

Appendix G.6
Marine Resources
Information Request #18

December 12, 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: Marine Resources Information Request #18

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

Information Request #18

Government of Canada – Outstanding Information

DFO: *The request is to “assess all effects, including the localized effects on fish and fish habitat, from dredging operations”. The effects of turbidity have not been assessed. Please explain how turbidity resulting from the project will impact fish and fish habitat and the implications for significance determinations. The proponent has indicated impacts within the active work area. Please define the active work area. How large is the active work area?*

EC: *Please refer to Marine Resource IR #11 for outstanding information on sediment plume and deposition modelling.*

Government of Canada – Elaboration on Outstanding Information:

In addition to defining the “active work area”, define the physical limits of the “active dredge area” and “disposal area” referred to in the response memo. Report Predicted effects using the most accurate term(s).

Pacific NorthWest Limited Partnership (PNW LNG) – Response:

TSS and Turbidity

The updated design of the marine trestle and LNG carrier berth has eliminated the need to dredge in the marine terminal area. Dredging will now be required only for the materials off-loading facility (MOF). Baseline total suspended solids (TSS) levels in the MOF area were obtained from water samples collected 1 m below the surface during flood and ebb tides on July 25, 2013 (see Section 3.2.2.7 in Appendix L of the EIS). During flood tide the TSS level was 7.4 mg/L (1 sample), and during ebb tide the TSS level was 7.0 mg/L (1 sample; duplicate sample had 8.2 mg/L TSS). Additional water samples collected in January and February 2014 to the southwest of the MOF area (in the previously-identified marine berth dredge area) were analyzed for TSS and turbidity. The maximum levels measured were 2.7 mg/L TSS and 1.45 NTU turbidity. Samples collected on Flora Bank had maximum levels of 4.0 mg/L TSS and 1.68 NTU turbidity (see the "Follow-up Report on Sediment and Water Quality Associated with Construction of the Terminal Berth Area" technical report submitted June 24, 2014). The predicted TSS levels in the MOF area during dredging are shown in Figures 13-2 and 13-3 in Section 13 of the Environmental Impact Statement (EIS). During dredging operations, the maximum predicted TSS levels in the water column for the four tidal stages are as follows: 17.4 mg/L during flood flow; 41.9 mg/L during flood slack; 15.7 mg/L during ebb flow; and 37.0 mg/L during ebb slack. TSS levels in excess of 5 mg/L are predicted to occur within a relatively confined area on the southeast side of Porpoise Channel (see Section 2.4.2 in Appendix O of the EIS).

To relate modelled TSS values to turbidity values, sediment samples collected from within the Pacific NorthWest LNG Project (the Project) development area will be used to calculate the relationship between TSS and turbidity. The resultant relationship will be calculated prior to marine construction activities to allow turbidity values measured in the field during dredging to be converted to TSS values, which have been modelled for both dredging and disposal activities. The approximate relationship between TSS and turbidity as well as the effects of dredging in the MOF area on fish and fish habitat are discussed in the technical memorandum "Effects of Dredging and Disposal at Sea" submitted June 24, 2014. The memorandum concluded that the effects of TSS and turbidity generated during dredging and disposal at sea on marine fish and fish habitat would be temporary and localized.

For the assessment of project effects, the effect of change in turbidity on foraging ability of fish to find food is addressed within the context of the assessment of TSS effects; i.e., the elevated turbidity and TSS levels will occur in the same locations during dredging. As noted in modelling of the TSS plumes, concentrations will be higher than water quality guidelines within the active work area (defined below) and, through use of mitigation measures such as silt curtains, will meet guidelines outside of the active work area. The elevated turbidity levels are expected to affect fish foraging to some extent; however, the dredging will occur during winter (outside of the sensitive period for juvenile salmonids using the area) and fish will be able to move away from turbid water.

Active Work Area

The active work area during dredging is defined as the immediate area surrounding operating construction equipment within the marine infrastructure area. The marine infrastructure area is defined as the area of all in-water construction activities associated with the MOF, the marine terminal and LNG carrier berth, the pioneer dock and the Lelu Island access bridge. The marine infrastructure area is 56,732.32 m² and is shown in the attached Figure 1. This figure shows the most up-to-date (at the time of this submission) marine infrastructure area and MOF dredge area. The final area will be finalized during project permitting. At any given time during construction, in-water works will be occurring within only a portion of the marine infrastructure area.

The physical limits of the Brown Passage disposal area are shown in Section 13, Figure 13-4 of the EIS and are defined by the 1 nautical mile boundary defined by Environment Canada.

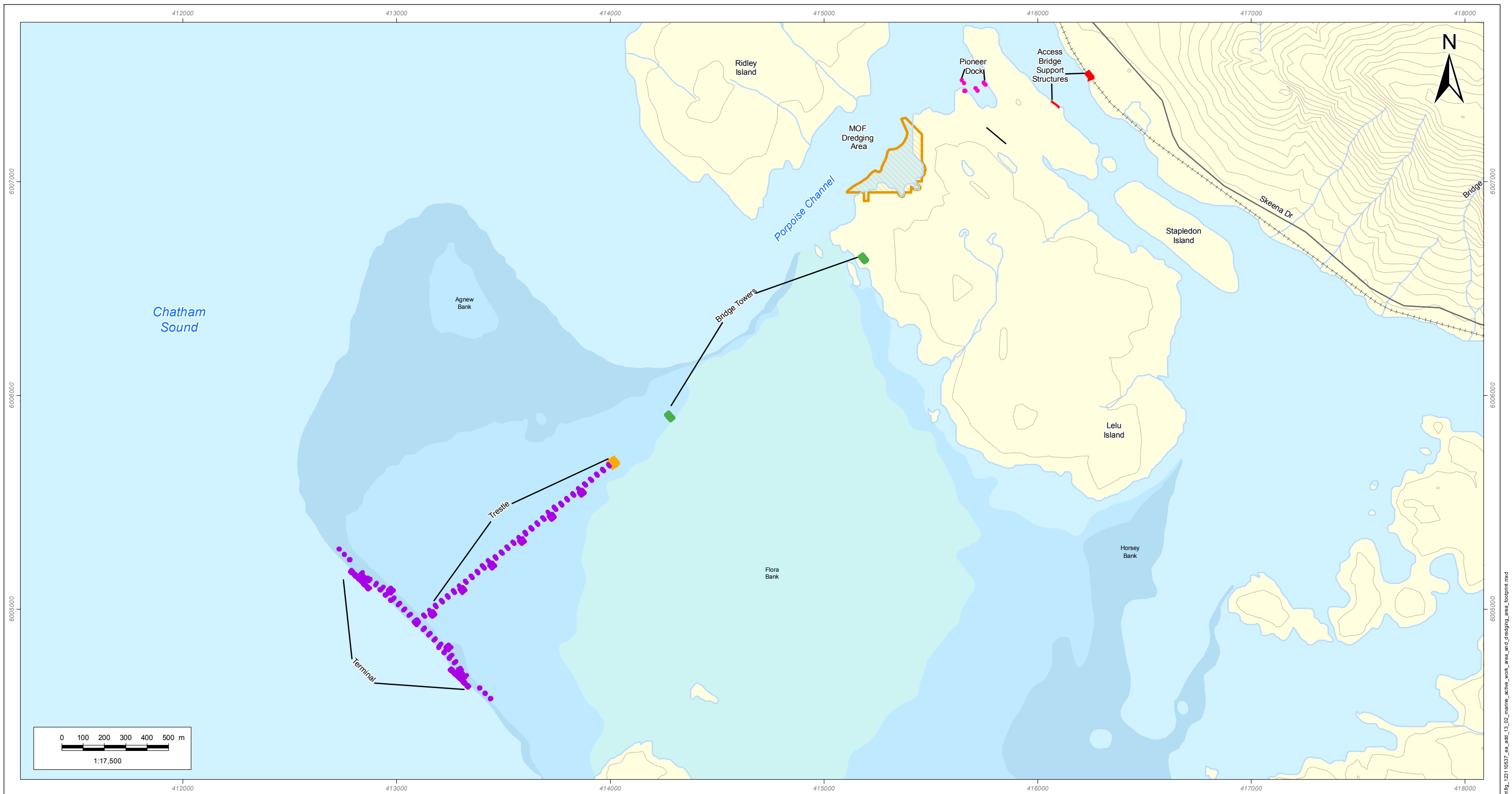
As stated in the EIS in section 13.5.4, the TSS effects associated with construction of the marine terminal, jetty piles and bridge footing is expected to be minimal due to highly localized sediment displacement and will largely be masked by the high amount of natural sedimentation from the Skeena River. The sediment plume created during dredging will be highest in a radius around the active dredge area and marine construction equipment. The physical limits of the active dredge area for the MOF are shown in Figure 1 (i.e., the dredge area). Conservative modelling in Figures 13-2 and 13-3 in Section 13 of the EIS has shown that unmitigated dredging activity would likely result at most in TSS concentrations of 5 mg/L and greater within approximately a 100m by 400m rectangular area in and around the MOF dredging area and associated dredging equipment during an ebb flow tide. The actual area will fluctuate daily with tidal conditions.

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: Marine Active Work Area and Dredge Area Footprint: Including MOF Dredging Area, Bridge/Trestle/Jetty Piles, Access Bridge and Pioneer Dock



— Contour (m)	● Bridge Supports in Water (142.50 m ²)
++++ Railway	● Jetty/Trestle (808.94 m ²)
— Secondary Road	■ SW Anchor Block (162.86 m ²)
— Watercourse	● Pioneer Dock Piles (6.5 m ²)
Waterbody	▨ MOF Dredge Boundary (56,645 m ²)
Agnew Bank	■ Access Bridge Support Structures (2,013.5 m ²)
Flora Bank	
Horsey Bank	

Pacific NorthWest LNG			PREPARED BY:
Marine Active Work Area and Dredge Area Footprint: Including MOF Dredging Area, Bridge/Trestle/Jetty Piles, Access Bridge and Pioneer Dock			
EIS ADDENDUM			PREPARED FOR:
<small>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.</small>			
<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</small>			FIGURE NO:
DATE: 28-NOV-14	PROJECTION: UTM - ZONE 9	DRAWN BY: M. BATE	1
FIGURE ID: 123110537-804	DATUM: NAD 83	CHECKED BY: D. BAISCH	

***Total Marine Infrastructure and Dredge Area: 57,184.3 m²**

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