

PACIFIC NORTHWEST LNG - ADDENDUM TO THE ENVIRONMENTAL IMPACT STATEMENT

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15.0 NAVIGATION AND MARINE RESOURCES

The assessment of potential effects of the Project on Navigation and Marine Resource Use was provided in Section 15 of the EIS. This section of the EIS Addendum provides:

- An update to the potential project and cumulative effects on the Navigation and Marine Resource Use VC as a result of the project changes, including effects of the Project on air navigation
- Responses to requests for additional information from the federal government (August 14, 2014 and September 11, 2014)
- An updated list of all mitigation measures for the Navigation and Marine Resource Use VC
- Conclusions on the assessment of effects on the Navigation and Marine Resource Use VC, taking into account project changes and the requested additional information.

Table 15-1 lists the documents applicable to Navigation and Marine Resource Use submitted by PNW LNG as part of the environmental assessment process to date and identifies if information is either *updated EIS Addendum*, *superseded*, *not relevant*, or *not affected* by information in the EIS Addendum. The following sections of the EIS Addendum contain information that updates the documents classified as *updated by EIS Addendum* in Table 15-1. Figure 15-1 to Figure 15-13 have been updated from those provided in the EIS to reflect the project changes and any other applicable updates.

Table 15-1 Status of Previously Submitted Documents

Document Name	Status
Section 15 of the EIS (February 2014)	Updated by EIS Addendum
Technical Memorandum: Marine Infrastructure – Low Resolution Figure (June 2014)	Updated by EIS Addendum
Technical Memorandum: Marine Safety Zones (June 2014)	Updated by EIS Addendum
Technical Memorandum: Clearance Heights of Infrastructure (June 2014)	Not affected
Technical Memorandum: Marine Traffic and Congestion (June 2014)	Updated by EIS Addendum
Responses to the Working Group (June 2014)	Updated by EIS Addendum

15.1 PROJECT EFFECTS ASSESSMENT UPDATE

15.1.1 Baseline Conditions

The baseline conditions described in the EIS were derived from publicly- available literature, stakeholder consultation, and data obtained from the Prince Rupert Port Authority (PRPA), including vessel tracking camera data. Baseline conditions cover a description of: navigational channels, aids, and refuge sites; marine infrastructure; traffic within the PRPA boundaries; commercial, recreational and aboriginal fisheries; other marine industries; and parks and recreational sites. With respect to those conditions described, all still apply to the marine terminal design mitigation. The design mitigation results in the relocation of the marine terminal berth by about

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510 m from the location described in the EIS; however, the Navigation and Marine Resource Use baseline conditions at the new location are similar to those originally presented in the EIS.

15.1.2 Effects Assessment

15.1.2.1 Interference with Navigation

As stated in Section 15.5.3 of the EIS, vessel traffic will increase in the local assessment area (LAA) during construction of the liquefied natural gas (LNG) facility, the marine terminal and supporting infrastructure. Support vessels (e.g., cranes, tug boats, drill rig, vibro-hammer, excavators and dredgers) will be required during construction for pile driving, dredging and disposal of dredge material in addition to construction support vessels that will be delivering material to the materials off-loading facility (MOF). The marine work sites for construction of the MOF, marine terminal, and the access bridge to Lelu Island from the mainland, will be highly localized with limited safety zones (50 m) and are located outside of normal shipping channels.

Construction of the marine terminal outlined in the EIS involved dredging of approximately 7 million m³ of material over an area of 84.6 ha which would affect navigation during the construction phase due to the presence of dredging equipment and vessel traffic from moving dredged material to the disposal site. Dredging and disposal at sea was planned to occur for over two years. The marine terminal design mitigation eliminates dredging at the marine terminal berth and therefore reduces effects of construction related traffic associated with dredging from approximately 27 months to approximately 6 months (for the MOF only).

Most of the navigational concerns for the Project are related to the marine structures, including the marine terminal (comprised of the jetty, suspension bridge, trestle, and berth), which would extend 2.7 km from Lelu Island, and a two lane access bridge between the mainland and Lelu Island. A particular concern is the ability to be able to transit underneath the marine terminal. Sufficient clearance (11.3 m above highest high-water [HHW]) for existing marine traffic will be provided beneath a portion of the suspension bridge to maintain navigation for fishing vessels (including gillnetters). Most vessels will be able to continue to travel from Port Edward into Chatham Sound, and access areas of Flora Bank and Kitson Island. The Project will increase commercial traffic by a maximum of two LNG carriers per day (one inbound and one outbound) at full build out; LNG carrier traffic is not expected to interfere with navigation.

Residual effects related to interference with navigation are summarized in Table 15-3.

Potential effects of the marine terminal design mitigation are similar to those reported in the EIS and subsequent technical memorandums. The marine terminal design mitigation is not expected to result in a material change to the assessment of residual effects for the construction, operations, and decommissioning phases of the Project and does not change the characterization of residual effects (i.e., context, magnitude, extent, duration, frequency, reversibility). There is a high-level of confidence that any impairment to navigation is not expected to be permanent and non-permitted in areas of high importance; therefore, the effects are anticipated to remain not significant.

Most vessels will be able to continue navigating across Flora Bank and into Porpoise Channel underneath a portion of the suspension bridge after the terminal has been constructed. There will be less construction related traffic due to less dredging. The marine terminal design mitigation presents no material change to navigation.

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15.1.2.2 Effects on Fishing, Recreation and Marine Resource Use

While the trestle is in an area known to support high levels of crabbing and fishing, any safety or exclusion zones that may be established represent a very small percentage of the overall area available to commercial, recreational and food, societal and ceremonial fishers. The marine safety zone of 50-100m in the immediate vicinity of the LNG carriers and all marine structures carrying LNG loading lines would restrict fishing activities in approximately 84 ha of the existing fishing area over Flora and Agnew Banks (Figure 15-7). Effects on the fishing areas that might be impacted by the Project are described in Information Request #9. Marine safety zones will affect a total of 0.35% of the total area used for commercial salmon net fisheries within the Fisheries Management Area 4 – Pacific Region, Smith Island subarea 4-12 for salmon (subarea 4-12), and are unlikely to reduce the overall catch amount. The potential marine safety zone within Flora and Agnew Banks is not within the most prominent commercial fishing areas within the Smith Island subarea 4-12. The safety zones will also affect 5.2% of the humpback and pink shrimp trap and Dungeness crab trap fishing area within statistical area 233-186. Humpback shrimp trap fishery takes place in nearshore waters between depths of 40 to 100 m (DFO 2013d). Please refer to the response to IR#9 below (Section 15.3.2) for additional detail.

The reduction of approximately 7 million cubic metres of dredge material at the marine terminal berth also reduces potential effects on marine resources such as crabs, shrimps and fish. The population viability of fish species will not be affected by project activities, nor are residual effects on fish habitat expected (see Section 13, Marine Resources); therefore, a decline in the quality of fisheries (commercial, recreational, and aboriginal) is not expected.

Residual effects related to marine resource use are summarized in Table 15-3. Potential effects of the marine terminal design mitigation are similar to those reported in the EIS and subsequent technical memorandums.

The context remains a moderate level of disturbance; the extent of effects is limited to the LAA and effects are considered to be reversible. During the construction phase, the magnitude of effects is low, the duration is medium-term, and the frequency of occurrence would be multiple-irregular events. For all other phases, the magnitude of effects are moderate, the duration would be long-term occurring continuously. The likelihood of effects in all phases would be a medium probability of occurring. There is a high level of confidence that effects are anticipated to be not significant.

The marine terminal design mitigation is not expected to result in a material change to the assessment of residual effects for the construction, operations, and decommissioning phases of the Project and does not change the characterization of residual effects (i.e., context, magnitude, extent, duration, frequency, reversibility) with the exception of confidence level (which has been increased from medium to high) related to Marine Resource Use. With less dredging occurring, there is less potential for any effects to marine resources such as crabs, shrimps and fish and therefore increased confidence that any impairment to marine resource use is not expected to be permanent and non-permitted in areas of high importance and therefore, the effects are anticipated to remain not significant.

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15.1.2.3 Interference with Air Navigation

The potential effect of interference with air navigation was identified in consideration of the marine terminal design mitigation and during review of the EIS. Interference with air navigation could potentially occur from any tall structure; for the Project this includes the two bridge towers that are part of the marine terminal design mitigation and the flare stack.

15.1.2.3.1 Potential Effects

The flare stack extends up to 181 m above ground level, and has potential for thermal effects during flaring events that extend up to 641 m above ground level. The two suspension bridge towers associated with the marine terminal design mitigation extend 140 m (460 feet) above sea level. Aircraft operate in the vicinity of the Project, associated with three bases:

- Prince Rupert Airport:
 - Approximately 7 nm (13 km) northwest of the bridge
 - Approximately 8 nm (15 km) northwest of the flare stack
- Digby Island Seaplane Base:
 - Approximately 8 nm (15 km) north of the bridge
 - Approximately 8.4 nm (16 km) north of the flare stack
- Seal Cove Seaplane Base:
 - Approximately 9 nm (17 km) north of the bridge
 - Approximately 8 nm (15 km) north of the flare stack.

The single runway at Prince Rupert Airport is aligned such that aircraft approaching from or departing to the southeast could fly over the marine terminal (see Figure 15-21). However, the obstacle limitation surface for the airport extends 3,000 m from the end of the runway, has a 2.5 degree angle of inclination, and widens at a 15 degree angle laterally from either side of the runway (pers. comm. Richard Reed, Prince Rupert Airport Manager). The flare stack and bridge are more than 10 km from the end of the runway, therefore, they are well outside the obstacle limitation surface for the airport and vertical separation distances will be sufficient. Because the flare stack is over 10 km from the runway and has sufficient separation distance, thermal radiation during emergency flaring events is also not expected to adversely affect civil aviation associated with Prince Rupert Airport.

Seaplanes using the Digby Island or Seal Cove bases reach cruising altitudes (typically 200 to 500 feet above sea level (asl) [60 to 150 m]) shortly after take-off and well before reaching the jetty and bridge. Discussions with local seaplane operators (Inland Air Charters Ltd.; Ocean Pacific Air) indicate that aircraft flying under visual flight rules (VFR) currently use the airspace in the vicinity of Lelu Island (e.g., to and from Porcher Island and along Inverness Passage; South Corridor VFR Route), including over the jetty (Figure 15-21). However, both operators indicated that with updated navigational charts, proper marking and lighting, and distribution of NOTAMs (notices to airmen), the bridge or flare stack would not adversely affect their operations. Pilots would avoid the bridge and flare stack as they would any other obstacle.

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15.1.2.3.2 Mitigation

Transport Canada is responsible for developing safety standards, policies, and criteria for obstacle limitation surfaces in the vicinity of airports. Transport Canada also issues marking guidelines, the Standards Obstruction Markings Manual (Standard 621.19), for structures that are considered obstructions under the *Canadian Aviation Requirements*. Although compliance to the Standards Obstruction Markings is generally voluntary, a proponent may be ordered by the minister to mark a structure deemed to be hazardous to aviation safety because of its height and location. During the detailed design phase of the Project, the “Aeronautical Assessment Form for Obstruction Marking and Lighting” will be submitted to Transport Canada for an Aeronautical Obstruction Clearance assessment of the bridge and flare stack.

The bridge and flare stack will be marked or lit according to Standard 621.19 of the *Canadian Aviation Requirements*. PNW LNG will ensure that all regulatory requirements with respect to aviation safety are met. This will include revisions to aeronautical charts to identify the location and height of the bridge towers and flare stack, and the use of marking or lighting on the bridge, towers and flare stack as prescribed in Standard 621.19 of the *Canadian Aviation Requirements*.

15.1.2.3.3 Characterization of Residual Effects

The Project is expected to have no effects on air navigation associated with Prince Rupert Airport. Effects on air navigation associated with the sea plane bases are expected to occur with a highly resilient context, be low in magnitude, restricted to the project development area (PDA), long term in duration, and occur continuously. Effects are potentially reversible, if the bridge towers and flare stack are dismantled during decommissioning.

15.1.2.3.4 Likelihood

Effects on air navigation are expected to be highly likely to occur.

15.1.2.3.5 Determination of Significance

Because of the low magnitude of potential effects on air navigation, and planned mitigation measures, the Project is not expected to result in a permanent, non-permitted impairment to navigation. Thus, residual effects are expected to be not significant.

15.1.2.3.6 Confidence and Risk

Based on input from the operators of the sea plane bases, confidence in the assessment of effects on air navigation is high. Since the confidence in this prediction is not low, no additional risk analysis has been conducted.

15.1.2.4 Summary of Residual Effects for Navigation and Marine Resource Use

Changes to the information presented in Table 15-3 (compared to Table 15-11 of the EIS) are identified with underlined text. An updated mitigation list is provided in Section 15.4.2 below.

The change in location of the accommodation camp will have no effect on Navigation and Marine Resource Use as workers are expected to be transported via road.

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15.2 CUMULATIVE EFFECTS ASSESSMENT UPDATE

The cumulative effects assessment provided in the EIS was reviewed with respect to the project changes, the potential cumulative effects from the change in location of the accommodation camp, and additional information requests related specifically to the cumulative effects assessment.

The marine terminal design mitigation presents no material change to navigation. It is therefore likely that there will be no material change in the residual cumulative effects for the construction, operations, and decommissioning phases of the Project except for the reduction in navigation conflict related to dredging traffic. Cumulative effects related to Navigation and Marine Resource Use include a context with a low level of disturbance; are moderate in magnitude; are limited in extent to the LAA, long-term in duration, are reversible; continuous frequency; and medium probability of occurrence. Cumulative effects are expected to be not significant with a high level of confidence. The potential change in interference with navigation does not change the characterization of cumulative effects (i.e., context, magnitude, extent, duration, frequency, reversibility) or the significance of those effects (i.e., not significant).

The marine terminal design mitigation presents no material change to marine resource use. It is therefore likely that there will be no material change in the residual cumulative effects for the construction, operations, and decommissioning phases of the Project with the exception of confidence levels. With less dredging occurring and potentially less effects on marine resources, there is greater confidence that residual effects are not significant. Cumulative effects related to navigation would represent a context with a low level of disturbance; are moderate in magnitude; are limited in extent to the LAA, long-term in duration, are reversible; continuous frequency; and medium probability of occurrence. Cumulative effects are expected to be not significant with a high level of confidence. The potential change in effects to Navigation does not change the characterization of cumulative effects (i.e., context, magnitude, extent, duration, frequency, reversibility) or the significance of those effects (i.e., not significant) with the exception of confidence levels (change from medium to high).

The marine terminal design mitigation does present a material change to air navigation. However, residual effects on air navigation from both the marine terminal design mitigation (potential interactions with the suspension bridge) and from the flare stack are expected to be not significant with the presented mitigation measures. Cumulative effects on air navigation could occur from a flare stack at the proposed Prince Rupert LNG facility. Effects from this facility are expected to be mitigated in the same manner as for the Project. Overall, residual cumulative effects on air navigation occur within a highly resilient context. Magnitude of effects is expected to be low (with the presented mitigations). Effects will extend through the regional assessment area (RAA), will be long-term in duration, reversible if infrastructure is dismantled, and occur continuously. There is a high likelihood that effects will occur, but because the Project is not expected to result in a permanent, non-permitted impairment to navigation, residual cumulative effects on air navigation are expected to be not significant. The confidence in this prediction is high.

Changes in the construction schedule for the Project have not affected the outcome of the cumulative effects assessment for the Navigation and Marine Resource Use VC. Peak period of construction would be limited to a fairly short duration of approximately 6 months and vessel traffic will be managed by the PRPA. In the previous

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design, the peak period of construction would have also been 6 months; however the amount of construction within that period is now diminished.

15.3 RESPONSES TO THE OUTSTANDING INFORMATION REQUESTS

15.3.1 Information Requests #1 and #2

15.3.1.1 Government of Canada - Outstanding Information:

Transport Canada: *The Technical Memo on Sediment Transport into the Project Development Area from the Skeena River provides a preliminary description of the extent and spatial distribution of the surface expression of the sediment plume from the Skeena River but there is still a gap in terms of the impacts on sediment transport from the placement of the trestle (through scouring and sedimentation) and the resulting impacts including impacts to navigation. (see Marine Resource IR #36).*

Please provide the updated scouring and sedimentation modelling and assess any effects to navigation that may result.

Transport Canada: *While the impacts of maintenance dredging would be less than during construction, the amount of resulting marine traffic would depend on the barge trips and type of dredging to be done. Considering that the request for information about expected duration, timing and volume of maintenance dredging remains outstanding (see Marine Resources IR # 10), it is unclear how the proponent can predict that the impacts on navigation from maintenance dredging would be negligible. Please explain how the conclusion was reached that the impact on navigation from maintenance dredging would be negligible if the information on the volumes and equipment expected for maintenance dredging is not yet known.*

15.3.1.2 Response

Modelling results indicate that the majority of the MOF dredge pocket area is predicted to have sedimentation rates less than 0.5 cm/year, with a small area (<100 m²) having sedimentation rates around 2 cm/year. As a result, PNW LNG does not anticipate the need for regular or cyclical maintenance dredging in the MOF. Thus, no effects on navigation from maintenance dredging are predicted.

Horizontal scour width throughout the trestle structure at equilibrium state is estimated to be 1.25 m. Scour protection will consist of two layers of quarried riprap 0.8 m thick at individual pile locations. This scour protection will not extend into navigation channels, and will not affect navigation.

Scour protection at the southwest tower and at the southwest anchor block will extend 15 m and 30 m respectively from each base. The scour protection will not extend beyond the safety zones for the marine terminal (50 to 100 m), and will therefore have no additional effect on navigation.

Hydrodynamic modelling and sedimentation analysis were conducted using Coastal Modeling System Flow and Particle Tracking Model developed by the U.S. Army Corps of Engineers. Results showed that suspended sediments coming from the Skeena River were transported towards Lelu Island and the LNG terminal site. Sediments

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deposited in the shallower areas around the LNG terminal are the main source of sediments that can be affected after construction of the trestle, southwest anchor block, and southwest tower.

Additional sediment deposition is predicted around the proposed southwest anchor block and southwest tower associated with reduced tidal current velocities near these structures. Approximately 5 to 10 cm/ yr of sediment is expected to be deposited within 50 m of the tower and anchor block and is not expected to be deposited onto shallower eelgrass areas of Flora Bank. The potential deposition area around the trestle does not extend under the proposed suspension bridge span or into navigation channels and is not expected to affect navigation. No effects on navigation are expected.

See Appendix G-18 (Potential Impacts of the Marine Structures on the Hydrodynamics and Sedimentation Patterns) for additional information.

15.3.2 Navigation and Marine Resource Use Information Request #6

15.3.2.1 Government of Canada - Outstanding Information

TC: The definition of spatial boundaries for the assessment of the effects of the Project on navigation was based on the location of marine resources, assuming that the only reason for navigating in/through the Project area is to access marine resources. However, there may be other reasons for navigating in/through the Project area besides marine resource use, such as access to spiritual and cultural sites, spiritual practices and other current uses of lands and resources for traditional purposes not associated with marine resources. Based on information collected through existing and ongoing Traditional Knowledge/Traditional Use studies explain how the proponent would account for these potential other navigational uses with respect to the definition of spatial boundaries and assess the impacts of the Project on these navigational uses. Refer to the deficiencies identified for Aboriginal Issues IR #2 and IR #3.

15.3.2.2 Response

The spatial boundaries for the Navigation and Marine Resource Use VC were established based on consideration of potential effects from project related infrastructure and shipping on both navigation and marine resource use. When defining these spatial boundaries, no assumptions were made regarding the reasons for navigating through or around the PDA or LAA/RAA. It is recognized that there are numerous potential reasons for navigating through the area, including commercial, recreational, traditional and other personal uses.

Data collected by the PRPA over a 12 month period (and presented in Section 15 of the EIS) confirms that areas of high traffic adjacent to Lelu Island (Porpoise Channel, Flora Bank and Lelu Slough) include a variety of marine vessels (i.e., recreational boats, fishing vessels, and commercial vessels). All of these users, including those that may be accessing the area for traditional purposes, would be affected by potential effects of the Project on Navigation and Marine Resource Use.

Since submission of the EIS, PNW LNG received four project specific Traditional Use Study (TUS) reports from First Nations that provided spatial information on sites currently used for traditional purposes including spiritual and culturally practices, within the Prince Rupert Harbour Area.

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These studies include:

- Metlakatla First Nation Traditional Land Use and Ecological Knowledge of the Proposed Pacific NorthWest LNG Project (Metlakatla report)
- The Gitxaala Use Study, Prepared for Port Edward Area LNG Projects (Gitxaala Use Study)
- Kitselas First Nation TUS Analysis: The North Coast Territories—Lelu Island (Kitselas Report)
- Kitsumkalum TUS Interim Report for Pacific Northwest and the Kitsumkalum Traditional Use Effects Matrix
- The Gitga’at First Nation Traditional Use and Occupancy Study. Prince Rupert Region. Preliminary Results Report (Gitga’at Preliminary Report).

The TUS reports indicate that sites currently accessed for traditional uses often involve more than one specific use. While a variety of identified sites occur within the LAA/RAA, two important areas outside of the LAA/RAA were also identified: Metlakatla Pass and the west side of Stephens Island.

The TUS reports demonstrate that First Nations navigate through the PDA and LAA/RAA for a variety of reasons in addition to marine resource harvesting. Navigation routes through the PDA and LAA/RAA used to access these sites are used to access sites with terrestrial resources (berry/plant gathering, hunting and trapping, gardening, resource material sites); access ceremonial, spiritual and sacred areas (burial sites, medicinal/therapeutic sites, storied places); and access traditional places and routes (temporary or permanent dwelling sites, preparation sites, teaching areas, manufacturing areas, trading places, trails and hereditary territories). In the absence of information specific to navigation routes, PNW LNG has included the location of these sites as a means of extrapolating travel routes around these locations. Figure 15-14 represents marine navigation routes that were either identified directly in the reports provided to PNW LNG, or extrapolated from this information. However, PNW LNG understands that travel happens throughout the LAA/RAA, and as is not limited to the areas identified. The applicable contents of the TUS reports are summarized below.

Metlakatla Report

The Metlakatla report provides detailed ethnographic and ethnohistoric information. It also provides detailed descriptions of marine and terrestrial use (Metlakatla Report, Figure 14). Navigation routes through the PDA and LAA/RAA surround identified areas of interest, including:

- West of Lelu Island and Northwest to Triple Island Pilotage
- Around Tree Knob Island Groups and Lucy islands
- Inverness Pass, Flora Bank, Skeena Slough and surrounding areas
- The Skeena and Nass rivers and surrounding land and water areas
- Chatham Sound in general.

Concerns about these navigation routes are:

- Disruption of access for fishing on the potential shipping routes (Lelu Island and Northwest to Triple Island)
- Increased traffic transportation route (canoe route) may affect access to intertidal campsites, cabins, and gathering activities (Tree Knob Island Groups and Lucy Islands)

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- Project activities on and around Lelu Island may affect access to nearby navigation areas (Inverness Pass, Flora Bank, Skeena Slough)
- Transportation area in Chatham Sound is over an important resource fishing area
- Sacred areas, cultural activities and archaeology sites (primarily in the area closer to the Skeena and Nass rivers and surrounding land and water areas).

Gitxaala Use Study

The Gitxaala Use Study describes traditional habits of travel throughout their territories on a seasonal round defined by smaller summer group activities and larger winter village gatherings. The Gitxaala report that there are many places throughout the study area that link them with their past and define who they are (Gitxaala Use Study Figures 3-1, 4-1 through 4-11). Navigation routes through the PDA and LAA/RAA include:

- Around Prince Rupert
- Along the west side of Kaien Island
- Both sides of Lelu and Ridley islands
- Porpoise Channel
- Around Dolphin Island
- Both sides of Smith Island.

These navigation routes are used to access:

- Sacred Places and Cultural Areas (e.g., Kaien, Ridley, Digby, Lelu, Smith and Porcher islands), including:
 - Storied places
 - Named places and hereditary territories
 - Burial sites
 - Teaching areas
- Settlement sites, camps/moorings (e.g., Lelu Slough, Kaien and Kitson Islands)
- Gathering areas for berries, plants, trees, wood, bark, driftwood (e.g., Lelu, Ridley, Kaien, and Stephens islands)
- Trading places (e.g., Kaien Island)
- Hunting sites for land animals and birds (e.g., Ridley, Kaien, Porcher, Philips and Stephens Island, and shorelines long the Skeena River, Porpoise Channel, and Porcher Inlet).

Kitselas Report

The Kitselas Report contains information in the form of interview transcripts and ethnohistoric information on use. Some geographic information was available through the provided interviews, but it was not spatially referenced in the report. Navigation routes through the PDA and LAA/RAA are anticipated to surround identified areas of interest, including:

- In and around Smith Island, Digby Island and Kaien Island
- Around Lucy Island and along the along the LNG carrier routes
- The north and south end of Stephens Island
- Routes across to Smith Island.

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These navigation routes are used for:

- Harvesting of herring (north end of Digby Island)
- Commercial fishing in the transportation route, and Lucy Islands
- Harvesting in and around Smith Island, Digby Island and Kaien Island
- Harvesting of seaweed and herring at the north and south end of Stephens Island
- Access for deer hunting across from Smith Island.

Kitsumkalum Traditional Use Study Interim Report for Pacific Northwest and the Kitsumkalum Traditional Use Effects Matrix

The Kitsumkalum Traditional Use Effects Matrix describes traditional uses within the LAA and RAA. These include but are not limited to:

- Food Security
- Fishing
- Hunting and Trapping
- Traditional Logging
- Gathering - Berries
- Gathering – Food and Medicines.

The report and Effects Matrix did not provide site specific information regarding TUS sites throughout the LAA, however it does list specific areas of concerns regarding the impact of development in general and the Project as they relate to travel corridors; harvesting and cultural sites; and the displacement of traditional and recreational users from around Lelu Island.

Gitga'at Preliminary Report

The Gitga'at Preliminary Report identifies a number of navigational uses for the waters of the project area beyond marine resource harvesting. The Report lists various site types where spiritual and cultural sites as well as non-marine resources were accessed through the waters within the project area. The Elders and Knowledge Holders have reminded the LNG developers that these sites do not exist in isolation, but are part of the cultural fabric that defines the First Nations who have travelled the waters of Chatham Sound.

Navigation routes through the PDA and LAA/RAA surround identified Traditional use and occupancy sites identified in this preliminary report, including:

- Berry/plant gathering
- Burial areas
- Ceremonial/sacred areas
- Conflict (defensive sites, battlegrounds)
- Dwelling sites (villages, houses, temporary cabins, resting places, lean-tos, campsites)
- Gardening sites

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- Hunting areas (land animals, birds)
- Manufacturing areas (bark stripping and canoe blanks)
- Medicinal/therapeutic sites (Devil's Club, hot springs)
- Named places
- Preparation sites: where resources were prepared (smokehouses, drying racks)
- Resource material sites (ochre, boiling stones)
- Trading (locations where people gathered to trade eulachon, moose meat, etc.)
- Traditional history areas (locations of historic or pre-contact events)
- Trails, blazes
- Travel (canoe or boat routes used for transportation)
- Trapping (areas where fur bearing animals could be accessed)
- Water supply (locations where good drinking water were gathered).

The report provides three different mapped areas, detailing "traditional use sites". No specific information on the types of sites was provided (Gitga'at Preliminary Report Figures 1-3). Three different topics (habitation sites, resource harvesting areas and culture history sites) had locations associated with them. These included:

- Habitation Sites
 - The earliest documented habitation site at the mouth of the Ecstall River
- Sites on the west side of Kaien Island (Casey Point, Hays and Wolf creeks)
 - The north shore of Inverness Passage
 - Porcher Island (Humpback Bay and Island Point)
 - The north end of Porcher Island (Squaderie)
- The North west end of Pitt Island (Alpha Bay)
- Resource Harvesting Areas
 - Prince Rupert harbor (Hays and McNichol creeks)
 - Silver Creek in Tuck Inlet
 - Wolf Creek in Port Edward
 - Marcus, Telegraph, Arthur, and Malacca Passages
 - Porcher, Kaien, Ridley, Lelu, Digby, Smith and Stephens islands
 - The Tree Knob Group
 - Casey Point
 - The mouth of the Skeena River
- Culture History Sites
 - Mouth of the Ecstall River and Tyee
 - Hays Creek and Casey Point.

Summary

A review of the TUS reports noted above indicate fishing, hunting and gathering are the primary traditional use activities potentially directly affected by project related marine activities. The TUS reports indicate that navigation routes are currently used to access a variety of traditional use sites, and marine resource gathering sites can contain teaching locations or campsites, while important cultural sites may also be located nearby travel routes or

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important harvesting locations. While a variety of identified sites occur within the LAA/RAA, two important areas outside of the LAA/RAA were also identified. These include the west side of Stephens island and Metlakatla Pass. However, any project related effects on navigation to and from these locations would be captured by the current LAA/RAA.

PNW LNG has developed a series of mitigation measures to avoid or reduce potential project effects on navigation and marine resource use, including traditional use. The key mitigation for potential effects to navigation is providing a minimum of 11m clearance (above HHW) beneath the bridge to Lelu Island and a portion of the suspension bridge which would allow continued navigation for small vessels to and from Porpoise Channel across Flora Bank.

Additional mitigation measures include:

- Implement a Marine Communications Plan
- Establish safety zones during construction
- Design lighting to reduce stray lighting, subject to safety
- Install navigational aids
- Update navigational charts
- Use of escort vessels for LNG carriers to confirm the route is clear and that other vessels do not intrude in safety zones
- Use of tugs for the safe transit and docking of LNG carriers
- Establish limits on environmental conditions under which LNG shipping operations can be conducted safely (visibility, sea state, wind)
- Assess traffic management and routing options to determine if de-confliction of LNG carrier routes is necessary for small craft.

Operations will be conducted in compliance with the Navigation Protection Act approval conditions and follow all PRPA and Pacific Pilotage Authority procedures (including mandatory piloting, speed limits, and safety/exclusion zones). Project related shipping will also be conducted in accordance with the *Canada Shipping Act* and in compliance with the requirements of the Canadian Coast Guard (CCG).

By implementing this collection of mitigation measures, PNW LNG is confident that any project related effects to navigation will be addressed for all marine users, including traditional use. The current spatial boundaries for the LAA/RAA are sufficiently broad to capture the interactions between the Project and various navigational uses, whether the uses are for commercial, recreational, traditional or other purposes.

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15.3.3 Navigation and Marine Resource Use Information Request #9

15.3.3.1 Government of Canada - Outstanding Information

DFO: *The proponent indicates that 0.1% of available fishing area will be impacted by the Project. This percentage assumes that access to suitable fishing locations is evenly distributed throughout the LAA. This is not the case. The area in and around the PDA experiences greater fishing effort for Dungeness crab, shrimp and Salmon net fisheries due to the high concentration of fish and the ease of access. To accurately assess impacts on commercial, recreational and aboriginal fisheries the proponent must study where fishing activity is occurring and the effort associated with it. In addition, the proponent only reported on the impacts associated with the physical trestle and marine berth. The proponent must consider how construction activities will impact commercial, recreational and Aboriginal fisheries and how vessel maneuvering in and out of the berthing area will impact fishing opportunities. This information is necessary for a fulsome understanding of impacts to commercial, recreational and Aboriginal fishing activity. Present this information.*

15.3.3.2 Government of Canada – Elaboration on Outstanding Information

When assessing impacts to commercial, recreational and Aboriginal fisheries, consider the impacts of all marine traffic associated with the Project for the construction, operation and decommissioning phases.

15.3.3.3 Response

15.3.3.3.1 Marine Fisheries

Salmon

The marine resources LAA and regional assessment area is situated in Fisheries Management Area 4 – Pacific Region (DFO 2013a). Of the three salmon net fisheries (i.e., gill, seine, and troll), only two of the fisheries (gill and seine) occur within the RAA according to local ecological knowledge (Figure 15-7). The marine terminal is within Fisheries Management Area 4 – Pacific Region, Smith Island subarea 4-12 for salmon (DFO 2013a). The salmon net fishing area within subarea 4-12 covers approximately 24,149 ha and is considered a high effort salmon net fishing based on the number of boat days within the region (Figure 15-15). The marine safety zone of 50-100m in the immediate vicinity of LNG carriers and all marine structures carrying LNG loading lines would restrict fishing activities in approximately 84 ha of the existing fishing area over Flora and Agnew Banks (Figure 15-7). This represents approximately 0.35% of the total area used for commercial salmon net fisheries in the Smith-Island subarea 4-12 (Figure 15-15). The restriction of approximately 84 ha of fishing area on Flora and Agnew Banks will not limit the fishing effort (number of boat days) or available salmon quota within subarea 4-12, nor will it substantially alter traffic patterns of fishers in the area; therefore, it is unlikely that the Catch per Unit Effort (CPUE) of salmon net fisheries will be impacted by this restriction to the fishing area.

Salmon gillnetters are likely the most prominent commercial salmon fishers in the PDA because, unlike seiners and trollers who fish in deeper waters and not within the PDA according to the local ecological knowledge (Figure 15-7), gillnetters generally fish near coastal rivers and inlets (DFO 2013b). Furthermore, the area that would potentially be restricted to salmon net fishers is not an ideal area for fishing with this type of gear. The terminal portion over Agnew is very shallow so is unlikely to be deep enough for gill netting. These factors can make setting

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a gill net difficult, or impossible, and make achieving appropriate soak times for catching salmon a challenge. Therefore, the potential marine safety zone within Flora and Agnew Banks is not within the most prominent commercial fishing areas within the Smith Island subarea 4-12.

Dungeness Crab

The marine terminal, including the marine safety zone, is located within the Dungeness crab fishing statistical area designated by DFO as 233-186 (Figure 15-16). This area covers 1,600 ha and is considered a medium-yield catch area for Dungeness crab based on annual landings data (Figure 15-16). The majority of the habitat within the marine terminal PDA is shallower water with a soft bottom (mud, silt or sand), which are typical habitats that adult Dungeness crabs inhabit (DFO 2013c). Therefore, crab-by-trap fishing effort is expected to be high in this region. Crab traps were observed in the area of the potential marine terminal during field studies, with local fishers reporting to set crab traps within the area. The potential marine safety zone around the terminal trestle and berth restricts the Dungeness crab fisheries in approximately 84 ha of fishing area over Flora and Agnew Banks. This represents approximately 5.2% of the total available fishing area within the statistical area of 233-186 (Figure 15-16). However, the Dungeness crab stock within and adjacent to the potential marine safety zone would still be accessible through local trapping efforts, since male Dungeness crabs are highly mobile. They have been known to travel up to 7 km within their home range to forage (Stone and O'Clair 2001) and may move into traps set adjacent to the safety zone. In the winter, adult male and female crabs generally move into deeper waters and become highly sedentary, they then move into shallower waters in the spring and summer (Stone and O'Clair 2001). Crab landings are typically larger in July and August, with about half of the annual Dungeness crab landing occurring in those months (DFO 2013c). If fishers in the area relocated their traps to areas adjacent to the marine safety zone, it is likely that crabs within the area will relocate to those traps. If the crab fish effort remains at the same level with relocated traps, the CPUE of the various Crab-by-trap fisheries is unlikely to be significantly impacted.

Humpback and Pink Shrimp

The marine terminal trestle and berth are within the shrimp fishing statistical area designated by DFO as 233-186 (Figure 15-17 and Figure 15-18). This area covers 1,600 ha and is considered a low-yield catch area for humpback shrimp (traps) (Figure 15-17) and a medium-yield catch area for pink shrimp (otter trawls) (Figure 15-18) based on annual landing data. The potential marine safety zone around the terminal trestle and berth will restrict humpback shrimp trap and pink shrimp trawl fisheries in approximately 84 ha of fishing area over Flora and Agnew Banks. This represents approximately 5.2% of the total fishing area within the statistical area 233-186 (Figure 15-17 and Figure 15-18).

Pandalid shrimp species occupy a variety of habitats from rocky to mud bottoms and in depths from intertidal to greater than 1,300 m, within both inshore and offshore areas (DFO 2014b). The marine terminal trestle and berth are situated on a soft bottom, which is considered suitable habitat for Pandalid shrimp species. However, the humpback shrimp trap fishery takes place in nearshore waters between depths of 40 to 100 m (DFO 2013d). The area covered by the marine terminal and safety zone extends to a maximum depth of approximately 35 m (Figure 15-19 and Figure 15-20); therefore, the effects on the humpback shrimp trap fishery are expected to be minimal. The pink shrimp trawl fishery takes place in high energy, soft bottom environments with low structural complexity to reduce the amount of benthic alteration and gear entanglement (DFO 2014b). Therefore, given that the majority of habitat located within the marine safety zone is either shallow or steeply-sloping, pink shrimp trawl effort in this area is expected to be low and the effects on this fishery are expected to be minimal.

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15.3.3.3.2 Marine Traffic

At full-build out of the facility there will be an arrival and departure of one LNG carrier (and associated tugs) at the marine terminal per day. Therefore shipping would increase over baseline conditions to up to two transits per day. Vessel maneuvering will take place within 500 m of the berth. Marine safety zones of 50-100m will be in place in the immediate vicinity of the LNG carriers all marine structures carrying LNG loading lines.

Construction related traffic is expected to be related to roll-on/roll-off (RO/RO), heavy lift vessels and barge/tug combinations to transport material and equipment for facility construction. A Marine Communications Plan will be established, which will keep recreational marine and commercial users informed of any temporary restrictions due to construction. A summary of effects of project related marine traffic on fishing and navigation during construction is presented in Table 15-2.

Table 15-2 Summary of Effects on Marine Traffic on Fishing and Navigation during Construction

Marine Infrastructure	Description of Effects of Marine Traffic on Fishing and Navigation during Construction
Pioneer Dock	Construction and use of the Pioneer Dock will take place over a relatively short period of time (less than 9 months). It will be used to transport workers and equipment to Lelu Island before the bridge to the mainland is constructed. The components of the Pioneer Dock comprise a small infrastructure area and its use is not expected to affect fishing or navigation.
MOF	Construction of the MOF will require the use of vessels to conduct dredging and the use of barges to transport marine sediment to Brown Passage for disposal at sea. Use of the MOF during construction of the LNG Facility includes delivery of heavy equipment and modules using large heavy lift and roll-on/roll-off vessels as well as towed barges. At peak construction one vessel arriving and one departing per day could be expected. Use of the MOF may temporarily disrupt navigation through Porpoise Channel for short periods of time (30 minutes), but on an exceptional basis only. Most cargo deliveries will not require channel restrictions.
Marine Terminal	The marine terminal design mitigation eliminates dredging at the marine terminal berth area. This also eliminates the barge traffic associated with disposal at sea of that dredge material. Marine construction activities also include construction of the marine terminal. During this time tug and barge traffic related to construction will increase, but temporary traffic restrictions including fishing vessel activities, will only apply to the immediate vicinity of various work sites.
Bridge to Mainland from Lelu Island	Marine construction activities for the mainland bridge are expected to take approximately 14 months. Vessel traffic through Lelu Slough will be restricted for some periods during construction.

The assessment of effects on fishing, recreation and marine use in the EIS assumes a “worst case” scenario of the high volume fishing months of July and August. As presented in Table 15-9 in the EIS, about 50% of the yearly fishing and recreational traffic takes place in July and August. In the context of vessel movements in Porpoise Channel (peaking at over 3,000 per month in July 2013 and 2014), the project related vessel activity presented in Table 15-2 does not represent a substantial increase over existing traffic. The marine terminal design mitigation reduces the dredging related traffic compared to the information presented in the EIS. While there may be limited and localized exclusion of activities in areas involved in construction, and associated safety zones, users will generally be able to continue all marine activities that they are currently conducting.

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Shipping activities for the construction and operations phases of the Project will follow the existing practices and procedures of the PRPA and international regulations that promote safe and efficient shared use of the waterways. A Marine Communications Plan will be established, which will keep recreational marine and commercial users informed of any temporary restrictions due to construction.

15.4 MITIGATION

15.4.1 Changes to Mitigation Measures Presented in the EIS

Based on project changes and the feedback received during the environmental assessment process, the set of mitigation measures originally presented in the EIS to address potential effects to navigation and marine resource use has been updated. The following mitigation measures have been added to the list of mitigation measures initially included in the EIS:

- PNW LNG (and their contractor) will be required to participate in a construction coordination committee led by PRPA to address potential effects of construction on marine users within the PRPA boundaries. In addition to other PRPA tenants, commercial fishers will also be invited to participate
- Use proper marking and lighting as required by Standard 621.19 of the *Canadian Aviation Requirements* for the flare stack and the bridge
- Work with the applicable agencies to update navigational charts and distribute NOTAMs (notices to airmen).

15.4.2 Complete List of Current Mitigation Measures

All of the technically and economically-feasible mitigation measures currently being presented by PNW LNG to address potential effects to Navigation and Marine Resource Use are listed below. This includes those originally presented in the EIS that remain relevant, as well as those that have been revised or added as a result of feedback received during the environmental assessment process or as a result of the project changes. By implementing this full set of mitigation measures, PNW LNG is confident that the Project will not result in significant adverse effects to Navigation and Marine Resource Use.

Mitigation measures include provision for making vessels aware of construction activities in the PDA and safety zones (no-go areas). These measures include a Notices to Shipping and a Notices to Mariners; compliance with the *Navigable Waters Protection Act* approval conditions; taking into consideration TERMPOL study findings; and following all PRPA and Pacific Pilotage Authority (PPA) procedures (including mandatory piloting, speed limits, and safety/exclusion zones). Navigation restrictions and routing advisories will be identified and communicated to the marine community as required. Measures to reduce lighting interference with navigation and navigational aids will also be implemented; see Section 9 (Ambient Light) of the EIS which refers to mitigation to reduce stray lighting. Mitigation measures will include:

- A Marine Communications Plan will be developed, which identifies measures so that all marine traffic is made aware of any project construction activities and that details the local marine communications and project related safety procedures
- Safety zones will be established during construction which specifies “no go” areas

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- Lighting will be designed to reduce stray lighting (subject to safety requirements)
- Navigational aids will be installed on structures where required to enhance navigation safety
- Navigational charts will be updated to show the MOF and marine terminal locations
- Clearance of at least 11m will be provided beneath the Lelu Island access bridge and a portion of the marine terminal (beneath the suspension bridge) that best supports navigation to and from Porpoise Channel
- Escort vessels for the LNG carriers will be used to confirm the route is clear and safe and that other vessels do not intrude safety zones
- Tugs will be used for the safe transit and docking of LNG carriers
- Traffic management and routing options will be assessed to help small craft know which route a carrier will follow, if deemed necessary by the port and pilots based upon analysis of TERMPOL studies
- Limits on environmental conditions under which LNG shipping operations can be conducted safely (visibility, sea state, wind) will be set consistent with the results from the TERMPOL studies, consultation with pilots, and LNG terminal practices throughout the industry
- PNW LNG (and their contractor) will be required to participate in a construction coordination committee led by PRPA to address potential effects of construction on marine users within the PRPA boundaries. In addition to other PRPA tenants, commercial fishers will also be invited to participate
- Use proper marking and lighting as required by Standard 621.19 of the *Canadian Aviation Requirements* for the flare stack and the bridge
- Work with the applicable agencies to update navigational charts and distribute NOTAMs (notices to airmen).

In addition to these project specific mitigation measures PNW LNG will be required (through legislation) to:

- Provide Notices to Shipping and Notices to Mariners
- Comply with all *Navigable Waters Protection Act* approval conditions
- Follow all PRPA and PPA procedures (including mandatory piloting, speed limits, and safety/exclusion zones).

15.5 CONCLUSION

Project changes were assessed for potential effects, including cumulative effects, on navigation and marine resource use. Based on this assessment the potential adverse effects and the characterization of residual adverse effects (i.e., context, magnitude, extent, duration, frequency, reversibility) that were identified in the EIS remain valid and no changes are warranted. The determination of significance of those effects remain the same as that presented in the EIS (i.e., not significant). The substantial reduction in dredging activity has increased confidence in this prediction (see Table 15-3 and Table 15-4). The outstanding information provided in response to the Information Requests does not change the results of the assessment.

The conclusions of the assessment of effects on navigation and marine resource use do not change from those presented in the EIS. Specifically, the project related effects on navigation and marine resource use are considered not significant. Similarly, cumulative effects on navigation and marine resource use are not significant.

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Table 15-3 Characterization of Residual Effects for Navigation and Marine Resource Use

Project Phase	Mitigation/ Compensation Measures	Residual Effects Characteristics						Likelihood	Significance	Confidence	Follow-up and Monitoring
		Context	Magnitude	Extent	Duration	Reversibility	Frequency				
Interference with Navigation											
Construction	<ul style="list-style-type: none"> Implement a Marine Communications Plan Establish safety zones during construction Lighting design to reduce stray lighting Installation of navigational aids Updated navigational charts Sufficient clearance (11m above HHW) for vessels up to gillnetter size will be provided beneath the Lelu Island bridge and <u>a portion of the suspension bridge</u> Use of escort vessels to confirm the route is clear and that other vessels do not intrude safety zones Tugs will be used for the safe transit and docking of LNG carriers Limits on environmental conditions under which operations can be conducted safely will be set Traffic management and routing options will be assessed to determine if de-confliction of LNG carrier routes is necessary for small craft <u>Participate in a construction coordination committee led by PRPA to address potential effects of construction on marine users within the PRPA boundaries. In addition to other PRPA tenants, commercial fishers will also be invited to participate.</u> 	L	M	LAA	M	R	MI	M	N	H	None
Operations		L	M	LAA	L	R	C				
Decommissioning and Abandonment		L	M	LAA	L	R	C				
Residual effects for all phases		L	M	LAA	L	R	C				
Effects on Fishing, Public Recreation and Marine Use											
Construction	<ul style="list-style-type: none"> Implement a Marine Communications Plan Sufficient clearance (11m above HHW) for vessels up to gillnetter size will be provided beneath the Lelu Island bridge and <u>a portion of the suspension bridge</u> Effects related to navigation (see Section 15.5.2.2 of the EIS) will be mitigated Other effects related to marine resources will be mitigated (see Section 13 and Appendix A - Marine Resources) <u>Participate in a construction coordination committee led by PRPA to address potential effects of construction on marine users within the PRPA boundaries. In addition to other PRPA tenants, commercial fishers will also be invited to participate.</u> 	M	L	LAA	M	R	MI	M	N	H	None
Operations		M	M	LAA	L	R	C				
Decommissioning		M	M	LAA	L	R	C				
Residual effects for all phases		M	M	LAA	L	R	C				
Interference with Air Navigation											
Construction	<ul style="list-style-type: none"> <u>Use proper marking and lighting as required by Standard 621.19 of the Canadian Aviation Requirements for the flare stack and the bridge</u> <u>Work with the applicable agencies to update navigational charts and distribute NOTAMs (notices to airmen).</u> 	H	L	PDA	L	R	C	H	N	H	None
Operations		H	L	PDA	L	R	C				
Decommissioning		N/A	N/A	N/A	N/A	N/A	N/A				
Residual effects for all phases		H	L	PDA	L	R	C				

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<p>KEY</p> <p>CONTEXT: N = negligible level of disturbance L = low level of disturbance M = moderate level of disturbance H = high level of disturbance</p> <p>MAGNITUDE: N = Negligible L = Low M = Moderate H = High</p>	<p>EXTENT: PDA—effects are restricted to the PDA LAA—effects extend into the LAA RAA—effects extend into the RAA</p> <p>DURATION: S = Short-term M = Medium-term L = Long-term</p> <p>REVERSIBILITY: R = Reversible I = Irreversible</p>	<p>FREQUENCY: S = Single event—effect occurs once MI = Multiple irregular event (no set schedule)— MR = Multiple regular event – effect occurs on a regular basis and at regular intervals throughout the Project C = Continuous—effect occurs continuously</p> <p>LIKELIHOOD OF RESIDUAL EFFECT OCCURRING : Based on professional judgment L = Low probability of occurrence M = Medium probability of occurrence H = High probability of occurrence</p>	<p>SIGNIFICANCE: S = Significant N = Not Significant</p> <p>CONFIDENCE AND RISK: Based on scientific information and statistical analysis, professional judgment and effectiveness of mitigation, and assumptions made. L = Low level of confidence M = Moderate level of confidence H = High level of confidence</p> <p>Note: N/A – not applicable</p>
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Table 15-4 Summary of Cumulative Residual Environmental Effects Navigation and Marine Resource Use

Cumulative Environmental Effect and Project Contribution	Other Projects, Activities and Actions	Mitigation and Compensation Measures	Residual Cumulative Effects Characterization						Likelihood	Significance	Prediction Confidence	Follow-up and Monitoring Programs	
			Context	Magnitude	Extent	Duration	Reversibility	Frequency					
<p>Interference with Navigation</p> <ul style="list-style-type: none"> Measure of effect on the public right to navigate Interference with existing navigational aids will pose safety concerns for navigation 	<p>Cumulative Effect with Project</p> <ul style="list-style-type: none"> PRPA expects to increase shipping to 2,000 ships (4,000 movements) by 2025 	<ul style="list-style-type: none"> Atlin Terminal Canpotex Potash Export Terminal Fairview Container Terminal Phase I Fairview Container Terminal Phase II Northland Cruise Terminal Pinnacle Pellet Inc. Prince Rupert LNG Facility Prince Rupert Gas Transmission Project Prince Rupert Ferry Terminal Prince Rupert Grain Limited Ridley Island Log Sort Ridley Terminals Inc. WatCo Pulp Mill Proposed Westcoast Connector Gas Transmission Project 	None	L	H	RAA	L	R	C	M	NS	H	None
	<p>Project Contribution to Cumulative Effect (in RAA)</p> <ul style="list-style-type: none"> During full-build out (19.2 MPTA) vessel traffic through PRPA waters, and between Triple Island and the terminal, will be one LNG carrier per day, or 350 per year berthed at the terminal. 	<p>Construction:</p> <ul style="list-style-type: none"> Site preparation (land-based) Onshore construction Dredging Marine construction Disposal at sea <p>Operations:</p> <ul style="list-style-type: none"> LNG facility and supporting infrastructure on Lelu Island Marine terminal use Shipping Fish habitat offsetting <p>Decommissioning:</p> <ul style="list-style-type: none"> Dismantling facility and supporting Infrastructure Dismantling of marine terminal 	See Table 15-11 of the EIS Summary of Residual Effects on Navigation and Marine Resource Use	L	M	LAA	L	R	C	M	N	H	None

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Cumulative Environmental Effect and Project Contribution	Other Projects, Activities and Actions	Mitigation and Compensation Measures	Residual Cumulative Effects Characterization						Likelihood	Significance	Prediction Confidence	Follow-up and Monitoring Programs	
			Context	Magnitude	Extent	Duration	Reversibility	Frequency					
<p>Effects on fishing, recreation and marine use</p> <ul style="list-style-type: none"> Increased vessel traffic and marine infrastructure may affect existing navigation use Interference with existing use may pose safety concerns for users Increased vessel traffic and marine infrastructure may affect fisheries quantity and quality Increased vessel traffic and marine infrastructure could inhibit recreational use (e.g., ability to kayak, canoe, etc. in the marine waters) 	<p>Cumulative Effect with Project PRPA expects to increase shipping to 2,000 ships (4,000 movements) by 2025.</p>	<ul style="list-style-type: none"> Atlin Terminal Canpotex Potash Export Terminal Douglas Channel LNG Enbridge Northern Gateway Project Fairview Container Terminal Phase I Fairview Container Terminal Phase II Kitimat LNG Terminal Project LNG Canada Project Northland Cruise Terminal Pinnacle Pellet Inc. Prince Rupert LNG Facility Prince Rupert Gas Transmission Project Prince Rupert Ferry Terminal Prince Rupert Grain Limited Ridley Island Log Sort Ridley Terminals Inc. Rio Tinto Alcan Aluminum Smelter and Modernization Project WatCo Pulp Mill Proposed Westcoast Connector Gas Transmission Project 	None	M	M	RAA	L	R	C	M	N	H	None
	<p>Project Contribution to Cumulative Effect (in RAA)</p> <ul style="list-style-type: none"> During full-build out (19.2 MPTA) vessel traffic through PRPA waters, and between Triple Island and the terminal, will be one LNG carrier per day, or 350 per year berthed at the terminal. 	<p>Construction:</p> <ul style="list-style-type: none"> Site preparation (land-based) Onshore construction Dredging Marine construction Disposal at sea <p>Operations:</p> <ul style="list-style-type: none"> LNG facility and supporting infrastructure on Lelu Island Marine terminal use Shipping Fish habitat offsetting <p>Decommissioning:</p> <ul style="list-style-type: none"> Dismantling facility and supporting infrastructure Dismantling of marine terminal 	See Table 15-11 of the EIS Summary of Residual Effects on Navigation and Marine Resource Use	M	M	LAA	L	R	C	M	N	H	None

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Cumulative Environmental Effect and Project Contribution	Other Projects, Activities and Actions	Mitigation and Compensation Measures	Residual Cumulative Effects Characterization						Likelihood	Significance	Prediction Confidence	Follow-up and Monitoring Programs	
			Context	Magnitude	Extent	Duration	Reversibility	Frequency					
Interference with Air Navigation <ul style="list-style-type: none"> Interference with air navigational from sea plane bases 	Cumulative Effect with Project Flare stack from Prince Rupert LNG facility could also effects air navigation	<ul style="list-style-type: none"> Prince Rupert LNG Facility 	Other proponents are expected to use similar mitigation measures to those planned by PNW LNG.	H	L	RAA	L	R	C	H	N	H	None
	Project Contribution to Cumulative Effect (in RAA) Bridge and flare stack could interfere with air navigation.	Construction: <ul style="list-style-type: none"> Marine construction Operations: <ul style="list-style-type: none"> LNG facility and supporting infrastructure on Lelu Island Marine terminal use 	See Table 15-11 of the EIS Summary of Residual Effects on Navigation and Marine Resource Use	H	L	PDA	L	R	C	H	N	H	None
KEY CONTEXT: N = negligible level of disturbance L = low level of disturbance M = moderate level of disturbance H = high level of disturbance MAGNITUDE: N = Negligible L = Low M = Moderate H = High EXTENT: PDA—effects are restricted to the PDA LAA—effects extend into the LAA RAA—effects extend into the RAA DURATION: S = Short-term M = Medium-term L = Long-term REVERSIBILITY: R = Reversible I = Irreversible FREQUENCY: S = Single event—effect occurs once MI = Multiple irregular event (no set schedule)— effect occurs more than once but at an unpredictable interval of time MR = Multiple regular event – effect occurs on a regular basis and at regular intervals throughout the Project C = Continuous—effect occurs continuously LIKELIHOOD: Based on professional judgment L = Low probability of occurrence M = Medium probability of occurrence H = High probability of occurrence SIGNIFICANCE: S = Significant N = Not Significant CONFIDENCE AND RISK: Based on scientific information and statistical analysis, professional judgment and effectiveness of mitigation, and assumptions made. L = Low level of confidence M = Moderate level of confidence H = High level of confidence													

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15.6 REFERENCES

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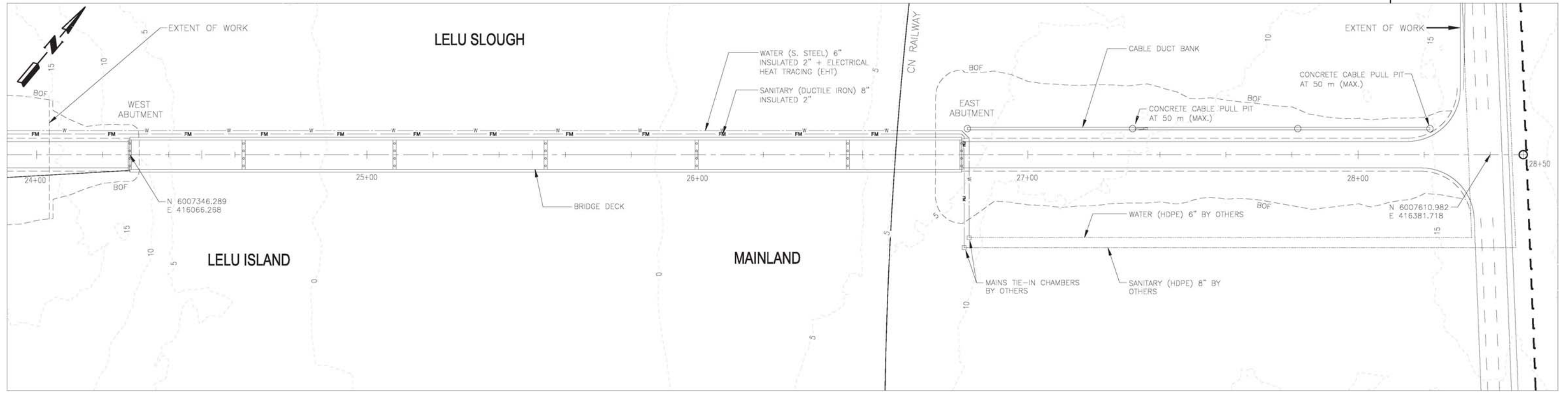
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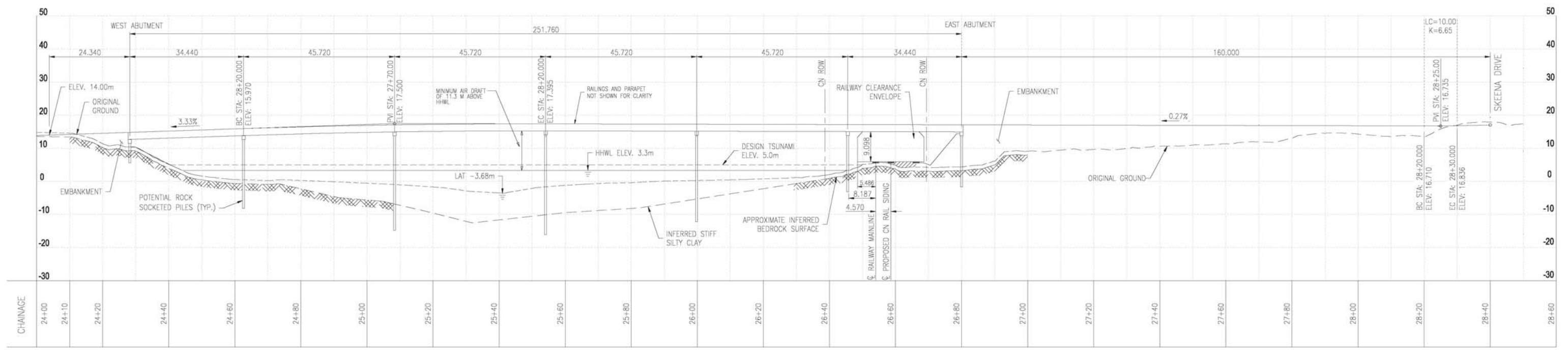
15.7 FIGURES

Please see following pages.

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. THIS CONCEPTUAL DESIGN IS BASED ON THE INFORMATION TAKEN FROM McELHANNY ENGINEERING SERVICES LTD. DRAWING R-XXX-801 REV-A.
3. REFER DRAWING BTL-CVS-DWG-0121 FOR TYPICAL ROAD SECTION AND TYPICAL BRIDGE SECTION AND DETAILS.
4. ELEVATIONS ARE RELATIVE TO MSL.



PLAN
SCALE 1:1250



SOUTH ELEVATION
SCALE 1:1250

Figure 15-1: Bridge from Lelu Island to the Mainland

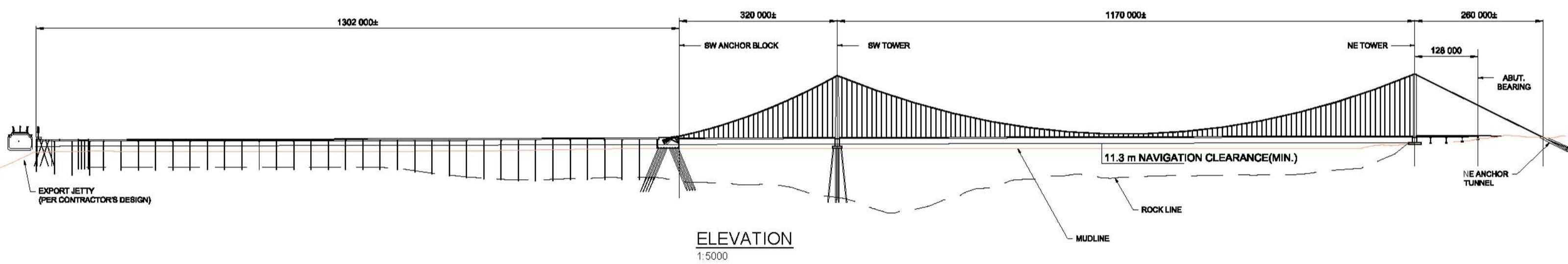
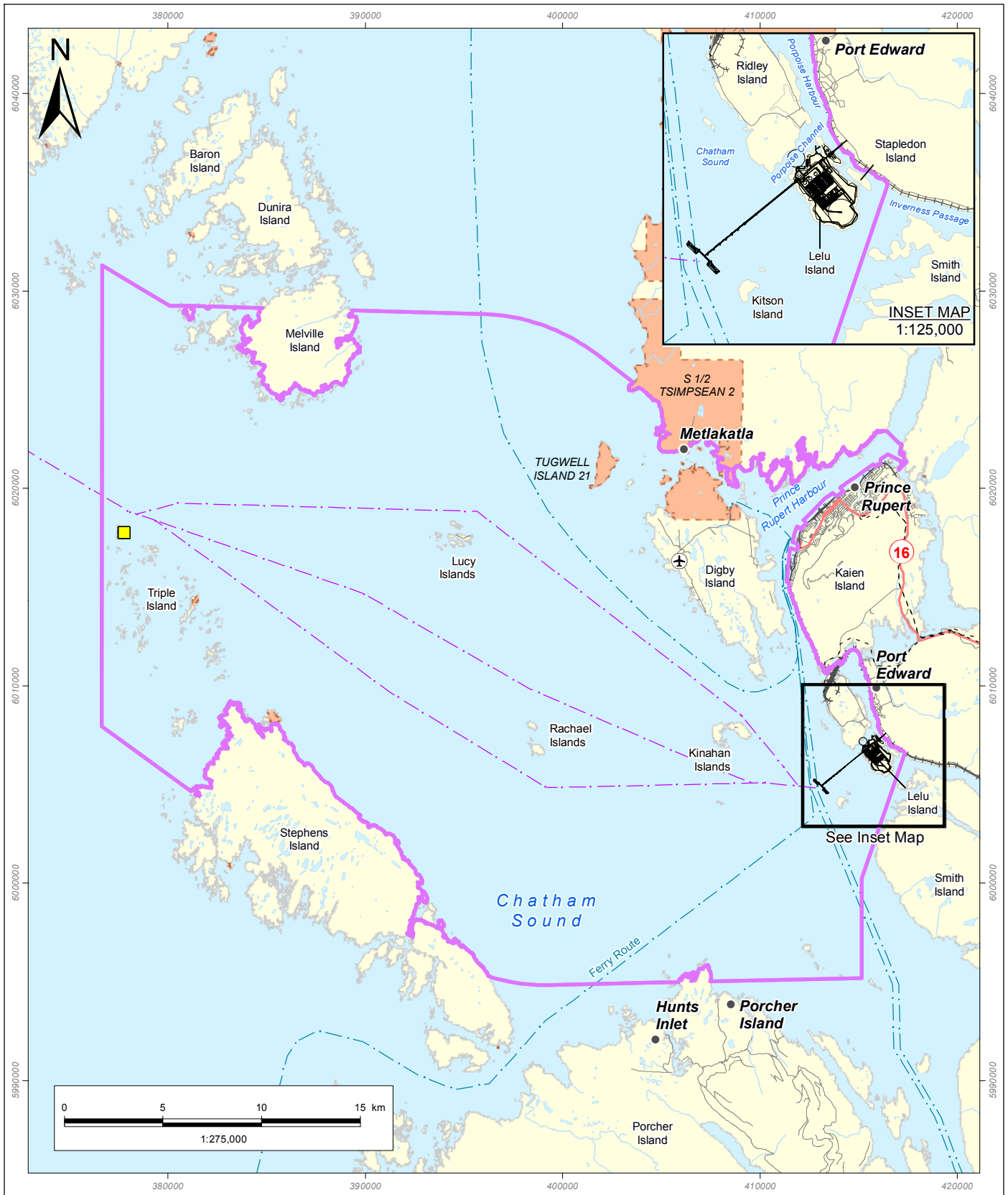
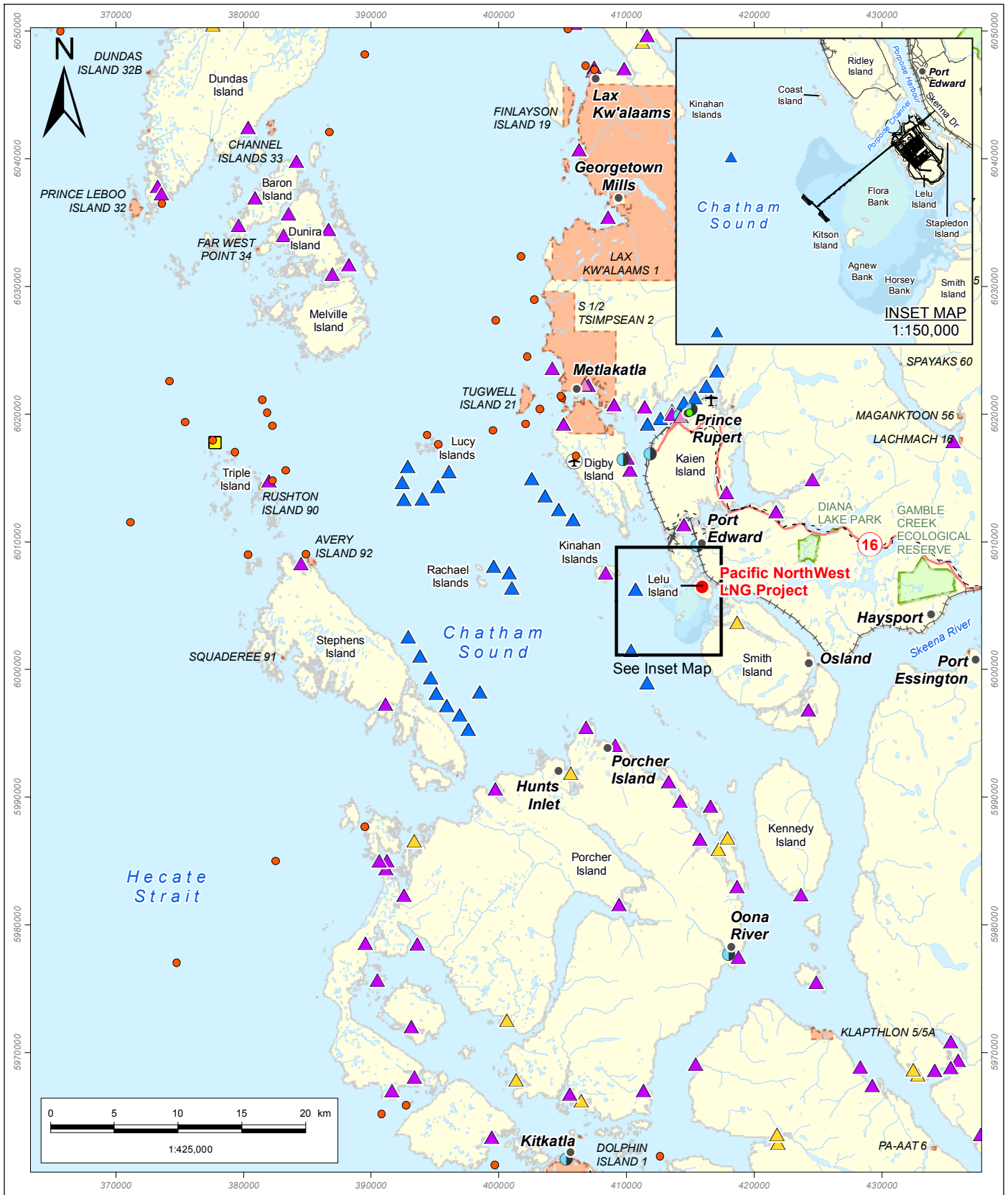


Figure 15-2: Marine Terminal (suspension bridge, trestle and berth)

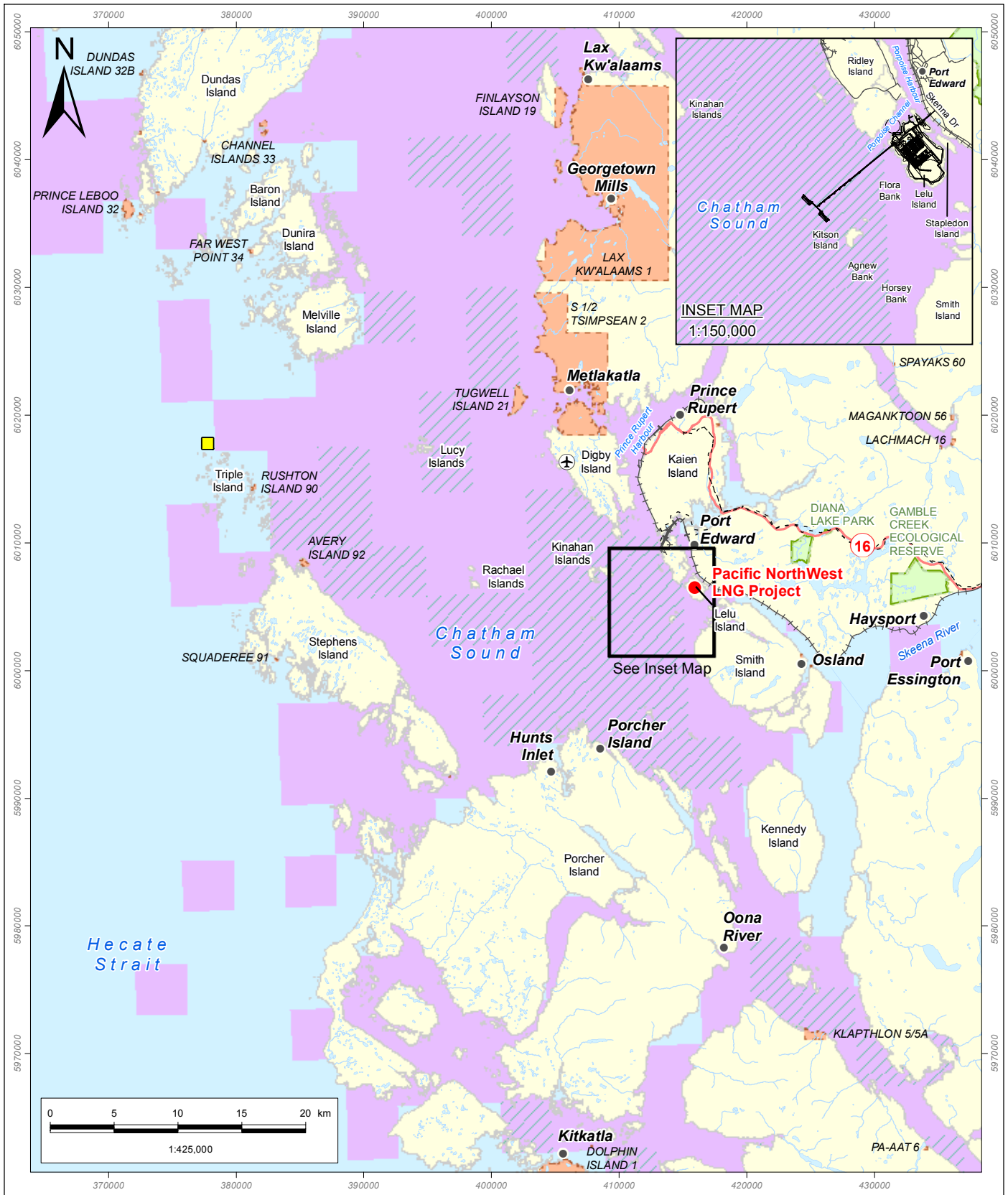


<ul style="list-style-type: none"> Local Assessment Area and Regional Assessment Area Potential Shipping Route Project Component 	<ul style="list-style-type: none"> Airport City or Town Pilotage Station Electrical Power Transmission Line Ferry Route Highway Railway 	<ul style="list-style-type: none"> Secondary Road Watercourse Indian Reserve Protected Area Waterbody 	<p>Pacific NorthWest LNG Navigation and Marine Resource Use Local Assessment Area and Regional Assessment Area EIS ADDENDUM</p> <p><small>Sources: Government of British Columbia; Prince Rupert Port Authority; Government of Canada; Natural Resources Canada, Centre for Topographic Information; Progress Energy Canada Ltd.</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">DATE: 20-NOV-14</td> <td style="width: 50%;">PROJECTION: UTM - ZONE 9</td> </tr> <tr> <td>FIGURE ID: 123110537-412</td> <td>DATUM: NAD 83</td> </tr> <tr> <td>DRAWN BY: K. POLL</td> <td>CHECKED BY: B. BYRD</td> </tr> </table>	DATE: 20-NOV-14	PROJECTION: UTM - ZONE 9	FIGURE ID: 123110537-412	DATUM: NAD 83	DRAWN BY: K. POLL	CHECKED BY: B. BYRD	<p>PREPARED BY: </p> <p>PREPARED FOR: </p> <p>FIGURE NO: 15-3</p>
DATE: 20-NOV-14	PROJECTION: UTM - ZONE 9									
FIGURE ID: 123110537-412	DATUM: NAD 83									
DRAWN BY: K. POLL	CHECKED BY: B. BYRD									

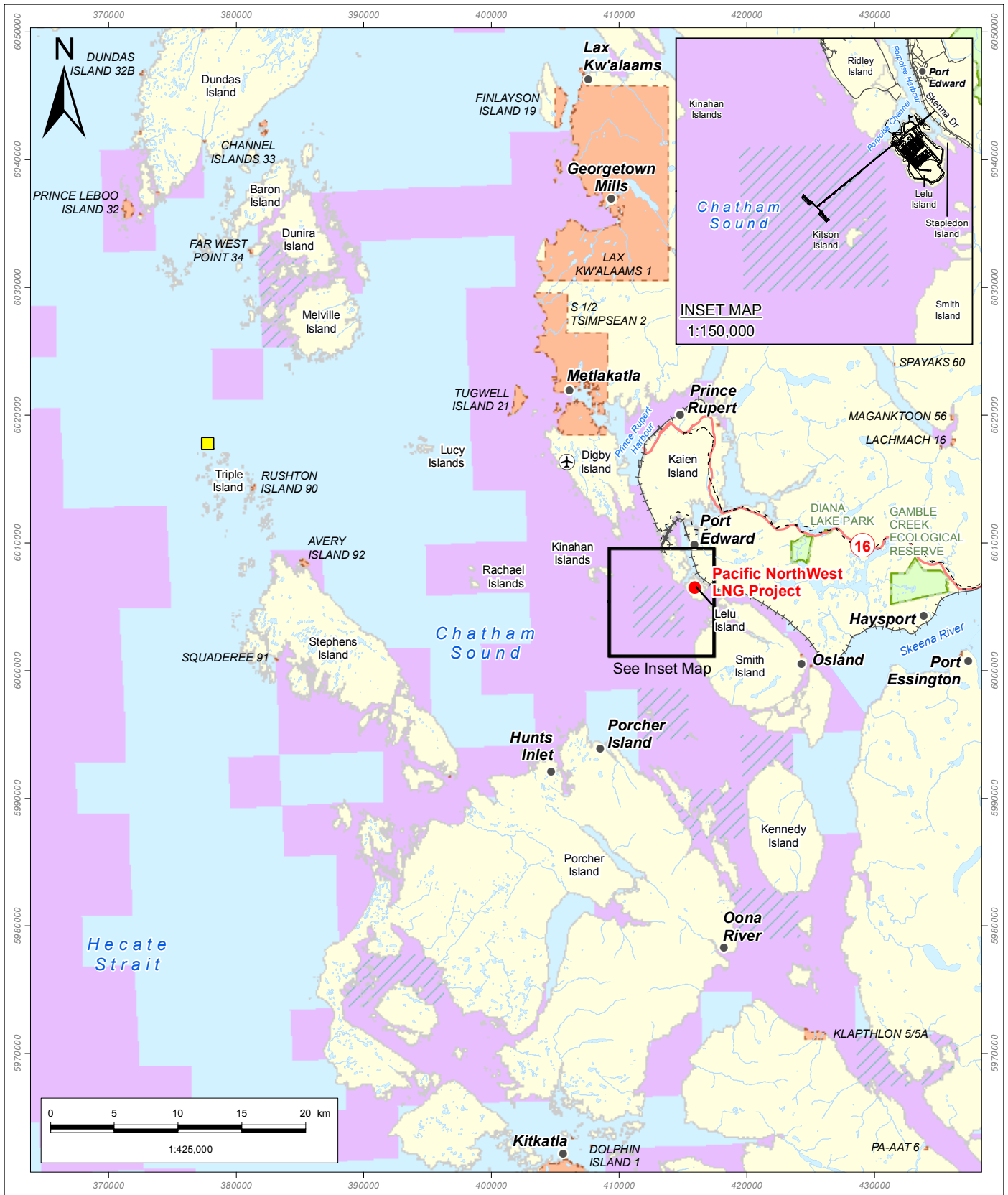
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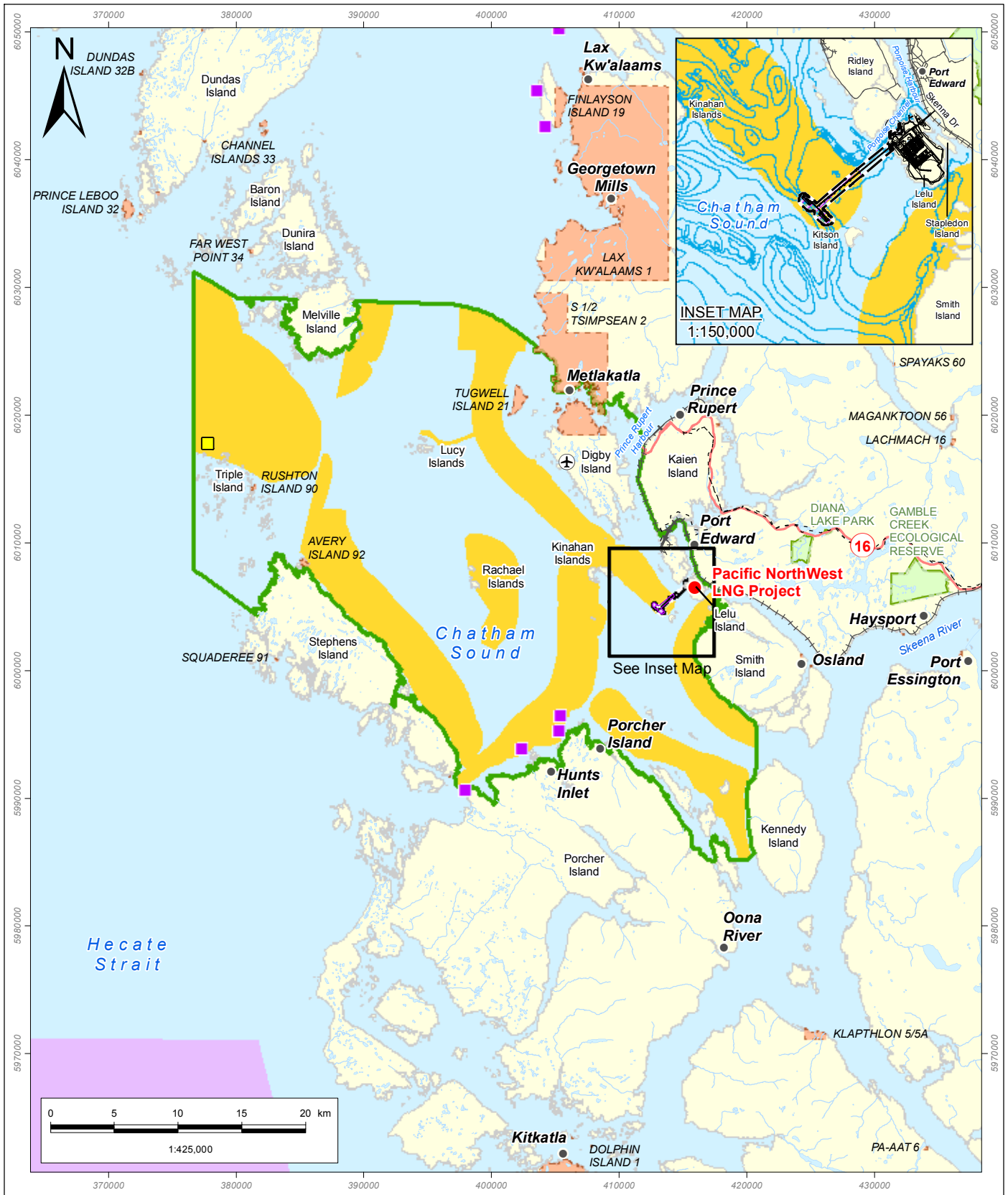
<ul style="list-style-type: none"> ● Project Location ● Navigation Aid (Light, Buoy, or Fog Signal)* Anchorage Type ** ▲ Safe Boat Haven ▲ Other Anchorage (BCMCA) ▲ Other Anchorage (Prince Rupert Anchorage Review) Marine Facilities ● Harbour Authority ▲ Marina 	<ul style="list-style-type: none"> ✈ Sea Plane Base ● Spill Response — Project Component ✈ Airport ● City or Town ■ Pilotage Station --- Electrical Power Transmission Line 	<ul style="list-style-type: none"> — Highway or Road —+— Railway — Watercourse ■ Indian Reserve ■ Protected Area ■ Waterbody Shoals ■ Agnew Bank ■ Flora Bank ■ Horsey Bank 	<p align="center">Pacific NorthWest LNG Anchorage, Marine Facilities and Navigation Aids EIS ADDENDUM</p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011; British Columbia Marine Conservation Analysis (BCMCA), 2012; Prince Rupert Anchorage Review, 2012.</small></p> <p><small>Vector digital data for anchorages and safe boat havens available at: http://bcmca.ca/data/features/</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>	<p>PREPARED BY: </p> <p>PREPARED FOR: </p> <p>FIGURE NO: 15-4</p>
<p>* Location of navigation aids from Fisheries and Oceans Canada, Notices to Mariners. ** Location of anchorages and Council of BC Yacht Clubs Safe Havens.</p>			<p>DATE: 20-NOV-14 FIGURE ID: 123110537-413 DRAWN BY: K. POLL</p>	<p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: B. BYRD</p>



<ul style="list-style-type: none"> ● Project Location — Project Component <p>Commercial Fisheries</p> <ul style="list-style-type: none"> ▨ Prawn spp. (trap), 2001-2009 ▨ Shrimp spp. and Spot Prawn (trawl), 2000-2009 	<ul style="list-style-type: none"> ✈ Airport ● City or Town ■ Pilotage Station --- Electrical Power Transmission Line — Highway or Road +++ Railway 	<ul style="list-style-type: none"> — Watercourse ▨ Indian Reserve ▨ Protected Area ▨ Waterbody 	<p align="center">Pacific NorthWest LNG Commerical Fisheries: Shrimp <i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011. Commercial Fisheries Data, 2000-2009. Data derived from Pacific Biological Station Stock Assessment Harvest Log Database.</small></p> <p><small>Metadata available through Mapster: http://www.pac.dfo-mpo.gc.ca/gis-sig/maps-cartes-eng.htm</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>	<p>PREPARED BY:</p> <p align="center"></p> <p>PREPARED FOR:</p> <p align="center"></p> <p>FIGURE NO:</p> <p align="center">15-5</p>
<p>DATE: 20-NOV-14</p> <p>FIGURE ID: 123110537-034</p> <p>DRAWN BY: K. POLL</p>	<p>PROJECTION: UTM - ZONE 9</p> <p>DATUM: NAD 83</p> <p>CHECKED BY: A. GROMACK</p>	<p>11/20/2014 - 1:45:58 PM V:\archive\123110537\figure\EA_Addendum\Fig_123110537_ea_add_15_05_comm_fish_shrimp.mxd</p>		

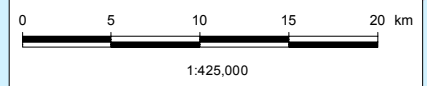
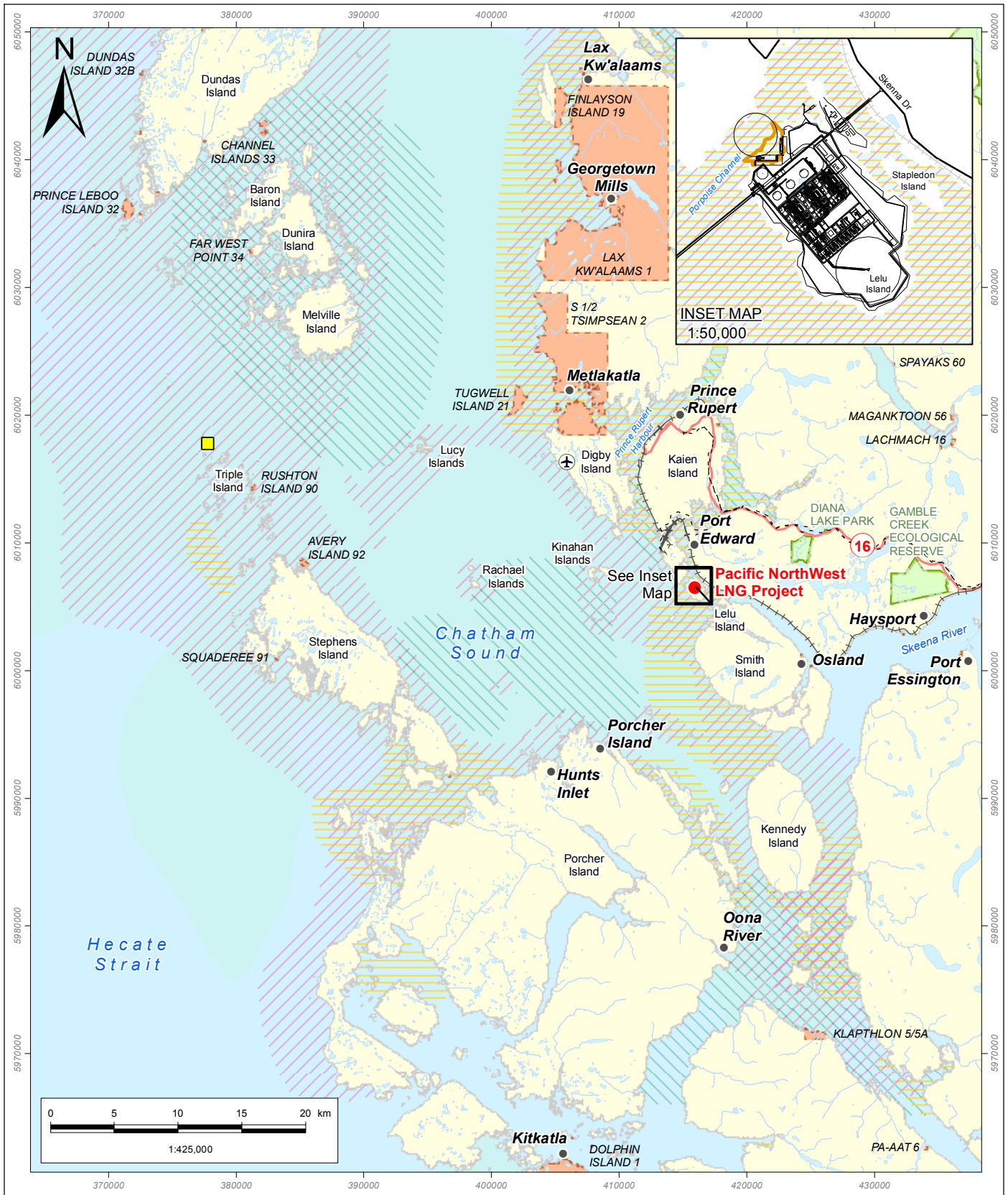


<ul style="list-style-type: none"> ● Project Location — Project Component <p>Commercial Fisheries</p> <ul style="list-style-type: none"> Dungeness Crab (trap), 2001-2009 King Crab (trap), 2001-2008 	<ul style="list-style-type: none"> ✈ Airport ● City or Town Pilotage Station - - - Electrical Power Transmission Line Highway or Road Railway 	<ul style="list-style-type: none"> Watercourse Indian Reserve Protected Area Waterbody 	<p style="text-align: center;">Pacific NorthWest LNG</p> <p style="text-align: center;">Commerical Fisheries: Crab</p> <p style="text-align: center;"><i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011. Commercial Fisheries Data, 2000-2009. Data derived from Pacific Biological Station Stock Assessment Harvest Log Database.</small></p> <p><small>Metadata available through Mapster: http://www.pac.dfo-mpo.gc.ca/gis-sig/maps-cartes-eng.htm</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">DATE: 20-NOV-14</td> <td style="width: 50%;">PROJECTION: UTM - ZONE 9</td> </tr> <tr> <td>FIGURE ID: 1231110537-035</td> <td>DATUM: NAD 83</td> </tr> <tr> <td>DRAWN BY: K. POLL</td> <td>CHECKED BY: A. GROMACK</td> </tr> </table>	DATE: 20-NOV-14	PROJECTION: UTM - ZONE 9	FIGURE ID: 1231110537-035	DATUM: NAD 83	DRAWN BY: K. POLL	CHECKED BY: A. GROMACK	<p>PREPARED BY:</p> <p style="text-align: center;"> Stantec</p> <p>PREPARED FOR:</p> <p style="text-align: center;"> Pacific Northwest LNG</p> <p>FIGURE NO:</p> <p style="text-align: center; font-size: 24pt; font-weight: bold;">15-6</p>
DATE: 20-NOV-14	PROJECTION: UTM - ZONE 9									
FIGURE ID: 1231110537-035	DATUM: NAD 83									
DRAWN BY: K. POLL	CHECKED BY: A. GROMACK									



<ul style="list-style-type: none"> ● Project Location — Project Component ■ Salmon (seine) 2000 - 2007 ■ Salmon (troll) 2002 - 2007 ■ Salmon (net) 2002 - 2007 (51,584 ha) 99% Bisected Salmon Fishing Area (65 ha) 0.1% Marine Resources Local and Regional Assessment Area 	<ul style="list-style-type: none"> ✈ Airport ● City or Town Pilotage Station Electrical Power Transmission Line — Highway or Road + Railway 100 m Marine Infrastructure Safety Zone 	<ul style="list-style-type: none"> — Watercourse Indian Reserve Protected Area Waterbody
<p>Pacific NorthWest LNG Commercial Fisheries: Salmon - Local Ecological Knowledge</p> <p><i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011. Commercial Fisheries Data, 2000-2009. Data derived from Pacific Biological Station Stock Assessment Harvest Log Database.</small></p> <p><small>Metadata available through Mapster: http://www.pac.dfo-mpo.gc.ca/gis-sig/maps-cartes-eng.htm</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>		
<p>DATE: 20-NOV-14</p> <p>FIGURE ID: 123110537-829</p> <p>DRAWN BY: M. BATE</p>	<p>PROJECTION: UTM - ZONE 9</p> <p>DATUM: NAD 83</p> <p>CHECKED BY: D. BAISCH</p>	<p>PREPARED BY:</p> <p style="text-align: center;"></p> <p>PREPARED FOR:</p> <p style="text-align: center;"></p> <p>FIGURE NO:</p> <p style="text-align: center; font-size: 24pt;">15-7</p>

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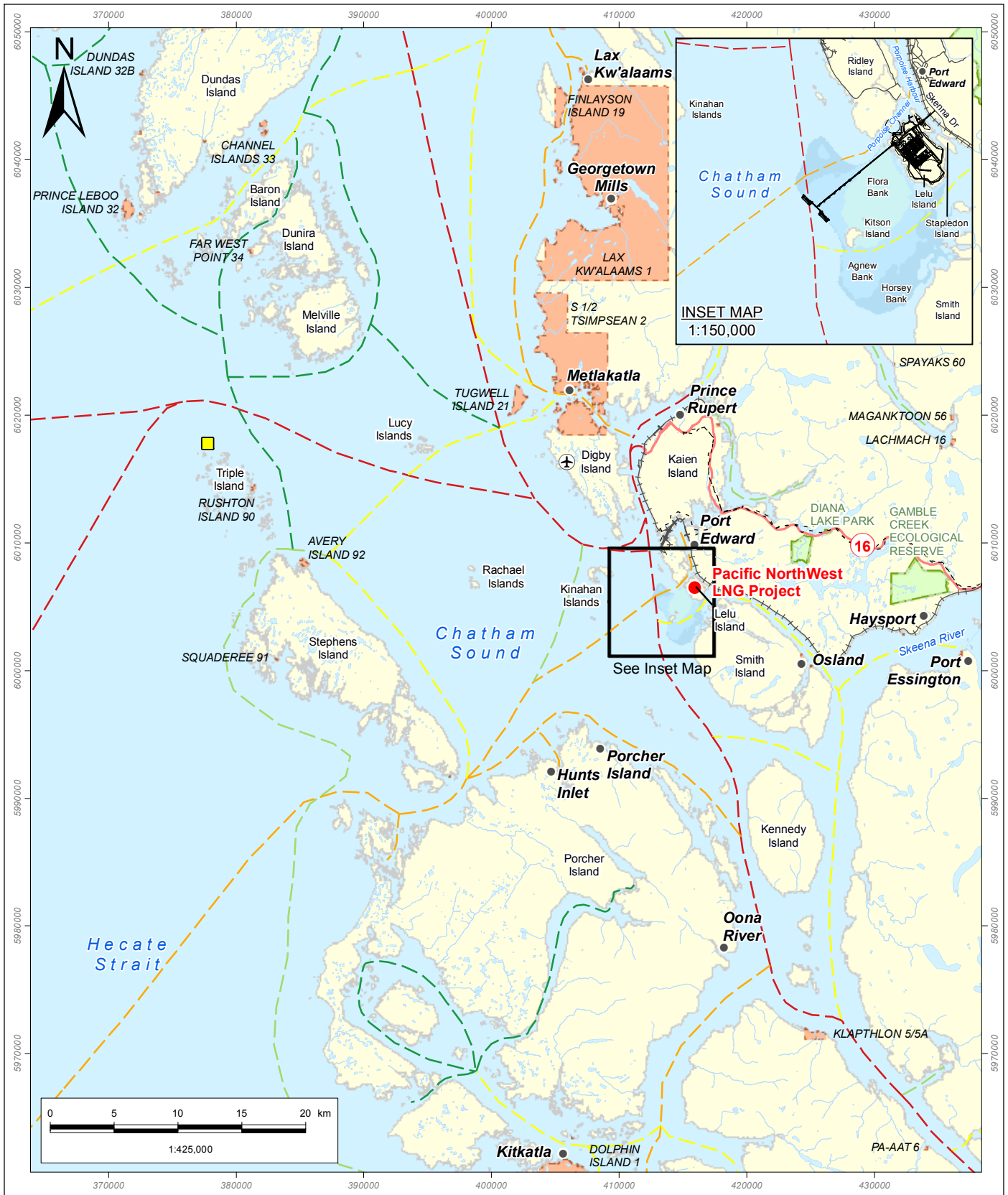


Project Location	Salmon and Andaromous	Watercourse
Dredge Boundary	Airport	Indian Reserve
Project Component	City or Town	Protected Area
Groundfish	Pilotage Station	Waterbody
Prawn and Shrimp	Electrical Power Transmission Line	
	Highway or Road	
	Railway	

* Areas where recreational fishing for salmon and other anadromous finfish, groundfish, crab, prawn and shrimp occurs, identified by participants in 19 local and regional Sport Fishing Advisory Board meetings, as well as through other local knowledge.

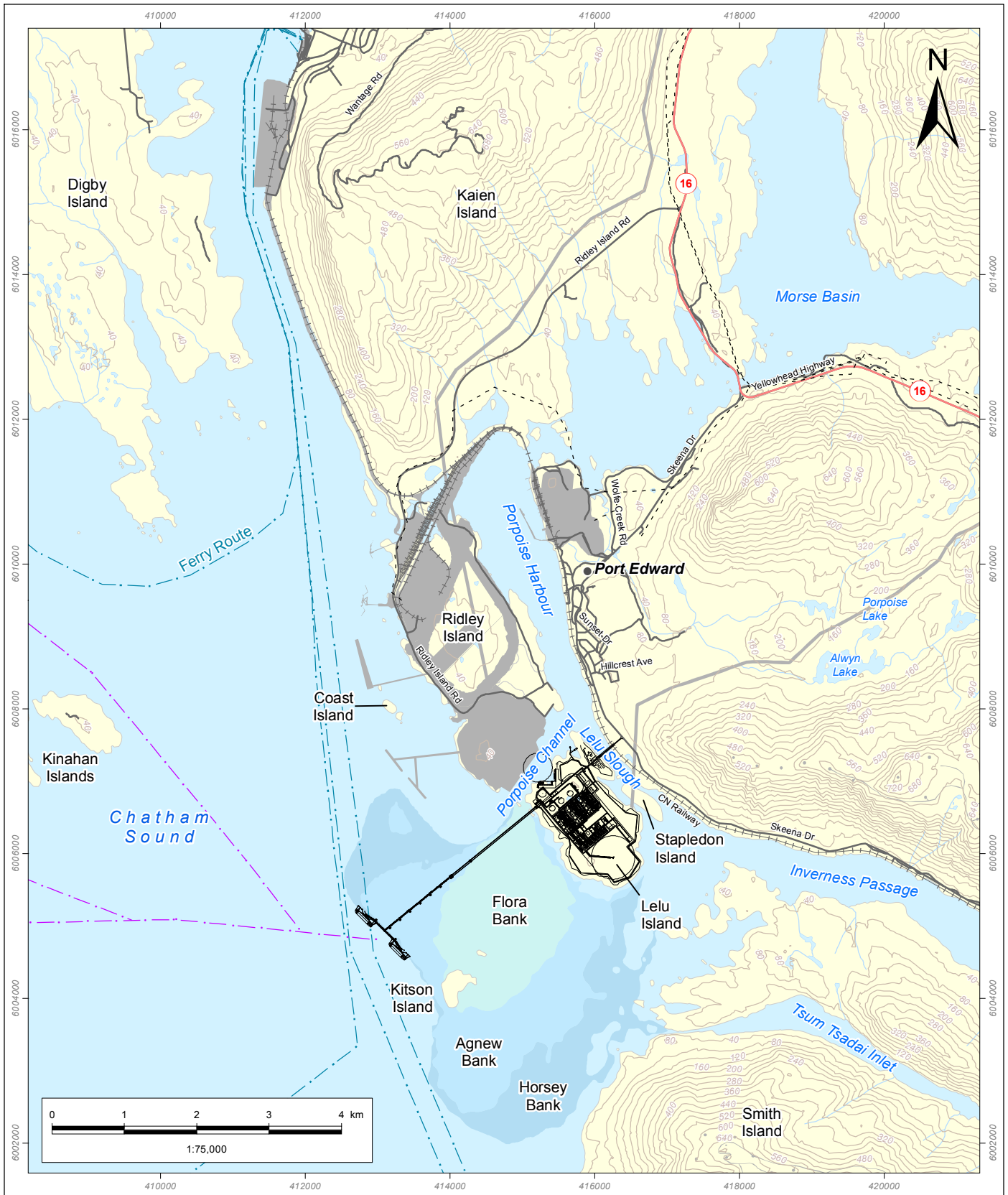
Pacific NorthWest LNG Recreational Fishing EIS ADDENDUM		PREPARED BY:
Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011; British Columbia Marine Conservation Analysis (BCMCA), 2012. Vector digital data for groundfish, prawn and shrimp, crab, salmon and anadromous fish available at http://bcmca.ca/data/features/		PREPARED FOR:
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.		FIGURE NO: <h1 style="text-align: center;">15-8</h1>
DATE: 20-NOV-14 FIGURE ID: 123110537-046 DRAWN BY: K. POLL	PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: A. GROMACK	

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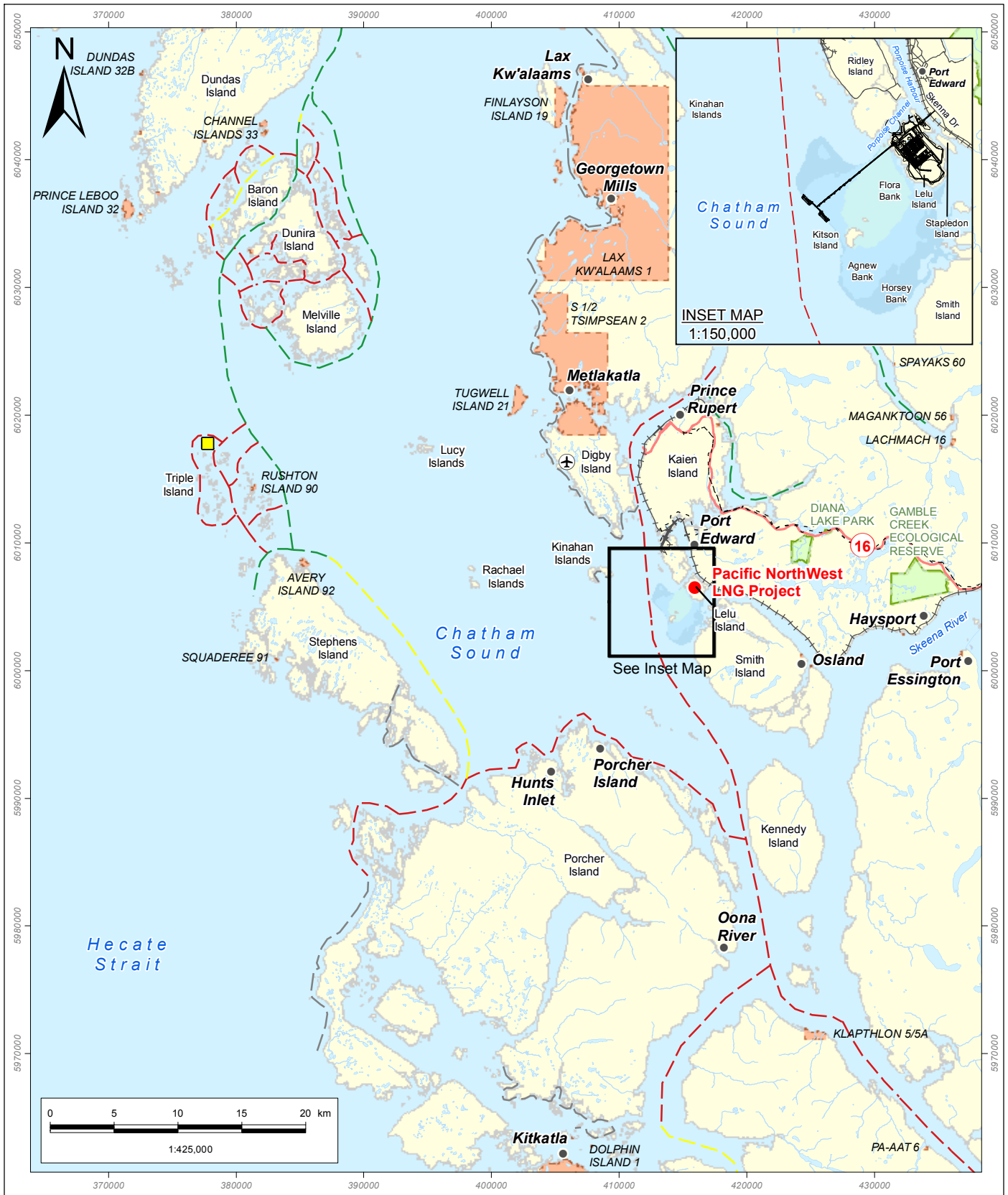
<ul style="list-style-type: none"> ● Project Location Relative Importance (Use) * --- High --- Moderate to High --- Moderate --- Low to Moderate --- Low --- Unknown 	<ul style="list-style-type: none"> Project Component Airport City or Town Pilotage Station Electrical Power Transmission Line Highway or Road Railway 	<ul style="list-style-type: none"> River or Stream Indian Reserve Protected Area Waterbody Shoals Agnew Bank Flora Bank Horsey Bank 	<p>Pacific NorthWest LNG</p> <p>Recreational Boating Routes</p> <p><i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011; British Columbia Marine Conservation Analysis (BCMCA), 2012.</small></p> <p><small>Vector digital data for recreational boating routes available at: http://bcm.ca/data/features/</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>	<p>PREPARED BY:</p> <p> Stantec</p> <p>PREPARED FOR:</p> <p> Pacific NorthWest LNG</p> <p>FIGURE NO:</p> <p style="font-size: 24pt; font-weight: bold; text-align: center;">15-9</p>	
<p><small>* Pleasure craft (powerboat and sailboat) cruising routes. Includes coastal routes only (no offshore routes).</small></p>			<p>DATE: 20-NOV-14 FIGURE ID: 123110537-052 DRAWN BY: K. POLL</p>	<p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: A. GROMACK</p>	

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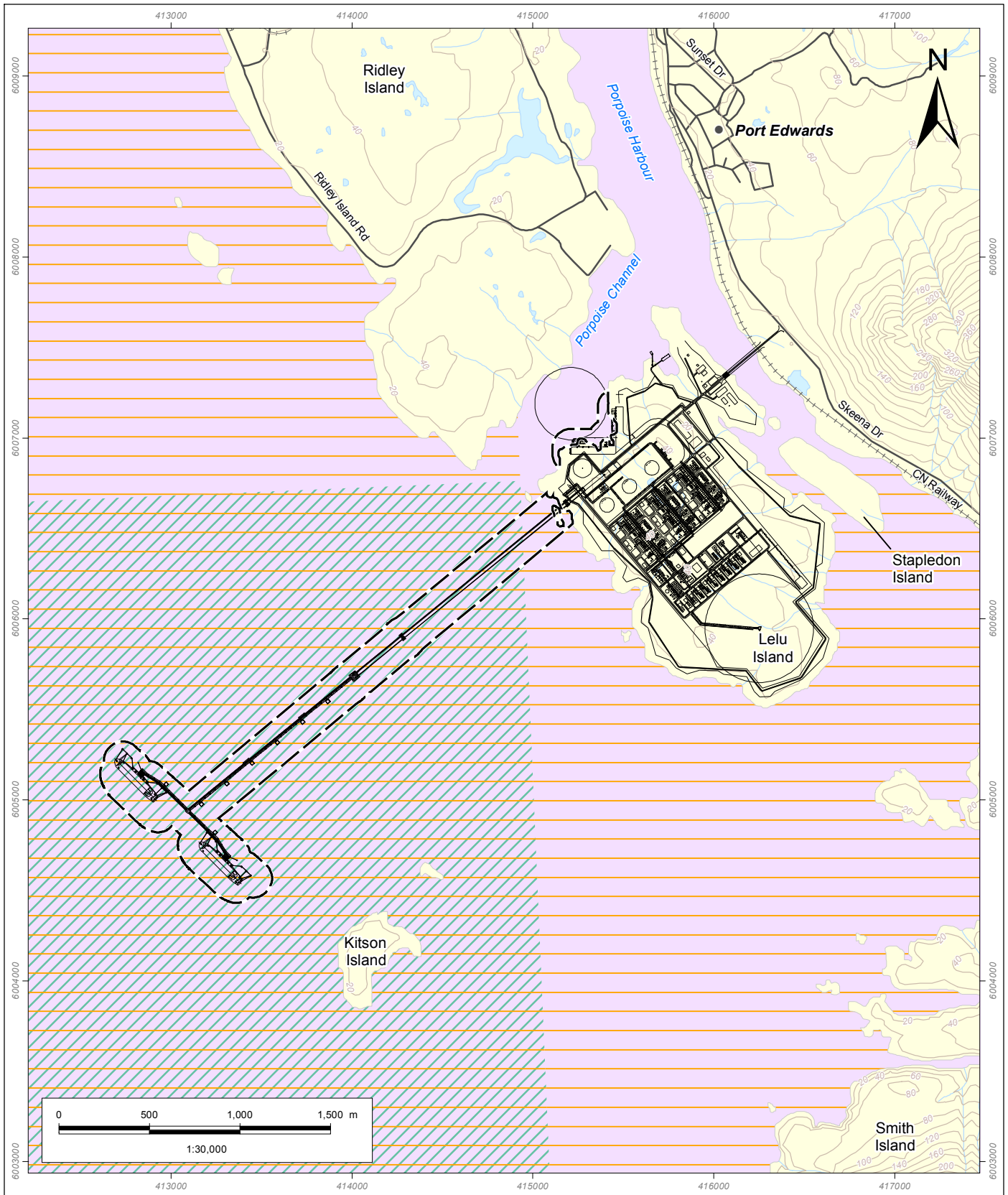
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<ul style="list-style-type: none"> --- Potential Shipping Route --- Project Component Proposed or Existing Industrial Development 	<ul style="list-style-type: none"> ● City or Town — Contour (m) — Electrical Power - - - Transmission Line — Ferry Route +++ Railway — Road — Secondary Road 	<ul style="list-style-type: none"> — Watercourse Waterbody <p>Shoals</p> <ul style="list-style-type: none"> Agnew Bank Flora Bank Horsey Bank 	
<p>Pacific NorthWest LNG Waterways around the Project Development Area EIS ADDENDUM</p>			<p>PREPARED BY: Stantec</p>
<p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Canadian Hydrological Service (CHS), 1995.</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data</small></p>			<p>PREPARED FOR: Pacific NorthWest LNG</p>
<p>DATE: 20-NOV-14 FIGURE ID: 123110537-440 DRAWN BY: K. POLL</p>			<p>FIGURE NO: 15-10</p>
<p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: J. BILKHU</p>			



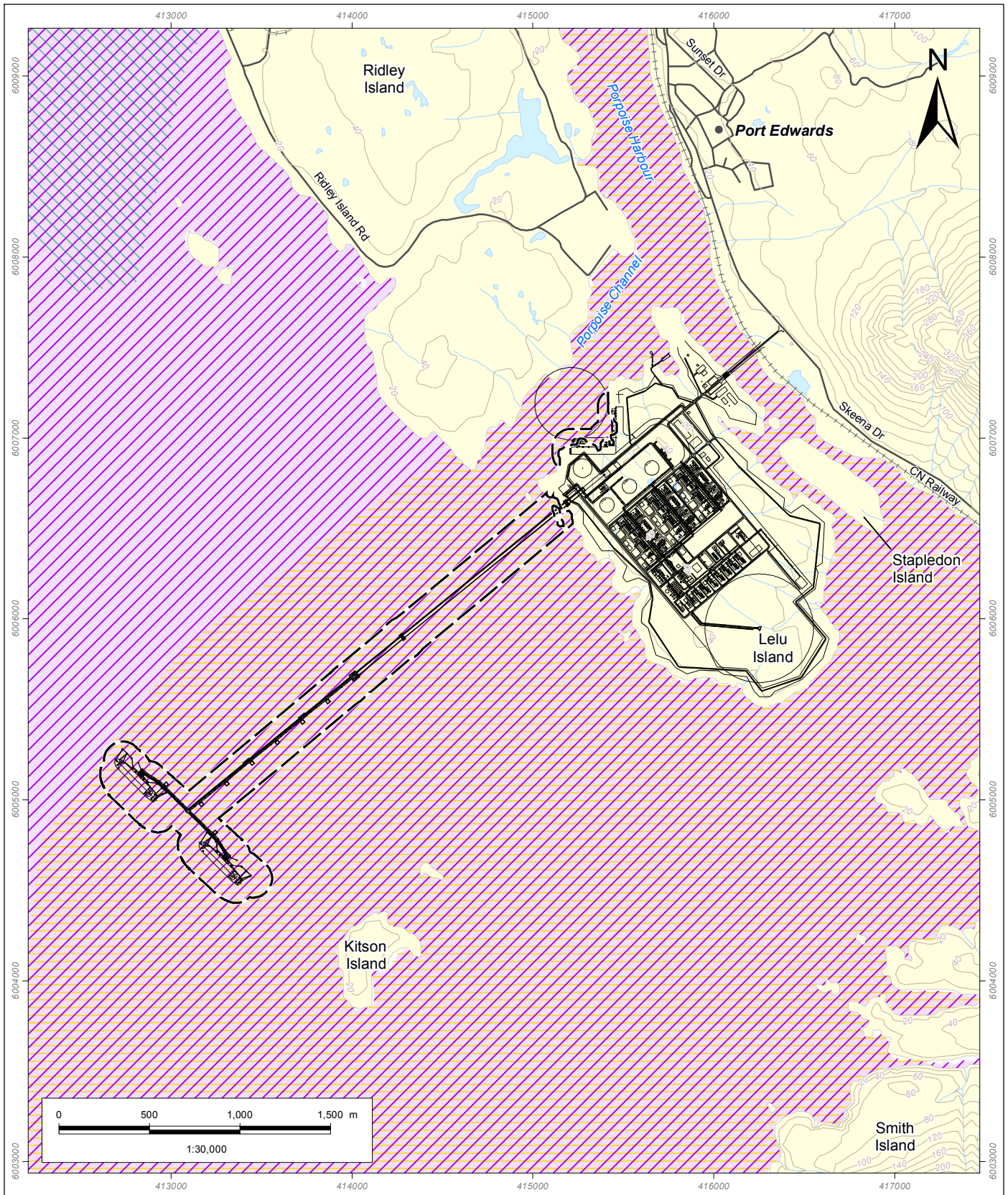
<ul style="list-style-type: none"> ● Project Location Project Component Sea Kayaking Route * Relative Intensity of Use High Moderate Low Unknown 	<ul style="list-style-type: none"> ✈ Airport City or Town Pilotage Station Electrical Power Transmission Line Highway or Road Railway 	<ul style="list-style-type: none"> Watercourse Indian Reserve Protected Area Waterbody Shoals Agnew Bank Flora Bank Horsey Bank 	<p>Pacific NorthWest LNG</p> <p>Sea Kayaking Routes</p> <p><i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011; British Columbia Marine Conservation Analysis (BCMCA), 2012.</small></p> <p><small>Vector digital data for sea kayaking routes available at: http://bcmca.ca/data/features/</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>	<p>PREPARED BY:</p> <p> Stantec</p> <p>PREPARED FOR:</p> <p> Pacific NorthWest LNG</p> <p>FIGURE NO:</p> <p style="font-size: 24pt; font-weight: bold; text-align: center;">15-11</p>
<p><small>* Routes used by sea kayakers.</small></p>			<p>DATE: 20-NOV-14 FIGURE ID: 123110537-053 DRAWN BY: K. POLL</p>	<p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: A. GROMACK</p>

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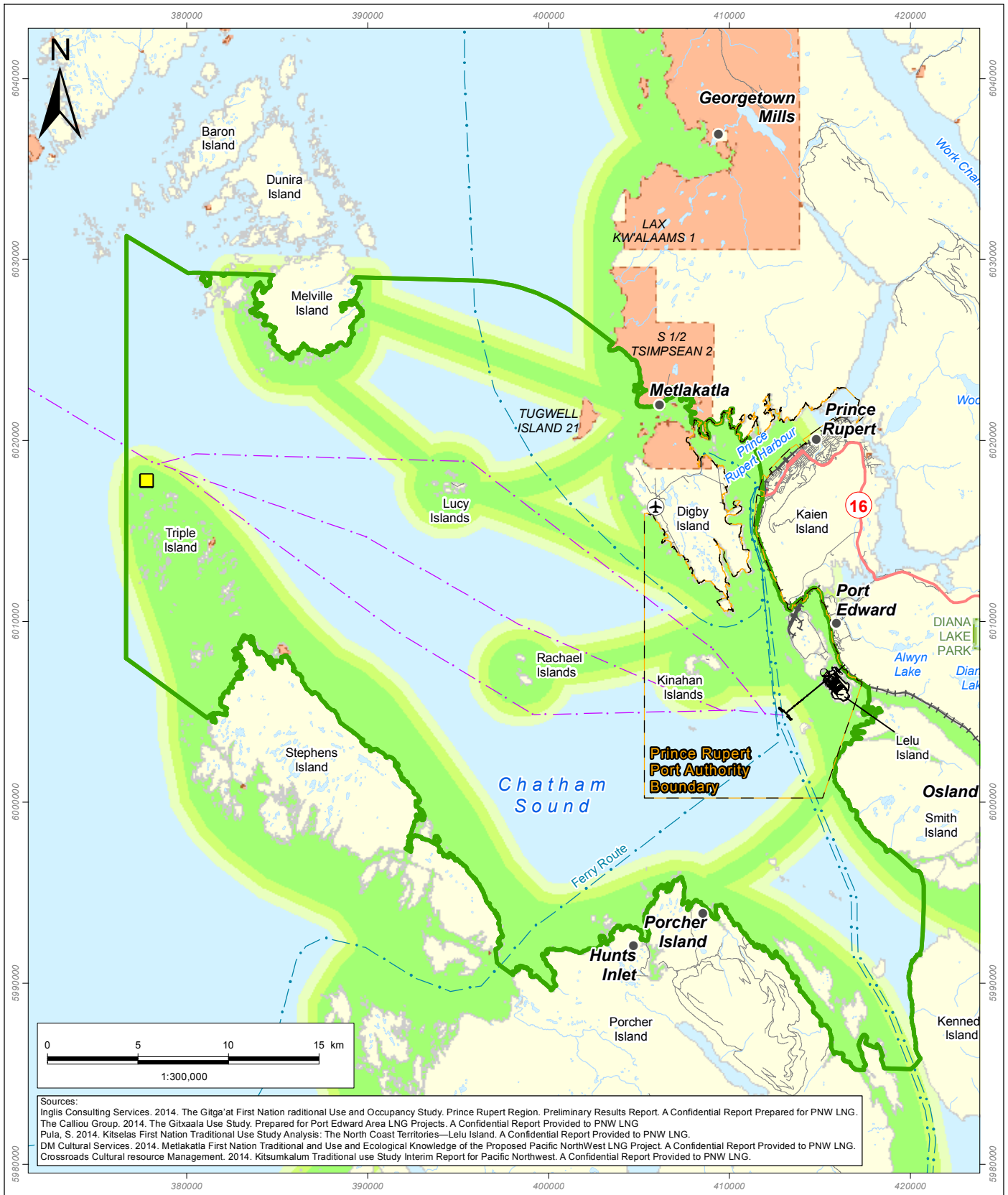
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<ul style="list-style-type: none"> — Project Component □ 100 m Safety Zone (for assessment purposes) ▨ King Crab (trap), 2001-2008 	<ul style="list-style-type: none"> ▨ Shrimp spp. and Spot Prawn (trawl), 2000-2009 ● City or Town — Contour (m) +++ Railway — Road 	<p>Pacific NorthWest LNG Commercial Fisheries Near Lelu Island: Shrimp and Crab <i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011. Commercial Fisheries Data, 2000-2009. Data derived from Pacific Biological Station Stock Assessment Harvest Log Database.</small></p> <p><small>Metadata available through Mapster: http://www.pac.dfo-mpo.gc.ca/gis-sig/maps-cartes-eng.htm</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>						
		<p>PREPARED BY:</p> <p>PREPARED FOR:</p> <p>FIGURE NO:</p> <p style="font-size: 24pt; font-weight: bold; text-align: center;">15-12</p>						
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DATE: 20-NOV-14	PROJECTION: UTM - ZONE 9							
FIGURE ID: 123110537-414	DATUM: NAD 83							
DRAWN BY: D. COOK	CHECKED BY: J.BILKHU							



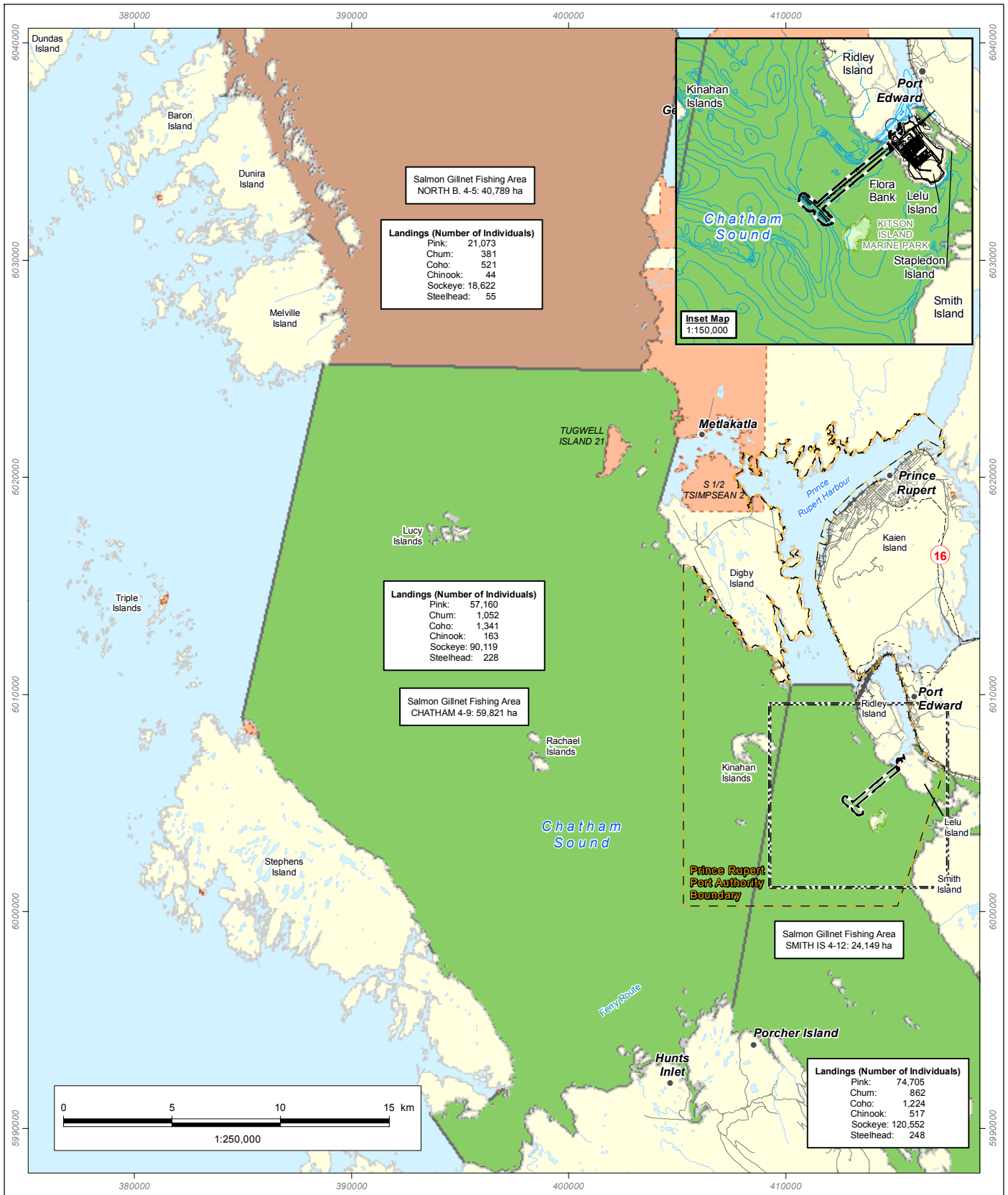
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<ul style="list-style-type: none"> — Project Component ● City or Town □ 100 m Safety Zone (for assessment purposes) — Contour (m) +++ Railway — Road Recreational Fishing * ▨ Crab ▨ Groundfish ▨ Prawn and Shrimp ▨ Salmon and Anadromous 	<p>Pacific NorthWest LNG Recreational Fisheries Near Lelu Island</p> <p><i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011; British Columbia Marine Conservation Analysis (BCMCA), 2012.</small></p> <p><small>Vector digital data for groundfish, prawn and shrimp, crab, salmon and anadromous fish available at http://bcmca.ca/data/features/</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>	<p>PREPARED BY:</p> <p style="text-align: center;"> Stantec</p> <p>PREPARED FOR:</p> <p style="text-align: center;"> Pacific NorthWest LNG</p> <p>FIGURE NO:</p> <p style="text-align: center; font-size: 24pt; font-weight: bold;">15-13</p>
<p>* Areas where recreational fishing for salmon and other anadromous finfish, groundfish, crab, prawn and shrimp occurs, identified by participants in 19 local and regional Sport Fishing Advisory Board meetings, as well as through other local knowledge.</p>	<p>DATE: 20-NOV-14 FIGURE ID: 123110537-397 DRAWN BY: D. COOK</p>	<p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: J. BILKHU</p>

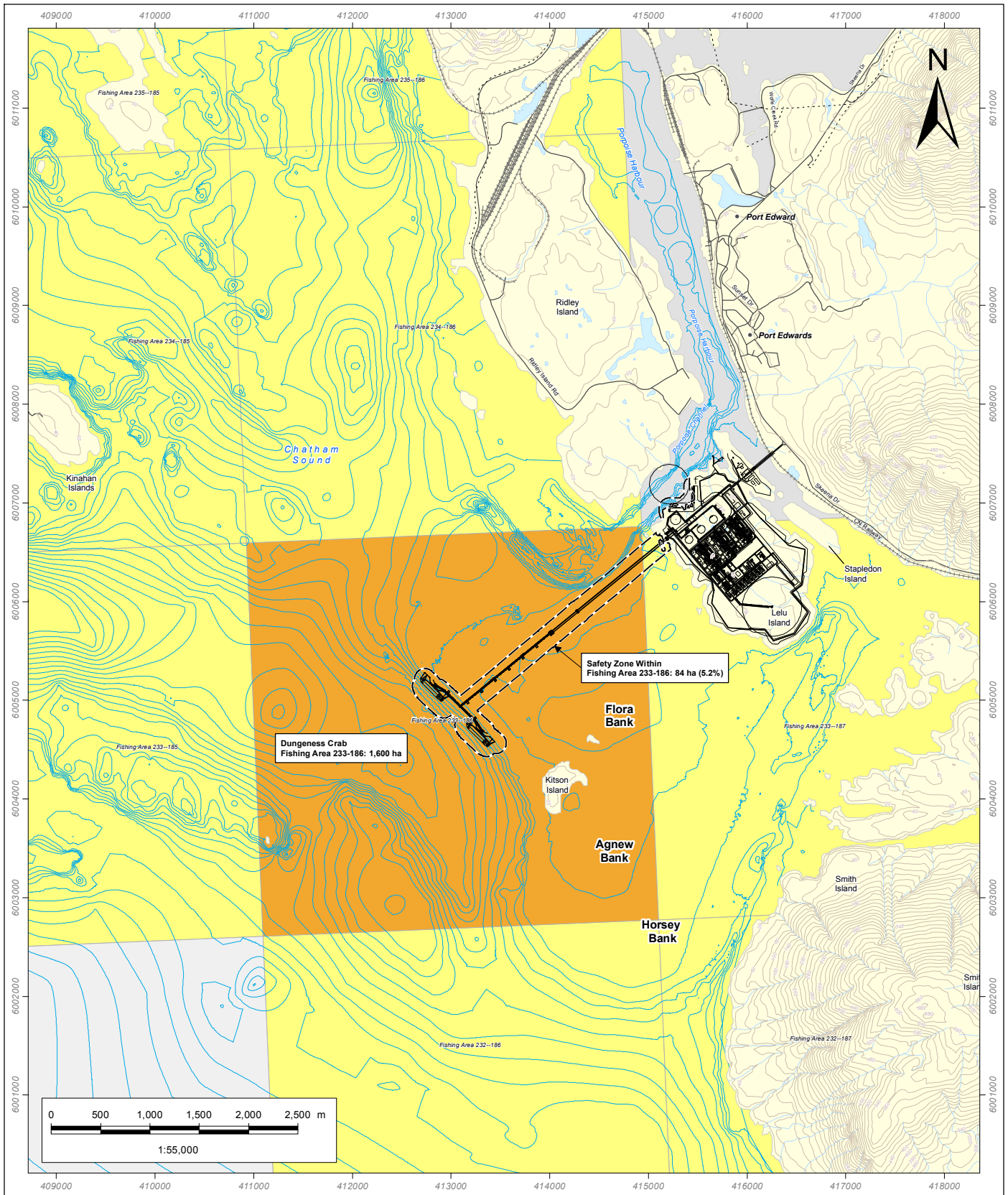


<p>Pacific NorthWest LNG Identified and Extrapolated Marine Navigation Routes for Current Use for Traditional Purposes EIS ADDENDUM</p> <p><small>Sources: Government of British Columbia; Prince Rupert Port Authority; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Progress Energy Canada Ltd.</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>		<p>PREPARED BY: </p> <p>PREPARED FOR: </p> <p>FIGURE NO: 15-14</p>
<p>DATE: 20-NOV-14 FIGURE ID: 123110537-850 DRAWN BY: N. PUREWAL</p>	<p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: J. HERBERT</p>	

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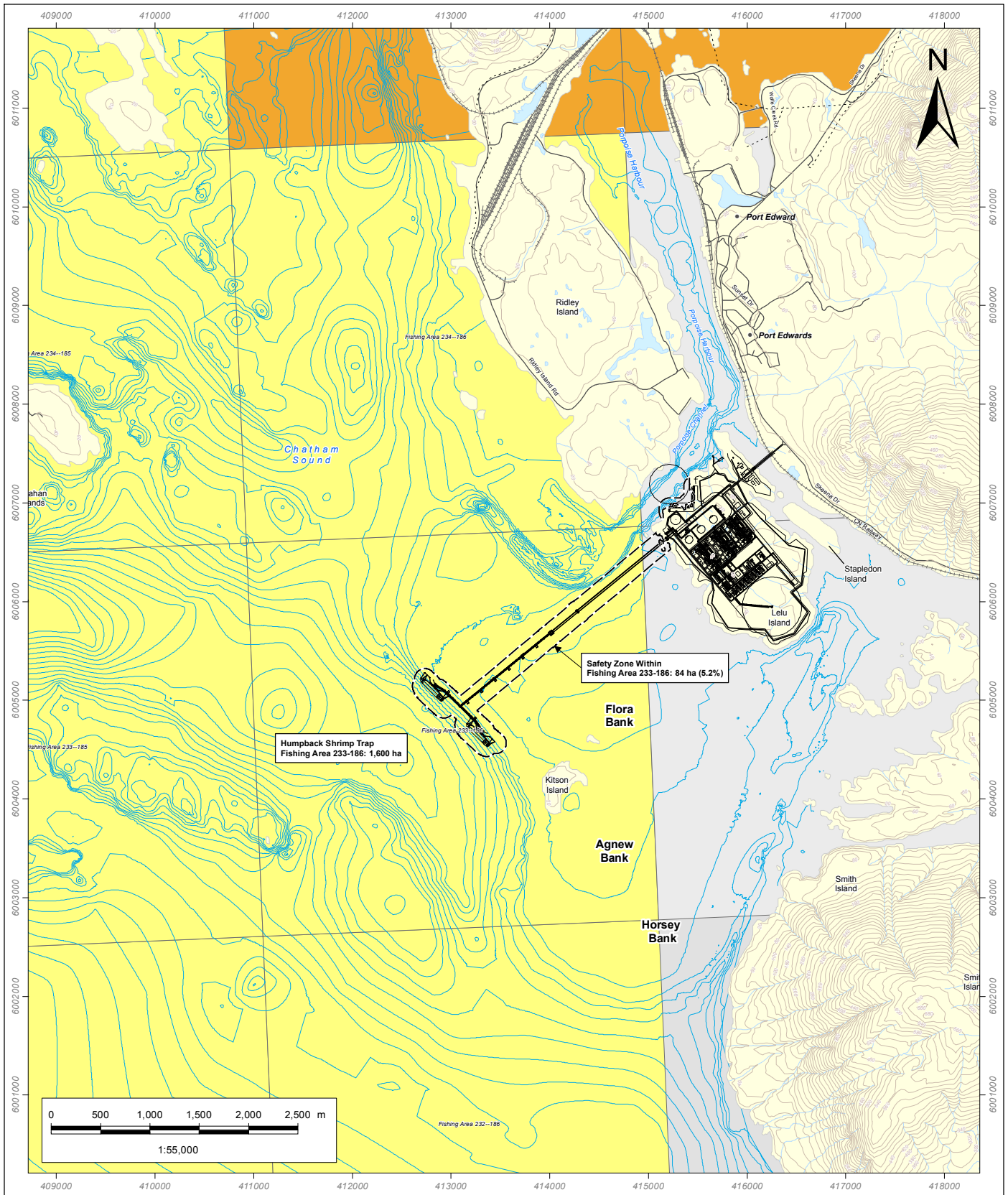


<p>— Project Component</p> <p>● City or Town</p> <p>▭ 100 m Marine Infrastructure Safety Zone</p> <p>Salmon Gillnet Effort, 2007</p> <p>Boat Days</p> <p>0</p> <p>1 - 207</p> <p>208 - 570</p> <p>571 - 1,006</p> <p>— Road</p> <p>++++ Railway</p> <p>— River or Stream</p> <p>Indian Reserve</p> <p>— Prince Rupert Port Authority Boundary</p> <p>Protected Area</p> <p>Waterbody</p>	<p>Pacific NorthWest LNG</p> <p>Commercial Fishing Data: Salmon Gillnet Effort (2007)</p> <p>EIS ADDENDUM</p> <p><small>Sources: Government of British Columbia; Prince Rupert Port Authority; Government of Canada; Natural Resources Canada; Centre for Topographic Information; Progress Energy Canada Ltd.</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>		<p>PREPARED BY:</p> <p>Stantec</p>
	<p>DATE: 20-NOV-14</p> <p>FIGURE ID: 123110537-292</p> <p>DRAWN BY: R. CAMPBELL</p>		<p>PROJECTION: UTM - ZONE 9</p> <p>DATUM: NAD 83</p> <p>CHECKED BY: D. BAISCH</p>
	<p>PREPARED FOR:</p> <p>Pacific NorthWest LNG</p>		<p>FIGURE NO:</p> <p>15-15</p>



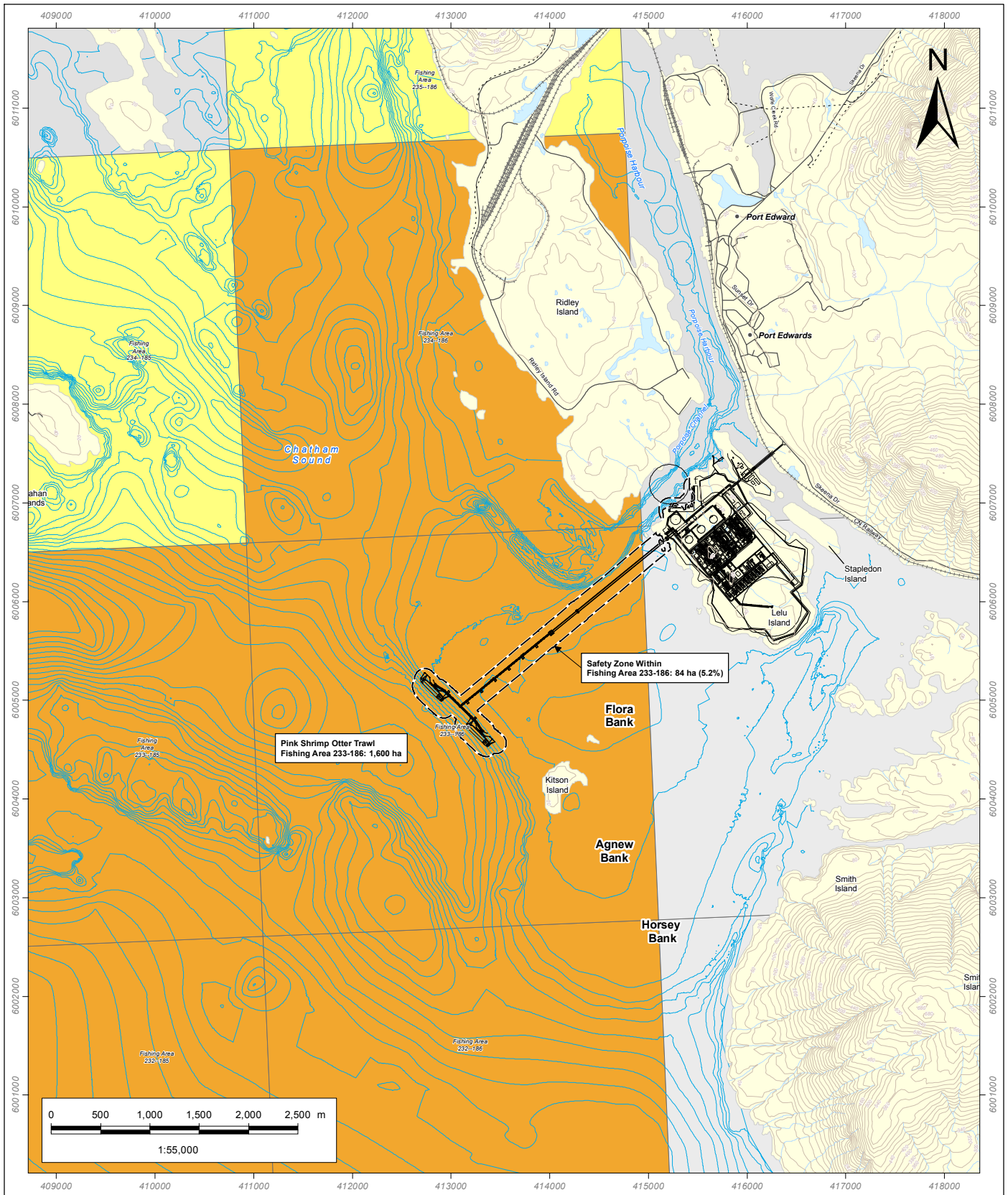
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<ul style="list-style-type: none"> — Project Component □ 100 m Marine Infrastructure □ Safety Zone Commercial Fisheries Dungeness Crab Landings (2001 -2009) (Kg) 27 - 106,272 106,272 - 337,023 337,023 - 1,076,212 No Data 	<ul style="list-style-type: none"> ● City or Town — Contour (m) +++ Railway — Road — Bathymetry 	<p>Pacific NorthWest LNG</p> <p>Marine Infrastructure Safety Zone Within Dungeness Crab Fishing Area 233-186</p> <p><i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011; British Columbia Marine Conservation Analysis (BCMCA), 2012.</small></p> <p><small>Vector digital data for groundfish, prawn and shrimp, crab, salmon and anadromous fish available at http://bcmca.ca/data/features/</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>						
		<p>PREPARED BY:</p> <p> Stantec</p> <p>PREPARED FOR:</p> <p> Pacific NorthWest LNG</p> <p>FIGURE NO:</p> <p style="font-size: 24pt; font-weight: bold; text-align: center;">15-16</p>						
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FIGURE ID: 123110537-650	DATUM: NAD 83							
DRAWN BY: M. BATE	CHECKED BY: M. PROUDFOOT							



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<p>— Project Component</p> <p>● City or Town</p> <p>□ 100 m Marine Infrastructure Safety Zone</p> <p>Commercial Fisheries</p> <p>Humpback Shrimp Trap Landings (2001-2009) (Kg)</p> <p>4 - 3,103</p> <p>3,104 - 11,183</p> <p>11,184 - 67,829</p> <p>No Data</p>	<p>— Contour (m)</p> <p>— Railway</p> <p>— Road</p> <p>— Bathymetry</p>	<p align="center">Pacific NorthWest LNG</p> <p align="center">Commercial Fishing Data: Cumulative Humpback Shrimp Trap Landings (2001-2009)</p> <p align="center"><i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011; British Columbia Marine Conservation Analysis (BCMCA), 2012.</small></p> <p><small>Vector digital data for groundfish, prawn and shrimp, crab, salmon and anadromous fish available at http://bcmca.ca/data/features/</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p> <p>DATE: 20-NOV-14 FIGURE ID: 123110537-650 DRAWN BY: M. BATE</p> <p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: M. PROUDFOOT</p>	<p>PREPARED BY:</p> <p align="center"></p> <p>PREPARED FOR:</p> <p align="center"></p> <p>FIGURE NO:</p> <p align="center">15-17</p>
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<p>— Project Component</p> <p>□ 100 m Marine Infrastructure</p> <p>□ Safety Zone</p> <p>Commercial Fisheries</p> <p>Pink Shrimp Otter Trawl Landings (2000-2009) (Kg)</p> <p>101 - 10,396</p> <p>10,397 - 56,090</p> <p>56,091 - 185,339</p> <p>No Data</p>	<p>● City or Town</p> <p>— Contour (m)</p> <p>+++ Railway</p> <p>— Road</p> <p>— Bathymetry</p>	<p align="center">Pacific NorthWest LNG</p> <p align="center">Commercial Fishing Data: Cumulative</p> <p align="center">Pink Shrimp Otter Trawl Landings (2000-2009)</p> <p align="center"><i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011; British Columbia Marine Conservation Analysis (BCMCA), 2012.</small></p> <p><small>Vector digital data for groundfish, prawn and shrimp, crab, salmon and anadromous fish available at http://bcmca.ca/data/features/</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p> <p>DATE: 20-NOV-14 FIGURE ID: 123110537-650 DRAWN BY: M. BATE</p> <p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: M. PROUDFOOT</p>	<p>PREPARED BY:</p> <p align="center"></p> <p>PREPARED FOR:</p> <p align="center"></p> <p>FIGURE NO:</p> <p align="center">15-18</p>
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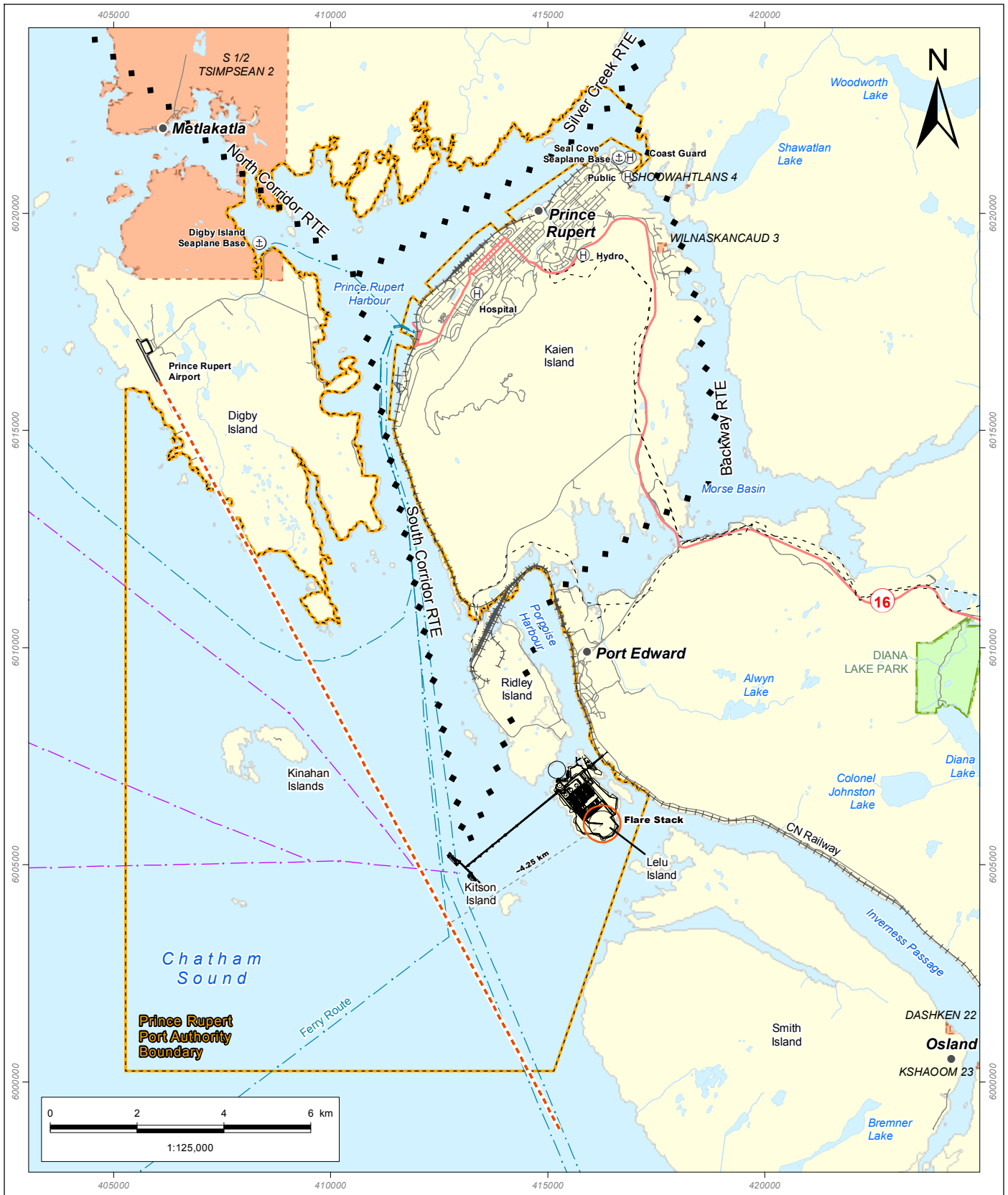
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<ul style="list-style-type: none"> — Project Component □ 100 m Marine Infrastructure Safety Zone Bathymetry — >= 40 m — < 40 m ● City or Town 	<ul style="list-style-type: none"> — Contour (m) +++ Railway — Road Shoals ■ Agnew Bank ■ Flora Bank ■ Horsey Bank 	<p>Pacific NorthWest LNG Bathymetry of the Marine Safety Zone: Humpback Shrimp Fishing Potential <i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011; British Columbia Marine Conservation Analysis (BCMCA), 2012.</small></p> <p><small>Vector digital data for groundfish, prawn and shrimp, crab, salmon and anadromous fish available at http://bcmca.ca/data/features/</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>						
		<p>PREPARED BY:</p> <p style="text-align: center;"></p> <p>PREPARED FOR:</p> <p style="text-align: center;"></p> <p>FIGURE NO:</p> <p style="text-align: center; font-size: 24pt;">15-19</p>						
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">DATE: 20-NOV-14</td> <td style="width: 50%;">PROJECTION: UTM - ZONE 9</td> </tr> <tr> <td>FIGURE ID: 123110537-650</td> <td>DATUM: NAD 83</td> </tr> <tr> <td>DRAWN BY: T. CARDINAL</td> <td>CHECKED BY: M. PROUDFOOT</td> </tr> </table>	DATE: 20-NOV-14	PROJECTION: UTM - ZONE 9	FIGURE ID: 123110537-650	DATUM: NAD 83	DRAWN BY: T. CARDINAL	CHECKED BY: M. PROUDFOOT
DATE: 20-NOV-14	PROJECTION: UTM - ZONE 9							
FIGURE ID: 123110537-650	DATUM: NAD 83							
DRAWN BY: T. CARDINAL	CHECKED BY: M. PROUDFOOT							



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<ul style="list-style-type: none"> — Project Component — Contour (m) — 100 m Marine Infrastructure Safety Zone — Bathymetry — >= 40 m — < 40 m ● City or Town 	<ul style="list-style-type: none"> —+—+ Railway — Road Shoals — Agnew Bank — Flora Bank — Horsey Bank 	<p>Pacific NorthWest LNG PNW Marine Terminal and Berth: 100 Metre Marine Safety Zone</p> <p><i>EIS ADDENDUM</i></p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Fisheries and Oceans Canada, 2011; British Columbia Marine Conservation Analysis (BCMCA), 2012.</small></p> <p><small>Vector digital data for groundfish, prawn and shrimp, crab, salmon and anadromous fish available at http://bcmca.ca/data/features/</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>						
		<p>PREPARED BY:</p> <p style="text-align: center;"></p> <p>PREPARED FOR:</p> <p style="text-align: center;"></p> <p>FIGURE NO:</p> <p style="text-align: center; font-size: 24pt;">15-20</p>						
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DATE: 10-DEC-14	PROJECTION: UTM - ZONE 9							
FIGURE ID: 123110537-650	DATUM: NAD 83							
DRAWN BY: T. CARDINAL	CHECKED BY: M. PROUDFOOT							



<ul style="list-style-type: none"> ● City or Town ⊕ Seaplane ⊙ Helicopter - - - Electrical Power Transmission Line - - - Ferry Route - - - Flight Path to/from Prince Rupert Airport — Project Component 	<ul style="list-style-type: none"> — Project Shipping Route — Highway — Railway — Secondary Road ◆ VFR Routes ◆ Watercourse 	<ul style="list-style-type: none"> ▭ Airport Runway ▭ Emergency Flaring Heat Flux Bubble ▭ Indian Reserve ▭ Prince Rupert Port Authority Boundary ▭ Protected Area ▭ Waterbody 	<p align="center">Pacific NorthWest LNG Airports, Seaplane Bases, Heliports, and VFR Routes near the Project and Emergency Flaring Heat Flux Bubble EIS ADDENDUM</p> <p><small>Sources: Government of British Columbia; Prince Rupert Port Authority; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Progress Energy Canada Ltd.; Det Norske Veritas, 2013a.</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>	<p>PREPARED BY: </p> <p>PREPARED FOR: </p> <p>FIGURE NO: 15-21</p>
<p><small>* Maximum estimated flammable hazard zone associated with a credible release of LNG from the trestle pipeline or loading arm infrastructure at the marine terminal (1,850 m radius), or an LNG vessel along the shipping routes (1,700 m radius). Source: Det Norske Veritas 2013a.</small></p>			<p>DATE: 20-NOV-14 FIGURE ID: 123110537-825 DRAWN BY: T. CARDINAL</p>	<p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: N. MACLEOD</p>

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