



Attachment 2: NRCan's January 2016 Response to the Canadian Environmental Assessment Agency's Request for Advice (November 12, 2015) for the PNW LNG Project

In the review of the proponent's 3D Modelling Update Report (November, 2015), NRCan was requested by CEAA to provide advice to inform their work to complete the assessment, including the drafting of the EA Report and federal conditions. NRCan was also asked to respond to three specific questions to assist in the analysis and determination of conclusions of potential environmental effects. The Proponent has now provided a sufficient amount of information and quantitative evidence for NRCan to effectively respond to CEAA's three questions, which are found below.

Question #1: Re. Likelihood of significant adverse effects

Based on the current information, what is NRCan's advice to CEAA regarding the likelihood of significant adverse effects from the Project?

NRCan's May 29, 2015 response to this question focussed on the conclusion that the Proponent had not adequately substantiated its conclusions, and the departments [Fisheries and Oceans Canada (DFO) and NRCan] shared the view at that time, that the potential magnitude and extent of physical changes to Flora Bank from the proposed marine structures were uncertain.

However, given the substantial amount of work and quantitative evidence provided by the Proponent to date, in NRCan's view, the impact of the marine structures on currents, waves, sediment transport, and seabed morphology for various seasonal and storm conditions has been modelled with acceptable certainty and therefore, NRCan has confidence in the Proponent's conclusions regarding sediment transport and morphological changes in the project area. DFO concurs with the Proponent's conclusions that no significant effects are expected from the marine structures (trestle pilings), with the south west tower and anchor block likely to cause the greatest disturbance. The impacts associated with these two large structures are predicted to be localized, resulting in a low risk to commercial, recreation and Aboriginal fisheries. Consequently, subject to a robust and long term monitoring program and implementation of effective mitigation measures, DFO has concluded that the effects of the marine structures on fish and fish habitat have been categorized as having a low potential of resulting in significant adverse effects.

Question #2: Re. Mitigation measures

Considering the current information, including the suite of mitigation measures described in the proponent's letter to DFO dated August 19, 2015, what mitigation measures would NRCan suggest are required to avoid significant adverse environmental effects? Please identify any additional mitigation measures beyond those in the letter that NRCan would consider necessary to avoid significant adverse effects.

Mitigation measures related to engineering design of bridge structures, best management practices to be implemented during the construction, maintenance, operation and decommissioning of a project in a marine setting, or offsets related to potential impacts to fisheries are outside of NRCan's expertise. However, NRCan has reviewed the Proponent's Mitigation Plan (August, 2015) and although we cannot assess the adequacy of the mitigation measures presented, we acknowledge that the Proponent's plan to monitor turbidity / total suspended solids during construction activities and into operation, would be important to ensure levels do not exceed modelled predictions.



Question #3: Re Follow-up program

The proponent has outlined a follow-up program in its final response (section 7 of the Response Summary). What elements of this program does NRCan think are important to verify the predictions of the assessment and effectiveness of mitigation measures? Does NRCan have any suggestions regarding additional elements of a follow-up program that should be included?

The follow-up program outlined in section 7 of the Proponent's IR Response Summary Report (November, 2015) provides details of the Marine Fish and Fish Habitat Follow-Up Program, its purpose to verify the predicted effects to marine fish and fish habitat and assess the effectiveness of mitigation and habitat offsetting measures. NRCan is unable to comment specifically on the elements of this program as it is outside our expertise. However, NRCan does have suggestions regarding additional follow-up program activities in order to help verify model predictions of potential project impacts on waves, currents, sediment transport, seabed morphology in the project area and the stability of Flora Bank.

Through hydrodynamics and sediment transport modelling, the proponent concluded that (1) erosion and deposition changes arising in the immediate vicinity of the structures will dissipate within tens of meters away from the structures and that substantive increases of Total Suspended Solids (TSS) rarely extend to the eelgrass areas; and (2) results from regional-scale modelling indicate that in all circumstances, the structures have a limited effect on the background coastal conditions and generally cause mild attenuation of the erosion and deposition patterns primarily due to the slight wave attenuation effects of the proposed structures. Therefore, the Proponent concluded that the proposed marine structures will cause no potential material alteration to overall Flora Bank stability and will not generate changes in erosion and deposition which affect the eelgrass habitats.

NRCan recommends to CEAA that additional monitoring and follow-up measures to verify model predictions and to avoid and/or mitigate possible significant adverse environmental effects should be undertaken by the Proponent:

- 1) Measurements of TSS and erosion and deposition rates should be carried out during and after the construction of marine terminal structures to confirm that the values of TSS and rates and extent of erosion and deposition are within the ranges predicted by modelling. If the values of these parameters are nearing or exceed established guidelines, appropriate measures should be taken. In their January 2016 advice to CEAA, DFO also recommended that follow-up monitoring of TSS and sediment deposition rates during and after construction of marine terminal structures be conducted.
- 2) Repeat surveys utilizing multibeam bathymetry and seismic profiling technology should be conducted to verify that the morphological changes on Flora Bank are within the natural range and that the construction of the marine structures does not cause significant loss of sand volume on Flora Bank. In their January 2016 advice to CEAA, DFO also recommended that follow-up monitoring of the bathymetry of Flora Bank be conducted.
- 3) In previous reviews and meetings, both NRCan and DFO raised the issue of the lack of current and sediment transport data on Flora Bank for model calibration. NRCan maintains that the Proponent should collect field measurement data of waves, currents, and suspended sediment concentration over Flora Bank so that these data can be used to calibrate or verify the model predictions of waves, currents, and sediment transport in the project area.



- 4) The Proponent presented the results for the 1-year simulation using 1-hour wave-flow coupling in the 3D Modelling Update Report (November, 2015). They also confirm in the detailed response table provided to NRCan on November 25, 2015, that time series modelling for a second year is underway but the results are not anticipated at this time for this stage of the assessment. As recommended previously by NRCan (April 8, 21, June 8, and October 16), the time series run for the second year should also be completed with one hour wave-flow coupling to increase the confidence in the results of the 1 year time series simulation; help assess that the seabed changes from these time series runs are accumulative net changes; and, to inform the detailed design stage. In their January 2016 advice to CEAA, DFO recommended that the Proponent undertake additional high resolution modeling of the SW tower and anchor block based on proposed construction ready designs. This second model run would further confirm the preliminary model results and provide more accurate projections of potential impacts and mitigation measures based on an updated project design.