estuarine Fish and Fish Habitat (EAO 2021)	No	No	None
Marine Transport and Use	Section 7.3 Marine Transportation and Use (EAO 2015b)	No	No	None



## 14. REFERENCES

- Advisian. 2021. Technical Note: LNG Bunkering Options Validation. Document No. L001-00000-A-7180-1023. Prepared for LNG Canada. Rev 0, December 02, 2021.
- Advisian. 2022a. Concept Design for Tug Dock at Former Methanex Berth Location: Tug Berth Location Options Validation. Document No. L001-000000-AA-7180-1011. Prepared for LNG Canada. Revised 10 February 2022.
- Advisian. 2022b. LNG Canada-Former Methanex Tug Berth Upgrade: Environmental Inspection Report-Marine Baseline Study. Doc. No. L001-00000-AA-7180-1036. Prepared for LNG Canada. Revised 07 February 2022.
- Advisian Pers. Comm 2022a. Personal communication b/w LNG Canada (Robert St. Jean) and Advisian (Erika Grebeldinger) on 10 May 2022 via telephone.
- Advisian Pers. Comm 2022b. Personal communication b/w LNG Canada (Atiq Ahmed) and Advisian (Robert Bracken) on 29 April 2022 via telephone.
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