Appendix H
Human and Ecological Health

Appendix H.1
Human and Ecological Health
Information Request #1

Pacific NorthWest LNG

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October 23, 2014

Catherine Ponsford
Project Manager
Canadian Environmental Assessment Agency
Pacific and Yukon Regional Office
410-701 Georgia Street West
Vancouver, BC V7Y 1C6

Dear Ms. Ponsford:

Reference: Human and Ecological Health Information Request #1

This letter and attached figure respond to the request for Outstanding Information received from the Canadian Environmental Assessment (CEA) Agency on August 14, 2014.

Information Request #1 – Canadian Environmental Assessment Agency

Government of Canada – Elaboration on Outstanding Information:

An Ecological Health Risk Assessment was described in Section 19 of the EIS. In the discussion of baseline sediment quality, arsenic, copper, PAHs, PCBs, and PCDD/Fs were addressed. However, in the discussion of potential effects and characterization of residual effects, only PCDD/Fs were addressed.

Update the portion of the Ecological Health Risk Assessment that assesses sediment quality health risks to marine ecological receptors to include arsenic, copper, PAHs, PCBs, as well as PCDD/Fs, or provide a rationale as to why these chemicals weren't included. Update the Ecological Health Risk Assessment based on the additional tissue sampling requested in Human and Ecological Heath IR #1.

Pacific NorthWest LNG (PNW LNG) – Response:

The risk assessment considered the potential for arsenic, copper, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and polychlorinated dibenzo-p-dioxin and furan (PCDD/Fs) to change the degree of risk to ecological receptors. Chemicals that would not increase the risk to wildlife receptors were screened out and not evaluated further. The chemicals that were screened out include arsenic, copper, PAHs and PCBs.

Section 19.3.2.5 of the Environmental Impact Statement (EIS) describes PAHs and PCBs in the sediment. PAHs were not detected in 95% of 82 sediment samples. PCBs were not detected in 99% of 85 sediment samples. In the remaining samples, traces of PAHs and PCBs were only detectable. No samples were above sediment quality guidelines.

Existing concentrations of PAHs and PCBs are orders of magnitudes below guidelines. The Project will not release any PAHs or PCBs into the environment. Increased exposure to PAHs and PCBs was therefore considered to be an inoperable pathway that cannot increase ecological risk.

For arsenic and copper, Section 19.3.2.5 of the EIS indicates that these elements are naturally occurring. Sediment cores down to 15.6 meters showed similar arsenic and copper concentrations. In order for ecological risk to increase from exposure to a chemical, the chemical dose to the receptor must increase. The Project does not release any arsenic or copper into the environment and doses of arsenic and copper to marine life will not increase beyond what is already present. Increased exposure to arsenic and copper was therefore considered to be an inoperable pathway that cannot increase ecological risk.

Information Request #1 – Annex 2 i) 1a

Government of Canada – Outstanding Information:

In the HHRA it is not clear from which locations Dungeness crab and Macoma clams were collected. Although 9 crab locations and 2 clam locations are noted on Figure 3 of the HHRA, these locations are not labelled and cannot be linked to the sample ID. The crab sample IDs (PRGT13-Crab1 to –Crab8, and PNW13Crab1 to –Crab8) suggest only two sample locations for crab.

PNW LNG – Response:

The UTM coordinates for all tissue samples are provided in Table 1 and mapped on Figure 1. The sample codes correspond to the codes in Appendix Q-3 of the EIS showing the raw laboratory analytical results.

Table 1: Tissue Sampling Locations

Figure 1 Map Code	UTM Zone	Easting	Northing	Sample code	Species
Crab Samples					
1	9	415798	6007878	PNW13-CRAB1 and 2	*Metacarcinus magister*
2	9	415675	6007493	PNW13-CRAB3	*Metacarcinus magister*
3	9	415390	6007103	PNW13-CRAB6	*Metacarcinus magister*
4	9	415364	6007085	PNW13-CRAB7 and 8	*Metacarcinus magister*
5	9	414946	6006460	PNW13-CRAB4	*Metacarcinus magister*
6	9	414558	6006631	PNW13-CRAB5	*Metacarcinus magister*
7	9	415994	6005226	PRGT-CRAB1 to 4	*Metacarcinus magister*
8	9	415437	6004160	PRGT-CRAB6 to 8	*Metacarcinus magister*
9	9	415018	6001575	PRGT-CRAB5	*Metacarcinus magister*
10	9	412934	6004823	PNW13-PRAWN1 to 8	*Pandalus hypsinotus*
11	9	415743	6007353	PNW13-CLAM1 to 6	*Macoma sp.*
12	9	415337	6006959	PNW13-CLAM7 and 8	*Macoma sp.*
13	9	416848	6006379	PRGT-CLAM-COMPOSITE1 to 8	*Macoma sp.*

Information Request #1 – Annex 2 i) 1b

Government of Canada – Outstanding Information:

It is also not clear why crab would be sampled from locations noted on the south side of Flora Bank. These locations are well beyond the area of impact identified as part of sediment plume modelling (HHRA Figures 8 and 9).

PNW LNG – Response:

Dungeness crabs and clams were collected on the south side of Flora Bank as part of the Prince Rupert Gas Transmission (PRGT) pipeline project that feeds natural gas to the facility on Lelu Island. The pipeline approaches Lelu Island from the south and may require trenching in the shallow areas close to shore. Tissue samples from both projects were combined to increase the sample size and the spatial coverage of the general area under baseline conditions.

Information Request #1 – Annex 2 i)1c

Government of Canada – Outstanding Information:

Shrimp were collected from only one location (approximately 800 m west of the proposed main terminal berth dredge area). A location closer to the subject location may be more appropriate for impact monitoring. Also, if possible, a second location northeast of the proposed MOF in Porpoise Channel would be helpful to monitor flow tide impacts from the MOF dredge project.

PNW LNG – Response:

Pandalus prawns normally inhabit areas at least 70 m deep, but can occasionally be found in the intertidal area (Fisheries and Oceans Canada, 2014). Areas near Lelu Island (i.e., Porpoise Harbour, Porpoise Channel, Flora Bank, Agnew Bank and Horsey Bank) are less than 20 m deep.

Prawn and crab traps were set concurrently within a 3 km radius of Lelu Island. Nine of these locations yielded harvestable sized crabs but no prawns (Figure 1). The waters west of Horsey Bank increase in depth rapidly. A final attempt to collect prawns was made in this area, which yielded eight composite prawn samples.

The low prawn population in shallow waters may not support traditional, commercial or recreational prawn harvesters in the area. Prawns will likely be substituted with a different benthic marine species that is harvested locally and consumed by people.

Information Request #1 – Annex 2 i) 2

Government of Canada – Outstanding Information:

That crabs of legal weight be collected as part of the monitoring program, since some contaminants (dioxins and furans) will accumulate in tissue, and legal size crabs are most likely to be consumed. It is stated in the HHRA, Section 2.3.5 that the crabs collected were suitable for human consumption which suggests legal size (carapace width of 165 mm). The average weight of market Dungeness crab is in the range of 0.9 kg and the muscle meat can be approximated at 25% of the total weight or 200 g (http://www.dfo-mpo.gc.ca/csas/Csas/status/1999/C6-01e.pdf). It is not clear whether the sample size analyzed (average 16 g) was a subset of the total crab meat or if crabs collected were not of legal size. Assessment of undersize crabs could underestimate risk.

PNW LNG – Response:

All Dungeness crabs collected exceeded the legal harvesting size based on carapace width. There is no underestimation of health risk from undersized crabs. Crabs were dissected by ALS Laboratories yielding one tissue sample per crab. Future reporting of crabs will include the carapace length and body weight to compare dioxin concentrations with animal size.

Information Request #1 – Annex 2 i) 3

Government of Canada – Outstanding Information:

Crab hepatopancreas was not analyzed for dioxins and furans. Contaminants tend to accumulate in the hepatopancreas and may be detected at concentrations more than ten times that of the crab muscle. Since the FNFNES study results indicate that First Nations within ecozone #6, which includes the Kitsumkalum First Nation are consumers of crab hepatopancreas, the lack of crab hepatopancreas data is a significant uncertainty that will require further assessment. It was stated in section 2.3.5 that tissue collected was less than 1 g, which complicated analysis and assessment. As mentioned above, it is not clear that crabs of legal size were collected. Average crab hepatopancreas should be in the range of 40 g (http://www.dfo-mpo.gc.ca/Library/332030.pdf).

PNW LNG – Response:

A subset of 4 crabs collected for the Project was selected for dioxin and furan analysis in the hepatopancreas. The analytical results for one of the crabs had higher than normal detection limits because a low volume of tissue was used for the analysis. The US EPA method for measuring dioxins and furans in tissue recommends sample weights of 20 grams to achieve the lowest detection limit achievable using the

documented analytical method (US EPA, 1994). This is not a mandatory requirement for analysis. Minimum detection limits increase as tissue sample weight decreases.

Table 2 shows the tissue data presented in the Human Health Risk Assessment (HHRA), and the summary statistics of the three crab hepatopancreas samples. The dioxin concentration in crab hepatopancreas is lower than in prawns and clams. Prawns and clams are also consumed by a greater proportion of coastal First Nations in greater frequencies and quantities compared to crab hepatopancreas (Chan et al. 2011). Chan et al. listed the top 10 seasonally consumed traditional country foods for Coastal First Nations in Ecozone #6 for which prawns and clams ranked 9th and 10th, respectively (Chan et al. Table 7g). Crabs are not ranked among the top 10 traditional country foods. Furthermore, only 2% of study participants consumed crab hepatopancreas (Chan et al. Table 6).

The health risk (i.e., hazard quotient) quantified for prawns and clams in the HHRA are more conservative than for crab hepatopancreas. Therefore, the absence of more hepatopancreas samples is not a significant data gap. However, PNW LNG has committed to additional heptopancreas sampling, which is currently underway. It should be noted that tissue sampling is intended to evaluate a subset of relevant marine species that are consumed by people. It is not intended, nor is it feasible, to evaluate all species of marine seafood that is present in the study area.

Table 2: Summary of Dioxin and Furan Toxic Equivalency in Marine Tissues

Tissue Type	Sample Size	Average Sample Weight (grams)	Toxic Equivalency (ng TEQ/kg wet weight)		
			Lower-bound Average[2]	Mid-bound Average[3]	Upper-bound Average[4]
Crab	16	16	0.01	0.06	0.11
Prawn[1]	8	2.5	0.03	0.46	0.87
Clam[1]	16	4.3	0.06	0.53	0.91
All samples	40	8.6	0.04	0.33	0.58
Crab hepatopancreas	3	19.8	0.12	0.21	0.24

[1] Analysis based on low tissue yield resulting in higher detection limits.
[2] Non-detectable concentrations assumed to equal zero.
[3] Non-detectable concentrations assumed to be 50% of the method detection limit.
[4] Non-detectable concentrations assumed to be 100% of the method detection limit.
Toxic equivalencies (TEQ) calculated using the mammalian toxic equivalency factors (WHO 2011).
Health Canada seafood harvesting ban applies when tissues exceed 15 ng TEQ/kg wet weight.
US FDA recommends people do not eat fish or shellfish containing more than 50 ng TEQ/kg wet weight.

Information Request #1 – Annex 2 i) 4

Government of Canada – Outstanding Information:

Clam samples should be composited, as necessary, to produce sufficient mass to achieve appropriate sample detection limits. It was stated in Technical Memorandum Section 13 Marine Resources (June 22, 2014) that detection limits for clams were high due to low tissue samples, however it is not clear why the samples were not composited.

PNW LNG – Response:

Clams were composited as noted in the sample descriptions in Appendix Q-3 (Baseline Concentrations of Dioxins and Furans in Marine Tissues) because individual clams were too small to yield sufficient tissue for analysis. Clams sizes typical for human consumption were not found on the shores of Lelu Island.
Clams collected at all three sites on Lelu Island averaged 5 mm in diameter. Each composite clam sample contained approximately 20 clams, and most composites yielded less than 4 grams of tissue. Because the

clams found on the shores of Lelu Island are not typically consumed, clams may be substituted with a different benthic marine species that is harvested locally and consumed by people.

Information Request #1 – Annex 2 i) 5

Government of Canada – Outstanding Information:

That human health risk assessments should consider all receptor age groups (e.g., toddler, child) when assessing potential human health risks from the consumption of country foods. In the Proponent's HHRA, only adults were assessed for the country foods consumption pathway. Health Canada typically applies a body weight of 16.5 kg for a toddler and 32.9 kg for a child (HC PQRA Part 1, 2012). Health Canada has estimated fish consumption rates for children and toddlers of heavy consumers of seafood based on the consumption frequencies of the adults with an adjustment for portion sizes (child: 84% of adult portion, toddler: 50% of adult portion, Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption, March 2007).

PNW LNG – Response:

Revised health risks to toddlers and children consuming prawns, clams and crabs are presented in Table 3. The hazard quotients are calculated by applying toddler and child body weights (16.5 kg and 32.9 kg, respectively) and consumption rates (50% and 84% of adult consumption rate, respectively). Hazard quotients for adults from the HHRA report are also presented for comparison. The updated hazard quotients indicate that health risks from eating crabs, prawns and clams are below the health risk threshold of 0.2 as defined by Health Canada's guidance on conducting risk assessments.

Table 3: Human Health Risks from Consuming Marine Traditional Country Foods

	Hazard Quotient (unitless)								
	Toddler			Child			Adult		
Country Food	Lower-bound	Mid-bound	Upper-bound	Lower-bound	Mid-bound	Upper-bound	Lower-bound	Mid-bound	Upper-bound
Crab	0.0016	0.0096	0.0176	0.0013	0.0081	0.0148	0.0003	0.0018	0.0033
Prawn[1]	0.0061	0.0934	0.1766	0.0051	0.0787	0.1488	0.0011	0.0175	0.0331
Clam[1]	0.0071	0.0631	0.1084	0.0060	0.0532	0.0913	0.0013	0.0118	0.0203

Threshold HQ = 0.2

[1] HQ based on tissue data from low tissue yield resulting in higher detection limits in the laboratory.

[2] Non-detectable concentrations assumed to equal zero.

[3] Non-detectable concentrations assumed to be 50% of the method detection limit.

[4] Non-detectable concentrations assumed to be 100% of the method detection limit.

Information Request #1 – Annex 2 i) 6

Government of Canada – Outstanding Information:

That the summed risk be considered when assessing hazard quotients, and when setting recommended maximum weekly intakes and communicating this information to the public. It is not clear from the HHRA whether risks were summed for all foods. It may be helpful to provide a table of the percent of the tolerable daily intake (TDI) that would be used for each country food if 1 meal/wk was consumed.

PNW LNG – Response:

The revised summed health risk associated with the evaluated marine country food species for toddler, child and adult are presented in Table 4.

The summed HQs are conservative because they are based on the upper 95th percentile of consumption rates for each food. Summing hazard quotients based on the upper 95th percentile of consumption rates assumes a single individual would be consuming crab, prawn and clam at a rate close to the maximum

reported among BC First Nations. This could overestimate the amount of food that a typical person could reasonably be able to eat and overestimate the actual health risk.

The total risk to toddlers and children for the upper-bound (most conservative) case is above the HQ threshold of 0.2. This does not imply that a health risk exists due to the conservative assumptions. When dioxins are undetectable in the tissues, the upper-bound case assumes that dioxins exist at concentrations equal to the detection limit. Approximately 70% of dioxin congeners were undetectable in tissues. This has a substantial influence on decreasing the lower-bound value and increasing upper-bound values.

The upper-bound summed HQ suggests that the total dioxin exposure to toddlers and children consuming locally harvested crabs, prawns and clams is greater than 20% of Health Canada's tolerable intake. The remaining 80% of dioxins may come from other exposure routes (e.g., inhalation, dermal contact). However, Health Canada estimates that 90% of a person's exposure to dioxins is from food exposures (Health Canada 2005).

Table 4: Hazard Quotients from Exposures to Dioxins and Furans in Marine Country Foods

	Hazard Quotient (unitless)								
	Toddler			Child			Adult		
Country Food	Lower-bound[2]	Mid-bound[3]	Upper-bound[4]	Lower-bound[2]	Mid-bound[3]	Upper-bound[4]	Lower-bound[2]	Mid-bound[3]	Upper-bound[4]
Crab	0.0016	0.0096	0.0176	0.0013	0.0081	0.0148	0.0003	0.0018	0.0033
Prawn[1]	0.0061	0.0934	0.1766	0.0051	0.0787	0.1488	0.0011	0.0175	0.0331
Clam[1]	0.0071	0.0631	0.1084	0.0060	0.0532	0.0913	0.0013	0.0118	0.0203
Additive Risk	0.0148	0.1661	0.3026	0.0124	0.14	0.2549	0.0027	0.0311	0.0567

Based on HQ threshold = 0.2
[1] HQ based on tissue data from low tissue yield resulting in higher detection limits in the laboratory.
[2] Non-detectable concentrations assumed to equal zero.
[3] Non-detectable concentrations assumed to be 50% of the method detection limit.
[4] Non-detectable concentrations assumed to be 100% of the method detection limit.

Information Request #1 – Annex 2 ii)

Government of Canada – Outstanding Information:

HC continues to note that activities conducted during the construction and operational phases of the project, such as dredging of the marine sediment, could potentially elevate the concentrations of arsenic, copper and PCDD/F in the surrounding area through sediment circulation and dispersion. Total suspended solid (TSS) modelling was conducted for dredging activities and shows elevated TSS concentrations above background levels (HHRA, Section 6.3.2.3 Project Effects to Total Suspended Solids). Consequently, this is a viable exposure pathway of these COPCs in marine country foods, and should be considered in future country foods assessment work prior to construction.

PNW LNG – Response:

As part of any future food monitoring program conducted by PNW LNG, arsenic and copper analysis will be included for all future marine country food samples to inform food harvesters on the quality of locally harvested marine foods.

The concept that contaminants in the sediment may be re-introduced into the water is valid when the contaminants are buried or capped under clean sediment (US EPA 2005). In that case, the act of dredging would penetrate the layer of clean sediment and disturb the underlying sediments containing contaminants.

This scenario does not exist at the project dredging sites because dioxins are at the surface and are not buried.

For arsenic and copper, the concentrations in sediment are consistent from the surface to 15 m sediment depth. This suggests that arsenic and copper are naturally occurring in the environment, and not contaminants introduced by human activities. The geology of Canada is not homogenous and some metals frequently exceed environmental guidelines as a result of non-anthropogenic sources (Chapman and Wang 2000). There is no release of arsenic or copper from project activities and no changes to the concentrations of these metals are expected in the environment.

Information Request #1 – Annex 2 iii)

Government of Canada – Outstanding Information:

The country foods consumption patterns of local Aboriginal and non-Aboriginal communities. The proponent could omit (or include) specific exposure pathways for certain COPCs in country foods with an accompanying scientific rationale.

HC notes that the proponent used consumption rates from the First Nations Food, Nutrition and Environment Study (FNFNES) which focuses on First Nations from British Columbia in various ecozones/culture areas (Chan et al, 2011). The seafood consumption rates (crab, clams and shrimp) were estimated using the 95th percent upper confidence limit of the mean for First Nations in BC. These estimates may be low for coastal communities. Therefore, it would be most conservative for the Proponent to conduct a local food consumption study with one or more area First Nations to obtain community-specific information. Lax Kw'alaams in their EIS comments (#1408) note that "more information is needed to characterize harvesting rates in the affected areas for those species that are most likely to be affected by contamination". Any estimates of First Nation consumption rates should be compared with FNFNES Study, Canadian averages (Canadian Community Health Survey or other appropriate reference), and the more conservative estimate applied. If possible, "eaters" should be used to estimate consumption rates.

Further, it appears that the recommended maximum weekly intake for country foods does not account for PCDD/Fs from other sources. For example, the calculation in HHRA (Appendix 4) assumes a Hazard Quotient (HQ) threshold of 1, not 0.2. An HQ of 0.2 would allow for background contributions of PCDDs to the total daily intake as described in Section 6.2.1 of the HHRA.

PNW LNG – Response:

In Working Group meetings on February 24th and June 9th, 2014, Health Canada, Lax Kw'alaams and Metlakatla specifically requested that an HHRA should apply marine country food consumption rates from coastal Aboriginal communities when possible.

To accommodate this, the HHRA report applied the 95th upper percentile rate for the consumption for prawns, clams and crabs based on coastal and non-coastal First Nations in British Columbia (Chan et al. Table 28b). This was the most conservative consumption rate published in Chan et al. All other consumption rates in Chan et al. were less conservative – even if they were specific to coastal First Nations in Ecozone #6 - because they were based on average consumptions (Table 17 and 28a) instead of the 95th upper percentile.

It should be clarified that the concentrations of dioxins in the local sediment are very low, with an average range of 0.06 to 1.88 ng TEQ/kg. Most environments contain traces of contaminants, but the presence of a chemical does not imply the environment is "contaminated" without information on the concentrations present.

The BC Contaminated Sites Regulations uses benchmarks of 130 to 260 ng TEQ/kg to define a site as contaminated. The US EPA associates a low risk to fish when dioxin concentrations in sediment exceed 60 ng TEQ/kg and a high risk when concentrations exceed 100 ng TEQ/kg.

The concentration of dioxin in local marine seafood has been deemed safe for human consumption since 1995. The mid-bound average dioxin concentration of sampled marine foods was 0.33 ng TEQ/kg. In comparison, Health Canada bans seafood harvesting when dioxin concentrations exceed 15 ng TEQ/kg. The US Food and Drug Administration recommend people do not eat fish or shellfish containing more than 50 ng TEQ/kg.

The metric for which health risk is quantified is based on the hazard quotient (HQ) presented in Section 6.3.2 of the HHRA, also summarized in Table 3. This applied the standard HQ threshold of 0.2 when other exposure routes for dioxins may exist (e.g., air inhalation, dermal contact with soil).

The Recommended Maximum Weekly Intake (RMWI) is intended to illustrate the weekly consumption rate of a particular country food to exceed Health Canada's tolerable daily intake of dioxin (2.3 pg/kg body weight/day; or 16.1 pg/kg body weight/week), given that for most people, 90% of overall dioxin exposure comes from the diet (Health Canada 2005). The RMWI is not intended as a benchmark to evaluate risk.

Applying an HQ of 0.2 to the RMWI (rather than 1.0) would lower the RMWI in the HHRA report by 80%. This adjusted RMWI has been used to calculate the amount of meat from crabs, prawns and clams from the study area an adult would need to consume for their dioxin intake to reach the HQ-adjusted RMWI values (Table 7).

Table 7: Recommended Maximum Weekly Intake of Marine Country Foods

	Recommended Maximum Weekly Intake (kg/week)								
	Toddler			**Child**			**Adult**		
Country Food	Lower-bound[2]	Mid-bound[3]	Upper-bound[4]	Lower-bound[2]	Mid-bound[3]	Upper-bound[4]	Lower-bound[2]	Mid-bound[3]	Upper-bound[4]
Crab	5.39	0.90	0.49	10.75	1.79	0.98	24.99	4.17	2.27
Prawn[1]	1.80	0.12	0.06	3.58	0.23	0.12	8.33	0.54	0.29
Clam[1]	0.90	0.10	0.06	1.79	0.20	0.12	4.17	0.47	0.27

Based on an HQ threshold of 0.2
[1] RMWI based on tissue data from low tissue yield resulting in higher detection limits in the laboratory.
[2] Non-detectable concentrations assumed to equal zero.
[3] Non-detectable concentrations assumed to be 50% of the method detection limit.
[4] Non-detectable concentrations assumed to be 100% of the method detection limit.

Closure

This letter and the attached figure provide the Outstanding Information requested by the Government of Canada. If you have any questions, please contact PNW LNG.

Attachment: Figure 1: Tissue Sampling Locations

References

Chan, L.; Receveur, O.; Sharp, D.; Schwartz, H.; Ing, A.; and Tikhonov, C. 2011. First Nations Food, Nutrition and Environment Study (FNFNES): Results from British Columbia (2008/2009). Prince George. University of Northern British Columbia.

Fisheries and Oceans Canada. 2014. Aquatic species – Details for Prawn (Pandalus platyceros) http://www.dfo-mpo.gc.ca/species-especes/aquatic-aquatique/prawn-crevette-tachetee-eng.htm (Accessed August 2014).

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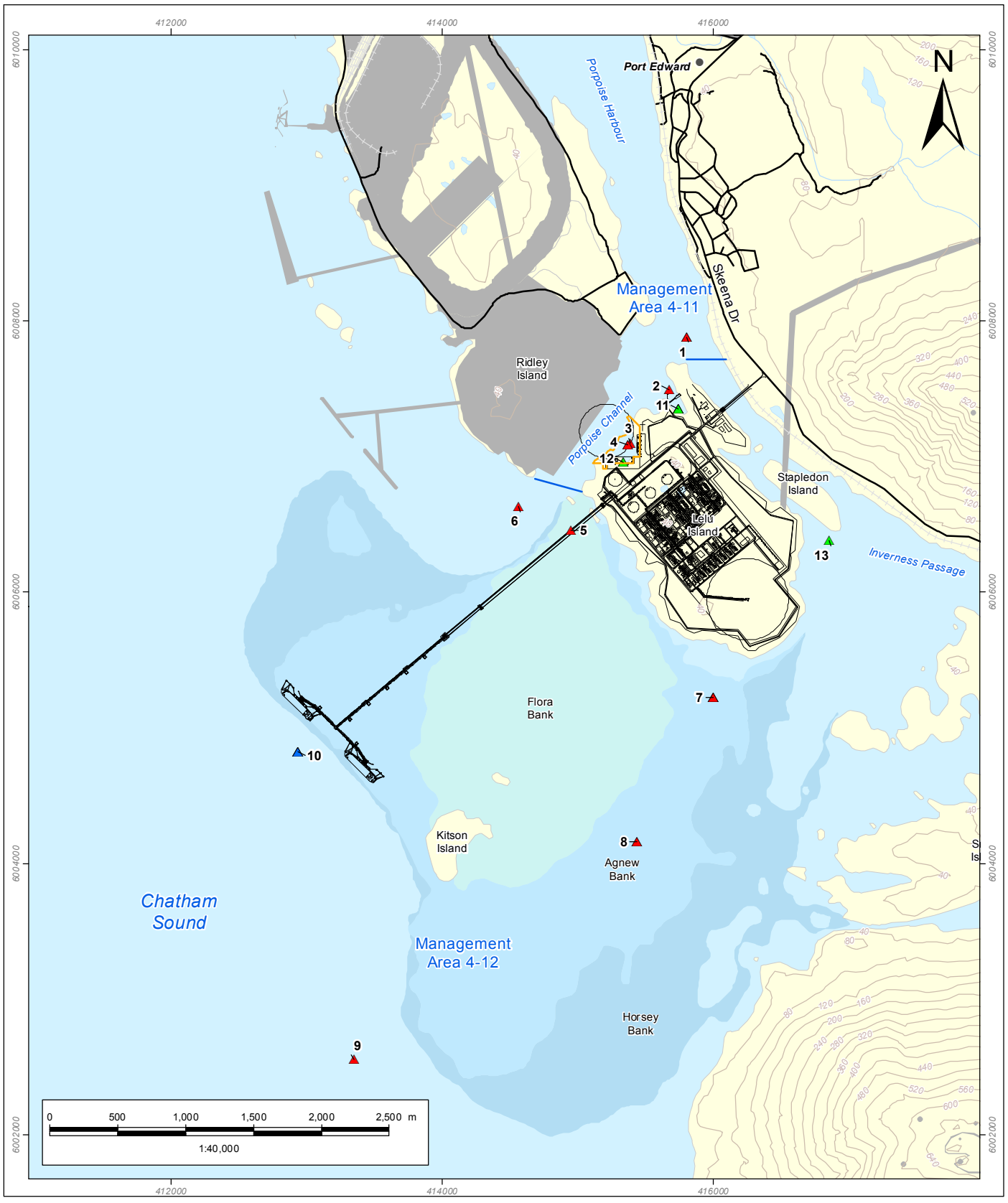
US EPA. 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. EPA-540-R-05-012.



- Clam Collection Area
- Crab Collection Area
- Prawn Collection Area
- Project Component
- Turning Basin
- Fisheries and Oceans Management Area Boundary
- Dredge Area
- Proposed or Existing Industrial Development
- City or Town
- Contour (m)
- Railway
- Road
- Watercourse
- Waterbody

Shoals

- Agnew Bank
- Flora Bank
- Horsey Bank

Pacific NorthWest LNG

Tissue Sampling Locations

Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Progress Energy Canada Ltd.; WorldView-2 Imagery. Imagery date: 2011.

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.

DATE: 13-NOV-14	PROJECTION: UTM - ZONE 9
FIGURE ID: 123110537-792	DATUM: NAD 83
DRAWN BY: D. COOK	CHECKED BY: G. MATHEWS

PREPARED BY: Stantec

PREPARED FOR: Pacific NorthWest LNG

FIGURE NO: 1

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