

November 10, 2015

Canadian Environmental Assessment Agency
PO Box 10114
Suite 410, 701 West Georgia St
Vancouver, BC V7Y 1C6

Attention: Catherine Ponsford, Project Manager, Regional Operations Pacific and Yukon

Dear Ms. Ponsford:

Re: Comments of September 16, 2015 draft Response to CEEA Information Request

PNW LNG is pleased to provide this response to your October 8, 2015 comments on PNW LNG's September 16, 2015 draft response to the CEA Agency's June 2, 2015 information request. This letter details the updates made to PNW LNG's submission in response to your feedback, and responds directly to other questions which have not resulting in changes to the submission.

COMMENTS ON SUMMARY RESPONSE

Comment:

p.7 says "Key components of the supplementary material include: collection of one additional year of marine mammal surveys, which started in November 2014; collection of one additional year of fish and fish habitat survey, which started in December 2014"

- Would be good to clarify how much data is included in the supplementary material. I believe it is less than one year.

Response:

This paragraph has been revised to:

Key components of the supplementary material include:

- *Collection of one additional year of marine mammal surveys, which started in November 2014 (the interim report submitted with this document summarizes the data up to June 11, 2015)*
- *Collection of one additional year of fish and fish habitat surveys, which started in December 2014 (the interim reports submitted with this document summarizes the data up the end of August 2015)*

Comment:

p. 17 says “a total of 68 species were positively identified”; p. 18 says “identified 50 marine fishes”

- Please clarify if one refers to all species (e.g. including crabs) and the other refers only to swimming fish, not fish as defined in Fisheries Act.

Response:

The text on page 17 has been revised to:

For the December 2014 to August 2015 portion of the survey program, a total of 82 species (including 61 marine fish [ichthytes] species) were positively identified.

The text on page 18 has been revised to:

The sampling program completed by PNW LNG positively identified 61 marine fish (ichthytes) species by the end of August 2015.

Comment:

p.20 describes how “predicted erosion and deposition around the structures remains remote from the mapped eelgrass habitat on Flora Bank.”

- Please comment on any effect this might have to other marine species, e.g., crab

Response:

This section of text on page 20 has been revised to:

Peak current velocities during both ebb and flood conditions typically remain below 0.3 m/s, and are of the same order as transient current velocities observed elsewhere on Flora Bank during typical tidal conditions. Over extended periods, local hydrodynamic effects are likely to gradually lead to local bedform changes within the immediate vicinity of the marine structures, but the predicted areas of erosion and deposition around the structures does not overlap the mapped eelgrass on Flora Bank. Elevated levels of TSS within the water column are found only over very short periods of time (tidal cycles), and only shortly after construction whereas the local erosion and deposition patterns develop over longer time periods.

Habitats around marine structures consist of soft sediment substrates in shallow subtidal waters. As a result of large tides, tidal currents, shallow depths and soft sediments, the area around the proposed marine structures often has naturally low levels of water clarity (higher turbidity and TSS) relative to nearby Porpoise Channel and deeper waters in Chatham Sound. Salmon species have been observed in these habitats during spring smolt migration (May to June) for short periods defined through systematic net catches (trawl and seines) and hydroacoustic transects over minutes and hours during northerly flowing ebb tides. Dungeness crab and benthic fish species (e.g., flounder and sole) are found here year-round. Resident fish and crabs use soft sediment habitats at and around the marine structures for feeding and crab moulting. Resident species are well adapted to these local conditions and are additionally able to move to similar nearby habitat that is commonly available. Migratory fish species will also use similar commonly available open-water habitats around proposed marine structures. The anticipated erosion and deposition around the structures is not predicted to have significant adverse effects on resident fish and invertebrate species, or on migratory fish species.

Comment:

p. 23 states “the facility is expected to be in operation for 40 years.” The EIS p. 2-16 describes the “cessation of operation are uncertain, but likely to exceed 30 years.”

- Please confirm the most recent estimation for cessation of operations.

Response:

The text on page 23 has been revised to:

In-water activities associated with construction of this infrastructure will occur year-round for approximately four years and the facility is expected to be in operation for over 30 years.

Comment:

p.23 includes a commitment to do “sub-tidal blasting within federal guidelines”. P.i of the Aug. 19 letter to DFO makes reference to “high and low risk” blasting activities.

- Please clarify how high/low risk activities relate to sub-tidal vs. intertidal activities.

Response:

The text on page 23 has been revised to:

- *Sub-tidal blasting (high risk blasting works) will be conducted within federal guidelines and at times only within least-risk timing windows (November 30 to February 15)*

Comment:

p.24 describes “more than 120,000 m³ of lower productivity habitats present within five identified offsetting sites”. P. 2 of the Aug. 19 letter to DFO describes “approximately 90,000 m² of lower productivity habitats present within three identified offsetting sites”

- Please confirm the most recent number and size of habitat areas being considered for offsetting projects

Response:

The text on page 24 has been revised to:

With respect to the habitat enhancements, there are more than 120,000 m² of lower productivity habitats present within five identified offsetting sites in the immediate vicinity, of which 90,000 m³ could be modified to increase the productivity of CRA fisheries.

Comment:

p.28 describes how “an annual monitoring report will document the findings of the previous year’s monitoring program in comparison to established baseline conditions.”

- Please clarify the timeline within which this baseline would be established relative to the construction: pre, during, or post.

Response:

The text on page 28 has been revised to:

In subsequent years, an annual monitoring report will document the findings of the previous year’s monitoring program and provide comment on any changes relative to baseline conditions established between 2012 and 2015 during the environmental assessment process.

Comment:

p.31 for the disposal of sediment on land, the PRPA will “require discharge water to be managed to applicable provincial water quality guidelines.”

- You may want to consider also referencing the *Fisheries Act* prohibition against the deposition of deleterious substances. This comment also applies to the “Effects of Dredge Material Disposal” technical memo.

Response:

The following text has been added to this section of page 31 (and to the Closure section of the “Effects of Dredge Material Disposal” technical memo):

All water discharges will also comply with other relevant regulations (e.g., the Fisheries Act prohibition against the deposition of deleterious substances).

Comment:

p.33 introduces two meetings on July 16, but I think only describes one.

- You may want to include a description of the second meeting

Response:

The following text has been added to item 14 on page 33:

The second meeting was held with NRCan, the Major Projects Management Office and PNW LNG to discuss early results from modelling efforts.

COMMENTS ON SUPPLEMENTARY MODELING REPORT

Comment:

p. 4, section 1.2, describes “five distinct pathways that may be induced by the marine infrastructure that could lead to adverse effects on fish and fish habitat.” P. 149 discusses “four distinct impact pathways that may be induced, triggered, or activated by the marine infrastructure and lead to adverse effects on fish and fish habitat.” The pathway not repeated is “Potential material alteration to the overall Flora Bank morphology;”

- Please clarify.

Response:

There are four pathways articulated in the technical memo *Marine Terminal – Environmental Effects Assessment* to the CEA Agency. This reference has been clarified in the *Supplementary Modelling Report*. An additional focus of the modelling effort (colloquially: a “fifth pathway”) has been made on addressing concerns regarding the overall stability of Flora Bank. While we continue to articulate this focus, we now avoid the use of the term “Pathway” with reference to the “overall stability of Flora Bank” in order to avoid confusion.

Comment:

p.141 states: “**Total Suspended Solids Concentrations**

“In direct connection to the transient current velocities discussed above total suspended solids (suspended sediment) concentrations are increased on the lee side of the structures when erosion is occurring (limited to a few structure diameters away), and quickly subsides as peak currents subside. Downstream outside of this area, no measurable difference in average suspended sediment concentration (TSS) is expected. As bedform changes around the structures reaches an equilibrium, these occasional, transient and localized increases in suspended sediment concentrations downstream of the structure are expected to reduce.”

- It would be useful to know the expected timeframe within which the equilibrium referred to would be achieved.

Response:

There are a number of questions and comments in the response received from the Federal agencies in relation to TSS generally, and regarding its relationship with to equilibrium of initial scour over time. Discussion in the *Supplementary Modelling Report* has been broadened in response to these comments, which will include additional figures. Although our principal conclusions (“...limited, local, transient...”) are unchanged, we have be adjusting the specific discussion referenced above.

COMMENTS ON AUGUST 19, 2015 LETTER TO DFO

Comment:

P.1 of this letter states “this letter provides a final compilation of the fish, fish habitat and marine mammal mitigation and offsetting commitments.”

- Please confirm that the table of mitigation measures in this letter supercedes the mitigation measures described in the EIS, EIS Addendum, and other earlier correspondence.

Response:

The compilation of mitigations described in the letter is consistent with that described in the EIS Addendum. For comparison, the details from each source are provided in Table 1.

Table 1 Comparison of mitigations described in the EIS Addendum and August 19, 2015 letter to DFO

Potential Effect	Mitigations in EIS Addendum	Mitigations in August 19, 2015 letter to DFO
Direct mortality or physical injury to fish or marine mammals - Blasting	<ul style="list-style-type: none"> • Blasting Management Plan will be implemented • Fisheries and Oceans Canada’s Blasting Guidelines will be implemented, including enforcing a safety radius of 500 m, and ensuring marine mammals are not present in the safety radius prior to blasting. A marine mammal observation program will be implemented and marine mammal observers (MMOs) will terminate blasting activities if cetaceans or marine mammals listed under the <i>Species at Risk Act</i> (SARA) enter the 500 m blasting safety radius (detailed below under ‘underwater noise’) • Blasting will be conducted within DFO least-risk timing windows (approximately November 30 to February 15); exact dates to be refined to reflect local conditions, based on pre-construction field surveys and in consultation with DFO to reduce mortality to fish during important lifecycle stages • The blasting design will consider appropriate measures to reduce overpressure, through the optimum use of explosives for rock blasting. Where possible (i.e., if low tides occur during daytime hours), blasting will be timed with low tides to reduce the number of detonations that occur underwater • In areas of low to moderate currents (≤ 1 knot), silt curtains will be installed around blasting activities if monitoring results indicate inferred TSS levels will be higher than the WQG outside the active work area. 	<ul style="list-style-type: none"> • Development of a Blasting Management Plan that considers both high and low risk works: <ul style="list-style-type: none"> ○ Mitigation for both high and low risk works include: <ul style="list-style-type: none"> ▪ Fisheries and Oceans Canada’s Blasting Guidelines ▪ Measures to reduce overpressure ▪ Timing blasting with low tides to reduce the number of underwater detonations ○ Mitigation for high risk works only: Blasting will be conducted within DFO least-risk timing window of November 30 to February 15; this window will be refined based on 2015 fish and fish habitat monitoring data prior to start of construction. ○ Establishing a variable 500 m to 1,000 m safety zone from blast sites - the distance is based on modelling and will be refined through in-situ underwater sound monitoring using a 160 dB re 1μPa rms sound pressure level threshold for marine mammals ○ Implement a marine mammal observation program during blasting and impact pile driving. Blasting and impact pile driving will be halted if, in the 160 dB re 1μPa rms safety zone, harbour seals are observed in distress or other marine mammals are observed. ○ Limiting blasting to daylight hours to allow marine mammal observers to visually determine if an animal is in the safety zone ○ Use of bubble curtains or bubble containment casing to reduce underwater pressure waves during impact pile driving and blasting.
Direct mortality or physical injury to fish or marine mammals - Burial	<ul style="list-style-type: none"> • Dungeness crabs will be relocated from construction zones using proper handling techniques and strategies that limit stress 	<ul style="list-style-type: none"> • Trapping and relocating Dungeness crab before start of dredging.

Table 1 Comparison of mitigations described in the EIS Addendum and August 19, 2015 letter to DFO

Potential Effect	Mitigations in EIS Addendum	Mitigations in August 19, 2015 letter to DFO
<p>Direct mortality or physical injury to fish or marine mammals - Pile installation</p>	<ul style="list-style-type: none"> • Low noise pile installation techniques (i.e., vibratory installation methods) will be used except during seating of some piles into bedrock • In instances when an impact pile driver is required (e.g., during pile seating), bubble curtains with bubble-containment casing will be used and the impact hammer will be constructed of sound absorbent material. To mitigate for behavioural effects, a bubble curtain will also be used during low noise pile installation (see Section 13.5.5.2 of Appendix A) • In instances when the efficacy of bubble curtains is diminished by high currents, isolation casings that contain bubbles will be used in lieu of bubble curtains • Bubble curtains will be used during pile installation (i.e., vibratory and impact) at the inner MOF. The exact style of bubble curtain and/or casing used will be determined on a case by case basis, taking into consideration the type of activity (and predicted sound levels) and oceanographic conditions (e.g., current speed). In situ field validation of the effectiveness will be measured/monitored during the first seven days of each style of curtain/casing implemented to confirm underwater sound levels produced following implementation of this mitigation 	<ul style="list-style-type: none"> • Use of low noise pile installation techniques • Use of bubble curtains or bubble containment casing to reduce underwater pressure waves during impact pile driving and blasting. • Use of pile within pile installation techniques should monitoring suggest that the use of bubble curtains are not sufficient mitigation during pile installation • Use of silt curtains to exclude fish from the MOF work area • Use of a coffer dam to isolate the tower block and anchor block in-water work areas from surrounding waters.

Table 1 Comparison of mitigations described in the EIS Addendum and August 19, 2015 letter to DFO

Potential Effect	Mitigations in EIS Addendum	Mitigations in August 19, 2015 letter to DFO
Permanent Alteration or Destruction of fish habitat	<ul style="list-style-type: none"> • A Habitat Offsetting Plan will be developed and implemented to maintain productivity within the LAA; • No offset habitats will be located on Flora Bank or Agnew Bank • Planned scour protection will be placed around tower platform below mud line through use of slightly larger substrate sized materials around the perimeter of tower platform • Hard multi-faceted shoreline protection material (e.g., rip-rap boulders) will be used where needed (e.g., trestle abutment) to promote colonization by marine biota • Beneficial re-use of rock for construction of fish habitat offset is being considered and will be determined in consultation with Fisheries and Oceans Canada. 	<ul style="list-style-type: none"> • A Habitat Offsetting Plan will be developed and implemented in accordance with DFO's Fisheries Productivity Investment Policy (2013). This plan will be provided to DFO in an application for a paragraph 35(2)(b) Fisheries Act authorization. • Scour protection will be placed around tower platform informed by hydrodynamic modelling of the final detailed marine infrastructure design (i.e., the works that will be constructed). • Hard multi-faceted shoreline protection material (e.g., rip rap boulders) will be used where needed (e.g., trestle abutment) to promote colonization by marine biota
Change in sediment or water quality (TSS)	<ul style="list-style-type: none"> • A 30 m vegetation buffer will be retained around the perimeter of Lelu Island, except at access points. Sediment and erosion control measures will be used (e.g., sediment fences) for land-based construction, particularly at the shoreline, to reduce TSS inputs into the water • Turbidity will be monitored in real time during in-water construction activities (i.e., blasting, dredging, and ocean disposal) and compared to predicted TSS levels (through use of a turbidity-TSS calibration curve) and WQG. • In the event that calculated TSS levels exceed modelled predictions outside of the active work area (defined as the immediate area surrounding operating construction equipment) or disposal site, the rate of the activity will be adjusted (e.g., slowed), or additional mitigation measures implemented (e.g., silt curtains) to minimize the spatial extent of elevated TSS. • Tugs with less powerful propulsion systems (Voith Schneider tugs) have been evaluated and will be used 	<ul style="list-style-type: none"> • In-situ turbidity/TSS will be monitored during dredging activities. • If TSS levels exceed modelled predictions outside of the active work area (defined as the immediate area surrounding operating construction equipment), dredge methods will be modified to reduce TSS levels to an acceptable standard or other means, such as silt curtains, will be used to contain the suspended sediments • Tugs will be equipped with Voith Schneider propulsion systems to minimize the suspension of sediments by propeller wash.
Change in fish behaviour	<ul style="list-style-type: none"> • Lighting will be designed to reduce stray lighting 	<ul style="list-style-type: none"> • Lights will be shielded and directed onto the deck structures to prevent spillage onto the water.

Comment:

p.3 of this letter describes the offsetting described (90,000 m³) as the minimum measures proposed and committed to.

- If appropriate, it would be useful to know if there is a corresponding commitment to a habitat ratio (e.g. 2:1, 3:1).

Response:

The 90,000 m³ noted in the letter describes areas that could be modified for offsetting. PNW LNG has not committed to offsetting at least 90,000 m³ or to a specific ratio. The commitment is to address habitat offsetting as described here in this section of the letter. Details of offset areas and how this is established will be described in detail through the *Fisheries Act* authorization process. Specific ratios of habitat offsetting will depend on the relative value of existing, affected and improved habitat and will be addressed in consultation with DFO throughout the authorization process.

Comment:

p.iii describes scour protection as a mitigation measure along Agnew Bank

- Please clarify if there will be scour protection too around MOF infrastructure (p.ii), or if that would not be required.

Response:

The assessed design of the MOF does not anticipate that scour protection will be required.

COMMENTS ON MARINE MAMMAL TECHNICAL MEMO

Comment:

As mentioned previously, it would be extremely useful to have a map to facilitate review of the many place names provided in the text.

Response:

A map showing the place names provided in the text has been added to the technical memo.

CLOSURE

PNW LNG trusts that's this letter, on concert with the updates to the response package, addresses the CEA Agency comments received on October 8, 2015. The information provided in this response package is intended to respond in full to all of the comments, questions and identified data gaps in the CEA Agency information requests of June 2, 2015, and related feedback. I look forward to working collaboratively with the CEA Agency and the working group as we move forward with the federal environmental assessment process.

Respectfully,

<Signature Removed>

Michael Lambert
Head, Environmental and Regulatory Affairs