

**PACIFIC NORTHWEST LNG - ADDENDUM TO THE ENVIRONMENTAL IMPACT STATEMENT**

Changes to the Environment  
December 12, 2014

## 25.0 CHANGES TO THE ENVIRONMENT

This section summarizes the changes to the environment pertaining to requirements of Section 5 (1)(a and b) of CEAA 2012 (see Table 25-1). The changes to the environment are updated to describe the currently proposed Project (i.e., marine terminal re-design, dredging limited to the MOF and worker accommodations camp removed from the EA). Conclusions in this section are summarized from the detailed analyses in Sections 6 through 13 and are categorized as follows:

- Changes to components of the environment within federal jurisdiction
- Changes to the environment that would occur on federal or transboundary lands
- Changes to the environment that are directly linked or necessarily incidental to federal decisions.

**Table 25-1: Summary of Changes to the Environment**

Topic	Potential Effects described in the EIS	Sections of the EIS and Addendum
Fish and Fish Habitat and Aquatic Species (including marine plants).	Change in fish habitat availability Change in food and nutrient content Change in fish behaviour Change in risk of fish mortality Change in marine sediment or water quality	Section 12: Freshwater Aquatic Resources Section 13: Marine Resources
Migratory Birds	Change in migratory bird habitat availability Change in migratory bird mortality Change in migratory bird movement patterns	Section 11: Terrestrial Wildlife and Marine Birds
Air Quality	Change in criteria air contaminant concentrations	Section 6: Air Quality
Greenhouse Gas	Change in meeting greenhouse gas (GHG) reduction targets	Section 7: Greenhouse Gas Management
Acoustic Environment	Change in acoustic environment	Section 8: Acoustic Environment
Ambient Light	Change in ambient light	Section 9: Ambient Light
Vegetation and Wetland Resources	Change in abundance of plant species of management concern Change in abundance or condition of ecological communities of management concern Change in wetland functions	Section 10: Vegetation and Wetland Resources
Terrestrial Wildlife	Change in wildlife habitat availability Change in wildlife mortality Change in wildlife movement patterns	Section 11: Terrestrial Wildlife and Marine Birds

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**25.1 CHANGES TO COMPONENTS OF THE ENVIRONMENT WITHIN FEDERAL JURISDICTION**

Changes in fish and fish habitat and aquatic species (including marine plants) and migratory birds are summarized in Table 25-2

**Table 25-2 Changes to Components of the Environment within Federal Jurisdiction**

Potential Effects described in the EIS	Sections of the EIS and Addendum
Change in fish habitat availability, including marine plants Change in food and nutrient content Change in fish behaviour Change in fish mortality risk	Section 12: Freshwater Aquatic Resources Section 13: Marine Resources
Change in migratory bird habitat availability Change in migratory bird mortality Change in migratory bird movement patterns	Section 11: Terrestrial Wildlife and Marine Birds
Change in ability to navigate Change in fishing, recreation and marine resource use	Section 15: Navigation and Marine Resource Use

**25.2 CHANGES TO THE ENVIRONMENT THAT WOULD OCCUR ON FEDERAL OR TRANSBOUNDARY LANDS**

The project is located on federal lands operated by the Prince Rupert Port Authority (PRPA), except for road access to the bridge and the mainland bridge abutment. Thus, no lands outside BC or outside of Canada will be affected by the Project.

Changes to the environment due to Project activities that would occur on federal land (i.e., Lelu Island, foreshore and marine environment surrounding Lelu Island) are noted in Table 25-3.

**Table 25-3 Changes to Components of the Environment that would occur on Federal Land**

Potential Effects described in the EIS	Sections of the EIS and Addendum
Change in fish habitat availability, including marine plants Change in food and nutrient content Change in fish behaviour Change in fish mortality risk Change in marine sediment and water quality	Section 12: Freshwater Aquatic Resources Section 13: Marine Resources
Change in migratory bird habitat availability Change in migratory bird mortality Change in migratory bird movement patterns	Section 11: Terrestrial Wildlife and Marine Birds
Change in criteria air contaminant concentrations	Section 6: Air Quality
Change in greenhouse gas (GHG) emissions	Section 7: Greenhouse Gas Management

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Potential Effects described in the EIS	Sections of the EIS and Addendum
Change in acoustic environment	Section 8: Acoustic Environment
Change in ambient light	Section 9: Ambient Light
Change in abundance of plant species of management concern Change in abundance or condition of ecological communities of management concern Change in wetland functions	Section 10: Vegetation and Wetland Resources
Change in wildlife habitat availability Change in wildlife mortality Change in wildlife movement patterns	Section 11: Terrestrial Wildlife and Marine Birds

**25.3 CHANGES TO THE ENVIRONMENT THAT ARE DIRECTLY LINKED OR NECESSARILY INCIDENTAL TO FEDERAL DECISIONS**

Following a positive decision on the Project by the Minister of Environment, and before the Project can proceed, federal decisions are required under the *Fisheries Act*, the *Canadian Environmental Protection Act*, the *Navigation Protection Act*, and the *Canada Marine Act*.

**25.3.1 Fisheries Act**

Serious harm to fish and fish habitat may result from construction of marine infrastructure in the intertidal and subtidal areas adjacent to Lelu Island. Prior to issuing section 35(2) authorizations under the *Fisheries Act* for these changes to the environment, DFO will require PNW LNG to prepare a Fish Habitat Offsetting Strategy (see Appendix K). Table 25-4 summarizes the additional changes to the environment that are directly linked or necessarily incidental to the decision to issue a *Fisheries Act* authorization and provides the Section of the EIS and EIS Addendum where additional information may be found.

**Table 25-4 Changes to the Environment Directly Linked or Necessarily Incidental to a Fisheries Act Authorization**

Potential Effects described in the EIS	Sections of the EIS and Addendum
<b>The Project has potential to result in the following environmental effects from the marine terminal, MOF, and access bridge to Port Edward:</b>	
Change in fish habitat availability, including marine plants Change in food and nutrient content Change in fish behaviour Change in fish mortality risk Change in marine sediment and water quality	Section 12: Freshwater Aquatic Resources Section 13: Marine Resources
Change in migratory bird habitat availability Change in migratory bird mortality Change in migratory bird movement patterns	Section 11: Terrestrial Wildlife and Marine Birds

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Potential Effects described in the EIS	Sections of the EIS and Addendum
Change in air quality from equipment emissions associated with construction.	Section 6: Air Quality
Change in GHG emissions from equipment emissions associated with construction.	Section 7: Greenhouse Gas Management
Change in the acoustic environment during construction.	Section 8: Acoustic Environment
Change in ambient light due to construction and lighting requirements for the marine terminal and access bridge to Port Edward.	Section 9: Ambient Light
Change in vegetation resources may result from removal of riparian and foreshore vegetation during construction.	Section 10: Vegetation and Wetland Resources
Change in wildlife resources (other than migratory birds) due to change in wildlife movement patterns, habitat availability and wildlife mortality may result during construction.	Section 11: Terrestrial Wildlife and Marine Birds
Change in surface water quality from air emissions during construction.	Not assessed further, requiring some mitigation
<b>The Project has potential to result in the following environmental effects due to the fish habitat offset:</b>	
Change in fish habitat availability, including marine plants Change in food and nutrient content Change in fish behaviour Change in fish mortality risk Change in marine sediment and water quality	Section 13: Marine Resources
Change in migratory bird habitat availability Change in migratory bird mortality Change in migratory bird movement patterns	Section 11: Terrestrial Wildlife and Marine Birds
Change in vegetation resources may result from removal of riparian and foreshore vegetation	Addendum Section 13

**25.3.2 Canadian Environmental Protection Act**

Disposal of dredged material at the Brown Passage marine disposal site will temporarily result in elevated total suspended solids each time sediment is disposed at the site. Low levels of dioxins and furans are present in some of the sediments to be disposed at sea, but this would not increase the risk to fish, mammals or the marine environment. Prior to issuing a permit under the CEPA for these changes to the environment, Environment Canada will require evidence that materials to be disposed will not contaminate the marine environment and that disposal at sea is the environmentally preferable and practical option. Table 25-5 summarizes the changes to the environment that are directly linked or necessarily incidental to the decision to issue a CEPA permit and provides the Section of the EIS and EIS Addendum where additional information may be found.

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**Table 25-5 Changes to the Environment Directly Linked or Necessarily Incidental to the *Canadian Environmental Protection Act* permit**

Potential Effects described in the EIS	Sections of the EIS and Addendum
<b>The Project has potential to result in the following environmental effects due to disposal of sediment dredged at the MOF:</b>	
Change in fish habitat associated with dispersal of dredge materials over the benthos at Brown Passage.	Section 13: Marine Resources
Change in migratory bird movement patterns	Section 11: Terrestrial Wildlife and Marine Birds
Change in air quality from emissions associated with disposal of dredge materials.	Section 6: Air Quality
Change in water and sediment quality.	Section 13: Marine Resources Section 13.4.2.1: EIS Addendum Appendix A

**25.3.3 Navigation Protection Act**

Construction of the marine offloading facility, the pioneer dock, the bridge from Lelu Island to the mainland, and the marine terminal (including a trestle and berth structures) may induce changes to the environment that alter marine navigation due to restrictions on movements of vessels. Construction and dredging activities will interfere with recreational boating and recreational, commercial, and Aboriginal fishing by introducing additional marine traffic and support vessels in Porpoise Channel and by providing berthing for LNG carriers. Ambient light will be affected by introducing lighting at the terminal.

Prior to issuing an approval under the *Navigation Protection Act*, Transport Canada will require detailed information on any works constructed or placed in, on, over, under, through, or across navigable waters that may constitute a substantial interference with navigation and information on navigation aids and lighting that comply with federal safety and navigation requirements. Table 25-6 summarizes the additional changes to the environment that are directly linked or necessarily incidental to the decision to issue a CEPA permit and provides the Section of the EIS and EIS Addendum where additional information may be found.

**Table 25-6 Changes to the Environment Directly Linked or Necessarily Incidental to the *Navigation Protection Act* approval**

Potential Effects described in the EIS	Sections of the EIS and Addendum
<b>The Project has potential to result in the following environmental effects due the marine terminal, MOF, and access bridge to Port Edward:</b>	
Change in fish habitat availability, including marine plants Change in food and nutrient content Change in fish behaviour Change in fish mortality risk Change in marine sediment and water quality	Section 12: Freshwater Aquatic Resources Section 13: Marine Resources

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Potential Effects described in the EIS	Sections of the EIS and Addendum
Change in migratory bird habitat availability Change in migratory bird mortality Change in migratory bird movement patterns	Section 11: Terrestrial Wildlife and Marine Birds
Change in air quality from equipment emissions associated with construction and dredging activities.	Section 6: Air Quality
Change in GHG emissions.	Section 7: Greenhouse Gas Management
Change in the acoustic environment due to equipment noise generated during construction and dredging activities.	Section 8: Acoustic Environment
Change in ambient light due to construction and dredging activities and lighting requirements for the marine terminal, trestle, suspension bridge and bridge to Port Edward.	Section 9: Ambient Light

**25.3.4 Canada Marine Act**

The PRPA operates under the provisions of the *Canada Marine Act* (CMA), S.C. 1998, c.10 and related CMA regulations, and through Letters Patent issued by the federal Minister of Transport. This regulatory framework gives the PRPA the authority to operate the Port in Prince Rupert Harbour.

The Project is proposed to be located on Lelu Island and its surrounding waters, all of which are located within the boundaries of the Port of Prince Rupert and under the jurisdiction of the PRPA. In order for the Project to proceed, a lease pursuant to PRPA’s Letters Patent under the CMA will be required to occupy federal lands managed by the PRPA.

Table 25-7 summarizes the changes to the CMA lease and provides the Section of the EIS and EIS Addendum where additional information may be found.

**Table 25-7 Changes to the Environment Directly Linked or Necessarily Incidental to the *Canada Marine Act* Lease**

Potential Effects described in the EIS	Sections of the EIS and Addendum
<b>The Project has potential to result in the following environmental effects due to issuance of a lease:</b>	
Change in fish habitat availability Change in food and nutrient content Change in fish behaviour Change in fish mortality risk	Section 12: Freshwater Aquatic Resources Section 13: Marine Resources
Change in migratory bird habitat availability Change in migratory bird mortality Change in migratory bird movement patterns	Section 11: Terrestrial Wildlife and Marine Birds
Change in criteria air contaminant concentrations	Section 6: Air Quality
Change in greenhouse gas (GHG) emissions	Section 7: Greenhouse Gas Management

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Potential Effects described in the EIS	Sections of the EIS and Addendum
Change in acoustic environment	Section 8: Acoustic Environment
Change in ambient light	Section 9: Ambient Light
Change in abundance of plant species of management concern Change in abundance or condition of ecological communities of management concern Change in wetland functions	Section 10: Vegetation and Wetland Resources
Change in wildlife habitat availability Change in wildlife mortality Change in wildlife movement patterns	Section 11: Terrestrial Wildlife and Marine Birds

**25.4 SUMMARY OF CHANGES TO THE ENVIRONMENT**

The Project is located on federal land on a greenfield site, which is identified for industrial development in the Port of Prince Rupert 2020 Land Use Management Plan. Changes to the environment under federal jurisdiction, on federal lands and requiring federal decisions are expected to result in low magnitude residual effects. For a detailed review of the expected changes and mitigation, see Sections 6 through 13.

**25.5 RESPONSES TO THE OUTSTANDING INFORMATION REQUESTS**

**25.5.1 Information Request #2**

**25.5.1.1 Government of Canada – Outstanding Information**

*The proponent did not consider terrestrial effects of the fish habitat compensation plan, as suggested in this IR. DFO has indicated in the Marine Resource IR #25 that there are information gaps pertaining to offsetting projects. In providing that information regarding offsetting projects, update the corresponding potential for terrestrial impacts from offsetting projects as required for this IR, including any other effects of changes that may be caused to the environment that are directly linked or necessarily incidental to all federal permits or decisions as appropriate.*

**25.5.1.2 Response**

Habitat offsetting plans have been updated based on the marine terminal design mitigation. Effects on fish habitat will be restricted to the marine environment resulting from dredging at the MOF and the placement of piles. The foreshore, riparian, intertidal and subtidal area that will be temporarily affected by construction of the fish habitat offsets are not CRA fish habitat. Materials for constructing the fish habitat offsets will be transported to the sites via barge. Any other land involvement will be limited to previously disturbed areas such as roads for delivering rock and aggregate material (for constructing the fish habitat offsets) via dump truck from approved aggregate quarries in either Terrace or Prince Rupert, as necessary.

Please refer to Appendix G.10 for further details on the proposed conceptual habitat offsetting measures.

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**25.6 SUMMARY**

The Project changes have not added or removed any predicted changes to the environment directly linked, or necessarily incidental to federal decisions that would allow the Project to proceed. Those changes to the environment previously identified in the EIS remain valid, but the Project changes may avoid, modify or adjust the severity of predicted effects. Each relevant VC section in the EIS Addendum provides an updated effects assessment which takes the Project changes into consideration.