Woodfibre LNG Project – Application for an Amendment to Environmental Assessment Certificate #E15-02

The following table includes Woodfibre LNG Limited's responses to My Sea to Sky comments submitted to the BC Environmental Assessment Office (EAO) as part of the 30-day public comment period on the Application for an Amendment to Environmental Assessment Certificate #E15-02 for the Woodfibre LNG Project, held between February 9, 2017, and March 11, 2017.

The EAO has reviewed My Sea to Sky's comments and Woodfibre LNG Limited's responses and is satisfied that Woodfibre LNG Limited has addressed My Sea to Sky's comments for the purposes of the Amendment Application for the Woodfibre LNG Project. The time and effort taken by those who submitted comments to the EAO during the public comment period is appreciated, and all of the comments received will be considered in the Amendment review process for the Woodfibre LNG Project.

EA Statement, omission	Comment/Question	Ref.	Woodfibre LNG Limited Response
Woodfibre LNG's claims about a "commitment to going beyond what is required in order to build a better Project."	This statement in the amendment is in reference to a CLOSED "stakeholder" meeting that excluded key stakeholders. A notable exclusion was the "My Sea to Sky organization. Although this group is opposed to Woodfibre LNG, its membership includes a large segment of the community, many of whom also have relevant expertise in engineering, biology, sociology, hydrology, economics and so on. Another glaring omission was the, "Future of Howe Sound." Woodfibre LNG is well aware of this group, one of whose key projects is to declare Howe Sound and UNESCO biosphere. This may have implications for the Woodfibre LNG and vice versa. Woodfibre LNG cannot fairly claim their closed, cherry-picked stakeholder consultation is either meaningful or representative.	3.2 Public and Local Government Consultation	From February 9, 2017 until March 11, 2017, the public was invited by the EAO to submit comments in relation to the Amendment Application. Specifically, during this 30-day period, the public was invited to submit concerns regarding new or additional potential effects that might result from the proposed Project changes. Prior to the public comment period, Woodfibre LNG hosted a stakeholder meeting at the Woodfibre site on January 18, 2017 for tenure holders and stakeholders who may be directly affected by the change in cooling technology, the potential change of intake location on Mill Creek, and the proposed short-term use of water from Woodfibre Creek. The purpose of the meeting was to explain the amendment application to tenure holders and stakeholders, gather their feedback, and answer their questions, which is consistent with Woodfibre LNG's commitment to go beyond what is required to build a better project.
Woodfibre LNG's amendment includes four key assertions regarding Value Component impacts, but only one of these (noise impacts) has included analysis to back up the claim: 1. There will be noise impacts, but they will be too small to require mitigation 2. There will be no Labour Market impacts 3. There will be Sustainable Economy impacts 4. There will be no Greenhouse Gas Management impacts	Even without prior contradictory claims by Woodfibre LNG, all of these items require some sort of evidence to back them up, as none are obvious. Given that Woodfibre LNG has made contrary claims, it is critical that we have deeper analysis of the above claims and explain past discrepancies. Furthermore, Woodfibre LNG's on-the-record falsehoods beyond just these topics demonstrate that we cannot take unsubstantiated assertions from Woodfibre LNG at face value. As a result, Woodfibre LNG needs to provide funding for the following independent analysis to be reviewed by the public before a decision on the amendment is rendered: • A detailed analysis of changes in power consumption (and thus GHG emissions, and also economic sustainability impacts); • An analysis of capital and operating costs; • An analysis of changes in construction employment and related impacts; • An analysis of the purported $85 Million annual tax benefits from the project to all 3 levels of Government; and • A verification of the new claims that with regards to noise: *"… additional mitigation measures are not required as the assessment* *of residual changes inclusive of the air cooling system do not change* *from those in the Application."*	Exec. Summary	The assessment of valued components (VCs) undertaken as part of the Amendment Application is consistent with the methodology approved in the Application Information Requirements document approved by the Environmental Assessment Office and Environmental Assessment Office guidelines.

Quoting from Woodfibre's 2015 Assessment of Alternative Cooling Systems document: *"The use of air coolers for the Project would require greater refrigerant inventory, increasing the potential magnitude and extent of contamination in the event of a leak or spill from the refrigerant piping or tube bundles."*	There is no mention of this concern in the amendment. Is refrigerant cooling being used and why is this risk not now being addressed? It is noted on page 18 "Site Contamination" that there are "no new interactions," however, the reference to refrigerant cooling in the 2015 document would suggest there is a risk to environment and possibly to human health. We ask Woodfibre LNG to verify whether refrigerant cooling is being used, and if so, we request a study to determine the increased risks of contamination in the event of a leak or a spill from the refrigerant piping or tube bundles.	Original Section 5.7 Site Contamination	A closed loop refrigerant system will be utilized in the LNG liquefaction process. There are no new interactions for site contamination due to the change to air cooling. Spill containment will be provided in compliance with codes and regulations to mitigate the risk in the rare event of a refrigerant leak. The Site Contamination IC is in reference to the existing site contamination at the Woodfibre property as a result of the historic Woodfibre pulp and paper mill. Existing contamination at the property is managed under the existing Certificate of Compliance issued by the BC Ministry of Environment for the Woodfibre property. There are no new interactions identified with the Site Contamination IC as there is no additional footprint required for the proposed Project changes (i.e., no additional ground disturbance).
Cumulative Effects: Any substantial treatment of cumulative effects of this and other proposed Howe Sound projects is absent from the Amendment	Since the initial application was submitted, other projects within the assessment area have progressed. The changes and impacts from Seawater Cooling System to Air Cooled System should require a review of cumulative impacts against the current and foreseeable projects in the assessment area. For example the current and future operations of the following projects should be considered in regards to noise and cumulative effects on fish and other species impacted by the changes to this project: • The Box Canyon (run of river) Hydro Project has been operating since the spring of 2016 and noise levels reported by local residents are higher than expected. • Forestry activities may have changed since the original application. Removal of trees in the assessment area, including updated plans for removal of trees by BC Hydro transmission lines and Fortis Eagle Mountain pipeline project affect wildlife and should be addressed in this amendment. • BURNCO Aggregate - 2016 fish returns to the artificial groundwater channel resulted in much changed baseline information. This project will impact fish in Woodfibre and Mill Creek. What is the potential combined impact on fish in Howe Sound?		*Noise* The Amendment Application follows the methodology approved by the Environmental Assessment Office in the Application Information Requirements document. Noise modelling was undertaken and is provided in Section 6.1 of the Amendment Application. The indirect effects associated with atmospheric noise are considered for each of the wildlife VCs. The noise modelling undertaken as part of the Amendment Application includes baseline noise levels determined in accordance with Oil and Gas Commission guidelines and Health Canada guidance. This modelling shows that the noise generated by the LNG facility reduces to background levels at about 1.5 km from the facility. The Woodfibre site is located approximately 14 km from the Box Canyon Hydro Project. *Forestry* Both the BC Hydro transmission line interconnection and the FortisBC Eagle Mountain – Woodfibre Gas Pipeline were considered as part of the cumulative effects assessment undertaken as part of the Application. The amount of clearing associated with the Project remains the same as reported in the Application (approximately 10 ha); therefore, the cumulative effects assessment is unchanged. Installation of the air cooling system will not require additional clearing. Construction of a new Mill Creek intake and associated infrastructure (i.e., pipeline/penstock and water storage tank) was identified and assessed in the Application. The use of the existing intake and associated infrastructure (i.e., pipeline/penstock) on Mill Creek could result in a reduction in the effects to vegetation, mainly associated with a reduced need for clearing for a new penstock. *Fish* Anadromous and residential fish presence in both Mill and Woodfibre creeks was identified as part of the Application (Section 5.15), and mitigation measures are proposed to avoid or reduce the potential effects to fish associated with reusing the existing intake on Mill Creek and temporary water withdrawals from Woodfibre Creek during construction. These mitigation measures are well understood and known to be effective. As noted in the Amendment Application, "the predicted effects are within the range assessed in the Application for Mill Creek; therefore, additional mitigation measures are not required and residual effects are not changed from the Application". Because the Project-related effects are

			not expected to change, the cumulative effect would also remain unchanged. In addition, the Application concluded that the Project-related effects to freshwater fish are expected to be negligible. In accordance with the methodology in the Application Information Requirements, cumulative effects assessments are not undertaken for valued components with negligible effects. Regardless of whether the existing intake or a new intake on Mill Creek is used, the intake adhere to best management practices for instream works and will follow the standards outlined in Fisheries and Oceans Canada (DFO)'s Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO 1995) and Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO 2013). Environmental Assessment Certificate (EAC) Condition 5 requires that Woodfibre LNG develop a minimum instream flow release regime that is acceptable to both the Ministry of Forests, Lands and Natural Resource Operations and Squamish Nation. Woodfibre LNG is proposing to withdraw water using the existing intake infrastructure or use temporary pumps to withdraw water from Woodfibre Creek. Pumps withdrawing water directly from Woodfibre Creek will incorporate best management practices for approach velocities and screen spacing, as outlined in Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO 1995). Woodfibre LNG is proposing to add the requirement to determine an instream flow release regime for Woodfibre Creek to EAC Condition 5 (see Section 8.0 of the Amendment Application).
"No new Greenhouse Gas interactions with the Project"	It came to light during the review of Fortis BC's Eagle Mountain Pipeline application amendment that Woodfibre LNG had underestimated the GHG impacts of their hydro consumption by over 2,000%[1]. FortisBC used BC Hydro's official GHG-factor for hydro consumption to argue that there was little reason to not burn fracked gas to power their operations. This claim was completely contrary to Woodfibre LNG's concurrent claim that they were doing us a big GHG favour by using hydro instead of fracked gas to power their own operations. Given that according to FortisBC and BC Hydro's official GHG factor, Woodfibre LNG's GHG impacts are 2,000% greater than originally claimed with sea cooling, it's important to understand changes in power requirements2. This will better inform us about increased GHG impacts with the proposed cooling redesign. We ask for Woodfibre LNG to resubmit their GHG estimates using BC Hydro's official GHG-factor for hydro consumption.	Original EA Section 5.3	The GHG emissions from purchased electricity in CO_2e in the Woodfibre LNG Limited Application were calculated based on the GHG consumption intensity factor within the Canada National Inventory Report (Environment Canada 2014a). GHG emissions due to electricity consumption were calculated based on the anticipated annual electricity consumption of the project. BC-specific emission factors, provided by Environment Canada in the National Inventory Report (Environment Canada 2014), specify the emission factor for CO_2, CH_4 or N_2O per kilowatt-hour used. As stated in Section 2.1 of the Amendment Application, design optimization work has shown that by adjusting the number of fans in use at any given time, energy consumption for air cooling is expected to be equivalent to or less than the energy consumption for seawater cooling. Because the power consumption remains unchanged the greenhouse gas emissions associated with power generation will also remain unchanged. Because the power requirements are unchanged, the GHG emissions intensity associated with electricity purchased from BC Hydro are outside the scope of the Amendment.
Air cooling: "*The air temperature above the air coolers is dependent on a number of factors, including wind speed, wind direction, and operating load; however, under typical conditions, the air from the fans would equal the ambient air*	There is no reference source for this statement. Nor is there any description of the extent of fog/steam induced by these cooling fans, and the effect of that on the visual quality valued component.	2.1 Air Cooling	This information was provided by the Woodfibre LNG design team working on the design of the LNG facility. Members of this team have extensive experience in the design, construction, and operation of LNG facilities worldwide. The air cooling system selected for the Project by Squamish Nation does not require freshwater spray. Heat from the fans is the only emission associated with the air cooling system.

temperature within 32 metres (m) of the system considering an 11°C ambient air temperature (as shown in Figure 2-3)".			
Air cooling- visual effects:" *Coolers are arranged in banks, which include tube bundles and fans in a cooler assembly mounted on top of the LNG process structure."(Fig. 2-1)*	How tall will the fan structures be – total height above ground? and… what plans are there to minimize the visual effects from water level /across the Sound? The answer given in Table 3-1 of the EA Amendment document that "*The height of the LNG facility varies, with some low-level buildings and facilities and some higher structures. The heat exchangers remain the tallest part of the LNG process structure*" is quite inadequate. We ask for additional information on the height of the fan structures and how the visual effects will be minimized.	2.1 Air Cooling	To clarify, the heat exchangers noted in the Amendment Application are the refrigeration system exchangers, and not the air cooling system (fans). The air coolers are mounted on a structure that is approximately 21 m above grade, and as described in the Amendment Application, the air cooling units will increase this height by approximately 3 m. The heat exchanger structure will remain the tallest part of the LNG train. The mitigation measures included in the Application will continue to apply to the Project regardless of the cooling technology. Examples of mitigation measures include the Green Zone, using low-glare and natural colour finishes on buildings, and screening infrastructure through planting. Similarly, Condition 20 of the EAC will continue to apply, and Woodfibre LNG will be required to develop a visual quality management plan in consultation with the Ministry of Forests, Lands and Natural Resource Operations, the OGC, Aboriginal groups, Tourism Squamish and the Sea to Sky Gondola. This plan will be based on FEED-level design and will incorporate the mitigation measures from the Application.
Air cooling: "*Design optimization work has shown that by adjusting the number of fans in use at any given time, energy consumption for air cooling is expected to be equivalent to or less than the energy consumption for seawater cooling* ".	This statement is in direct contrast with the previous study stating that the reason for choosing seawater cooling was its reduced power needs. (In a 2014 submission to the District of Squamish, Woodfibre LNG gave two reasons for choosing seawater cooling (pg 17 - https://squamish.ca/assets/WLNG/WLNG-electric-drives-seawater cooling-2014-07-17.pdf): • ***More energy efficient than air cooling*** • ***Produces less environmental noise than air cooling***) Both statements regarding energy consumption cannot be correct. So which one is true? What is the new power consumption estimate (in MWh p.a.) for the operation? The original figure – 1.55 Million MWh - was in the Golder report of 2015. (p.19). How will this impact on the requirements for BC Hydro's energy supply project? We ask Woodfibre LNG to account for this inconsistency.	2.1 Air Cooling	As the design of the Project was refined, we determined that not all the fans in the air cooling system will be required to operate at all times. The number of fans in operation will be based on the ambient temperature, and as it changes so does the number of fans in operation. Because not all fans are required to operate at all times, energy consumption is expected to be equivalent to or less than the energy consumption for seawater cooling. In addition, Woodfibre LNG analyzed the potential production impacts of switching from seawater to air cooling, and there is a slight loss of production with air cooling.
Air cooling: *"The EAC (Condition 11) requires that Woodfibre LNG prepare and implement a wildlife management and monitoring plan; monitoring of birds and bats will be included in this plan."*	Where are the baseline studies of the species and numbers of avifauna in/around the plant? These would be a necessary precursor to any plan to manage this valued component. We call for a year-long baseline study to be conducted on the species and numbers of birds and bats in Howe Sound.	Table 3-1	Information regarding birds is available in Sections 5.12 Avifauna and 5.17 Marine Birds of the Application. Information regarding at-risk bats is available in Section 5.13 of the Application.
Air-cooling: Ground-level ozone measurements are omitted from the EA	Where is the information on the increase in ground-level ozone as a result of using air-cooling with high-energy, electric-powered fans?	2.1 Air Cooling	Ozone produced by electric motors is not a recognized plant pollutant source. The air coolers will be located approximately 21 m above grade. The air is pulled from under the coolers and exhausted to above the cooler so ground-level buildup of any pollutants due to the presence of the air coolers would not be possible.

Fish – baseline studies	The original EA included 2014 fish studies on Woodfibre and Mill Creek, but this amendment should include 2015 and 2016 data in order to have more data for the baseline study. "Marine Fish" has been introduced as a specific value component in the amendment but the Table of Contents in the initial application did not have “Marine Fish” as a specific value component. The amendment states there will be affects to fresh water fish and fish habitat from water withdrawals, but 5.2.3 states there is “no interaction with marine fish”. The original application 4-12 states that " Mill Creek supports Andronomous and resident salmonids, and Woodfibre Creek supports resident salmonids. Both creeks discharge into Howe Sound which supports CRA fisheries." On page 36 of the amendment it states the 2014 Fish study on the creeks noted juvenile Chinook. In the original application it states “the presence of this Juvenile Chinook is likely the result of non-natal use, although the potential that Chinook salmon spawn within this limited segment in some years cannot be ruled out.” What are the more recent studies on the creeks to verify the possibility of fish spawning? How can there be no affects on Marine Fish if fish are prevented from entering the marine environment by this project? If there were less fish entering the marine environment this would have an effect on the entire food chain. In the 2015 “Assessment of Alternative Cooling Systems” document it was noted as a concern regarding Air Cooling systems in regards to the two creeks: " the purpose of the existing water licenses would need to be changed. Also, the flow available for diversion is limited during low flow (summer) months, particularly given the necessity to maintain minimum in-stream flow releases that are protective of fish." What is the compensation plan for loss of habitat or fish, particularly if Woodfibre Creek is a spawning area? Note, that the Squamish Streamkeepers documented 680 pink salmon in Mill Creek on 31st August, 2015, and sent out the following statement via email: *“Streamers,* *On Monday Pam Tattersfield, Patrick MacNamara and I counted 680 Pinks in Mill creek which bisects the old Woodfibre site. This count would be an underestimation as we couldn’t see through the torrents well enough. Thanks go to WLNG for being a good host and providing the boat rides.”* Given that the Squamish Streamkeepers have documented Pink Salmon spawning in Mill Creek, it seems disingenuous of Woodfibre LNG not to mention salmon in their application. Where are the current baseline studies for fish species populations in Mill Creek and Woodfibre Creek? Without these, how is monitoring the effects of the plant, and its water withdrawals from both creeks, supposed to proceed and be managed?	2.2	*Marine Fish VC* For clarity, the name ‘Forage Fish and Other Fish (Marine)’ was shortened to just Marine Fish in the Amendment Application. This was done in response to feedback that the original name of the VC was confusing. Although anadromous fish could be considered as part of either the Marine Fish VC or the Freshwater Fish and Fish Habitat VC, they were assessed as part of the Freshwater Fish and Fish Habitat VC because any potential effects would occur in the freshwater environment. *Salmon* Anadromous and residential fish presence in both Mill and Woodfibre creeks was identified as part of the Application (Section 5.15), and mitigation measures are proposed to avoid or reduce the potential effects to fish associated with reusing the existing intake on Mill Creek and temporary water withdrawals from Woodfibre Creek during construction. These mitigation measures are well understood and known to be effective. Regardless of whether the existing intake or a new intake on Mill Creek is used, the intake adhere to best management practices for instream works and will follow the standards outlined in Fisheries and Oceans Canada (DFO)’s *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO 1995) and *Measures to Avoid Causing Harm to Fish and Fish Habitat* (DFO 2013). Environmental Assessment Certificate (EAC) Condition 5 requires that Woodfibre LNG develop a minimum instream flow release regime that is acceptable to both the Ministry of Forests, Lands and Natural Resource Operations and Squamish Nation. Woodfibre LNG is proposing to withdraw water using the existing intake infrastructure or use temporary pumps to withdraw water from Woodfibre Creek. Pumps withdrawing water directly from Woodfibre Creek will incorporate best management practices for approach velocities and screen spacing, as outlined in *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO 1995). Woodfibre LNG is proposing to add the requirement to determine an instream flow release regime for Woodfibre Creek to EAC Condition 5 (see Section 8.0 of the Amendment Application). *Cooling Method* The quote referenced in the comment (i.e., “the purpose of the existing water licenses would need to be changed. Also, the flow available for diversion is limited during low flow (summer) months, particularly given the necessity to maintain minimum in-stream flow releases that are protective of fish."), is in relation to evaporative cooling, which is not the cooling technology that has been selected for the Project. The air cooling system selected by the Squamish Nation does not require the use of water. *Additional Baseline Studies* Since submission of the Amendment, Woodfibre LNG has engaged registered professional biologists to undertake two years of herring spawn surveys (2015 and 2016) as well as pink salmon fry outmigration sampling on Mill Creek. These surveys will help to inform the monitoring and management plans required as conditions of the Environmental Assessment Certificate and federal Decision Statement. As demonstrated by the quote that you include in your letter, Woodfibre LNG supports the

			Squamish Streamkeepers and the important work that they do. The Project changes proposed in the Application will reduce the potential effects to herring (see Section 5.2.3 of the Amendment Application).
Water Use: "*Woodfibre LNG will apply for a short-term use approval under section 10 of the Water Sustainability Act issued by the BC Oil and Gas Commission (OGC). A use approval would allow Woodfibre LNG to withdraw water from Woodfibre Creek for up to 24 months".*	The plant will operate for 25 (or maybe 40) years. Why use short-term usage licenses? What happens after 24 months?	Sec. 2.3	Woodfibre Creek has been proposed for short-term water use during construction, as an alternate water source to Mill Creek. An alternate water source will be required during upgrading or construction of the Mill Creek intake because it cannot be used over that period.
Water Use: "*Use the existing Mill Creek intake, including screenhouse, flume, and penstock, as an alternative to constructing a new intake for water withdrawals*".	The EA states that 7 litres of water will be withdrawn every second from a combination of Mill Creek and Woodfibre Creek? What will the effect be on fish habitat and the viability of fish stocks – especially in Summertime low-water conditions? Without a recorded baseline, how can this be measured and managed?	Exec. Summary	The hydrology of Mill and Woodfibre creeks is described in Section 5.9 of the Application. Mill Creek runs through the middle of the Woodfibre site. It has a watershed area of 39 km^2 and a mean annual flow of approximately 3.4 m^3/s. Woodfibre Creek is located at the south end of the Woodfibre site. It has a watershed area of 23 km^2 and a mean annual flow of approximately 2.0 m^3/s. Mitigation measures are proposed to avoid or reduce the potential effects to fish associated with reusing the existing intake on Mill Creek and temporary water withdrawals from Woodfibre Creek during construction (see Section 6.7 of the Amendment Application). These mitigation measures are well understood and known to be effective.
Water Use: "*Use the existing Mill Creek intake, including screenhouse, flume, and penstock, as an alternative to constructing a new intake for water withdrawals*".	Climate change will, over the lifetime of the plant, affect water flows in those streams. To combat a future crisis, Woodfibre LNG should integrate water recycling, as this is a sustainable approach that will offset the amount of water extracted from Mill and Woodfibre creeks.	Sec. 2.3	Woodfibre Creek has been proposed for short-term water use, as an alternate water source to Mill Creek during upgrading or construction of the Mill Creek intake. During times that natural streamflows are less than the IFR, water will not be withdrawn from Mill Creek. Woodfibre LNG will be required to locate alternative water sources.
Water Use: "*Use Woodfibre Creek for short-term water needs during construction".*	How much water will be withdrawn from Woodfibre Creek? What will the effect be on fish habitat and the viability of fish stocks – especially in Summertime low-water conditions? Without a recorded baseline, how can this be measured and managed?	Exec. Summary	The hydrology of Woodfibre Creek is described in Section 5.9 of the Application for an EAC. Woodfibre Creek has a watershed area of 23 km^2 and a mean annual flow of approximately 2.0 m^3/s. The highest mean monthly flow is 2.6 m^3/s and occurs in May. The lowest flows typically occur in August, with a mean monthly flow of 1.1 m^3/s. An IFR regime will be established based on available fish habitat in Woodfibre Creek and point of diversion (i.e., the existing intake or the pump location). Project-related water withdrawals from Woodfibre Creek will only occur on a temporary basis during the construction or upgrading of the Mill Creek intake. Woodfibre LNG is proposing to add the requirement to determine an IFR regime for Woodfibre Creek to EAC Condition 5 (see Section 8.0 of the Amendment Application).
Table 3.1: Q. How high is the LNG facility?	The answer "*The height of the LNG facility varies, with some low-level buildings and facilities and some higher structures. The heat exchangers remain the tallest part of the LNG process structure*." Is vague to the point of meaningless. Three years into this project, why can this simple question not be answered directly?	Table 3-1	To clarify, the heat exchangers noted in the Amendment Application are the refrigeration system exchangers, and not the air cooling system (fans). The air coolers are mounted on a structure that is approximately 21 m above grade, and as described in the Amendment Application, the air cooling units will increase this height by approximately 3 m. The heat exchanger structure will remain the tallest part of the LNG train.

Table 3.1: Q. Can you give an example of what to expect in summer – how many fans, how many hours per day.	The answer "*This is being determined through detailed design. All fans will not be operated full time and the number of fans in operation will be dependent on ambient temperatures*" – is equally vague and meaningless. If the noise from fans can be determined to be "not a concern", surely that conclusion was based on setting how many fans would be operating.	Table 3-1	The modelling undertaken in support of the Amendment Application includes the following assumptions that result in conservative estimates of sound levels: • all noise-generating components of the Project operate continuously (including all fans); • the wind is blowing towards the receptors at 5 m/s; • three tug boats assist with berthing; • both main and auxiliary LNG carrier engines are operating; and • there is no ground absorption of noise. The Oil and Gas Commission guidelines establish permissible sound levels of 50 dBA during the day and 40 dBA (which by comparison is the sound of whispers in an office and a quiet living room respectively) at night 1.5 km from the Woodfibre LNG Project. Section 15 of the LNG Facility Regulation states that construction and normal operation of the facility must not cause excessive noise. In accordance with a commitment made to Squamish Nation, noise monitoring during operation will be conducted to confirm the results of the modeling.
Socio-economic impact: Municipal tax revenue & jobs	One of the arguments for Woodfibre LNG's facility has been municipal tax revenue and jobs. It is not at all obvious that similar (or indeed any local) skills would be required to assemble or install an air-cooling system rather than a seawater cooling one. Neither is it obvious that the redesign won't fundamentally change the capital costs of the project. Intuitively, an on-land installation of fans should be a lot cheaper in terms of labour and capital expenditures thus reducing construction employment benefits, and also future tax revenues. Given the contradictions in Woodfibre LNG's other claims, it is not unreasonable to ask for analysis to support their claims regarding the lack of change in construction employment and capital value related to the facility. Woodfibre LNG labour study did not include the massive and possibly concurrent Garibaldi at Squamish project. That may provide much greater competition for "on land" construction jobs. Squamish has also entered a housing crunch with a much higher need for construction trades. A change to a system requiring "on land" construction needs to contemplate these realities. We still have not seen a cost/benefit analysis of the socio-economic impacts for the community of Squamish and other communities around Howe Sound. Given that economic and social values are two of the five pillars of the environmental assessment process, the lack of this analysis implies that the project is not as beneficial for the communities around Howe Sound as it claims. We continue to call for an independent cost/benefit analysis of the socio-economic impacts to the communities around Howe Sound to be completed.	N.A.	The switch from seawater cooling to air cooling is not expected to substantively change the construction employment for the Project. Woodfibre LNG anticipates sourcing the majority of its direct construction employment, approximately 60% (1,067 FTE jobs) from the local labour force (Metro Vancouver to Whistler). Squamish's labour force totaled 10,270 workers in 2011 (Statistics Canada), and the construction industry was the largest labour force sector in Squamish with 1,430 workers (14.0%). Woodfibre LNG will develop a Local Hiring Strategy, a Local Training Strategy and Local and Regional Procurement Strategy in order to ensure that the local workforce and economy can realize the potential economic benefits of the Project. These strategies will ensure that the labour force is well-positioned to seek Project employment based on individual capacities to supply needed skills; maximize employment opportunities for residents in Squamish, Whistler and Metro Vancouver; and ensure that local and regional businesses can access the benefits of increased demand for goods and services from the Project. As part of the Application, Woodfibre LNG engaged two separate qualified firms to undertake economic analyses as part of the Application. These analyses resulted in similar results, which were included in the Application. Woodfibre LNG was working with the District of Squamish to undertake a socio-economic impact study. Draft terms of reference were provided to the District of Squamish in March 2016 for further discussion.
Socio-economic impact: BC Hydro "eDrive" rate effect	To thoroughly assess any claims from Woodfibre LNG the presentation from Woodfibre LNG (pg 10- https://squamish.ca/assets/WLNG/WLNG-electric-drives		The Province of British Columbia's decision in November 2016 to offer the industrial rate to LNG projects that use electricity from B.C. Hydro to power their facilities ("eDrive") means Woodfibre

	seawater-cooling-2014-07-17.pdf) made two audacious claims: • ***Woodfibre LNG will not receive a preferred or subsidized rate on electricityfrom BC Hydro*** • ***Policy forbids any incremental costs be borne or subsidized by existing rate payers*** Both of these claims, previously used to gain public support during the BC EAO process, have proven to be untrue. At that time of the statements, the prescribed rate for LNG facilities was $83.02/ MWh. The eDrive rate, announced in Nov. 2016, lowers this tariff to around $54/MWh. It follows that Woodfibre LNG will be receiving a massive subsidy (estimated at over $34 million annually) via the Drive rate fromBC Hydro, and that will need to be covered by existing rate payers. This is not at all the "benefit" ratepayers were given to believe would accrue from locating the plant in the Region. We ask for the change in the BC Hydro rate to be included as part of a cost/benefit analysis of the socio-economic impacts to BC Hydro customers.		LNG will pay the same fair rate as any mine, pulp mill or factory in BC. Woodfibre LNG will also be required to contribute the full cost of connecting to the BC Hydro system, as well as transmission system upgrades required to serve the facilities. To clarify, the tax rates associated with the Project are not anticipated to change with the switch in cooling technology and are therefore not included in the Amendment Application. Woodfibre LNG Limited will pay a variety of taxes, including income tax, LNG tax, and municipal property tax. The BC LNG industry not only pays the same amount of tax as other industries in BC, but is also charged an additional LNG tax and must also pay additional carbon taxes under the *Greenhouse Gas Industrial Reporting and Control Act*.
Noise: "*Results from the Application case Woodfibre LNG Project with air cooling noise modelling indicate that air cooling will not perceptibly change the noise levels at the sound receptors from the baseline case, and that noise levels will remain below the OGC guidelines".*	The following statement is taken from a report by Kellogg, Brown Root (KBR) (https://www.kbr.com/Documents/LNG%20White%20Papers/KBR%20-%20Can%20You%20Hear%20Me%20Now.pdf) on noise emanating from LNG plants" "*Many LNG plant Environmental Impact Assessment (EIA) reports and preliminary noise reports exist that provide noise predictions based on suspect or poorly interpreted vendor data that leads to a noise control basis of design that is simply incorrect. These preliminary reports lead the Owner and engineering contractor project management teams in to a false sense of security that everything is fine on the noise front; when the problems to be identified late in a project, or even worse after start-up, corrective action is difficult, costly and time consuming….* *…..A plant noise model only yields value when it is modelled in sufficient detail that the effectiveness of different noise abatement options can be tested and evaluated in the model before they are include in the design. This requires a "bottom up" approach where all noise sources in the plant included in the model are modelled in sufficient detail to allow this analysis. To give a measure of this level of detail, a typical KBR LNG train noise model contains over 6,000 noise sources. "*. Fewer than 60 noise sources have been included in Woodfibre's noise modeling (Appendix D), suggesting that it may be substantially incomplete and an underestimate of to-be noise emissions.	6.1 Atmospheric Sound	Noise considerations are well addressed by existing permitting requirements. Facility-related noise levels during Project operation are an important component of the LNG Facility Permit, and section 15 of the LNG Facility Regulation will require that any noise emissions are not excessive. In addition, Woodfibre LNG has made a commitment to Squamish Nation to conduct noise monitoring during the Operation Phase, to verify the results of the noise model. Noise modelling was undertaken and is provided in Section 6.1 of the Amendment Application. This modelling shows that the noise generated by the LNG facility reduces to background levels at about 1.5 km from the facility. It also shows that the Project will meet available guidance, including the OGC guidelines and Health Canada guidance. In addition, the atmospheric sound from the plant will be assessed and will comply with the British Columbia Noise Control Best Practices Guideline (OGC 2009). Mitigation of individual sources will be applied where necessary to achieve full compliance.
Noise: Table 6-3	The same Kellogg, Brown Root (KBR) report indicated that BC's noise guideline for pristine areas (such as Howe Sound), is 40dba – not, as stated in the EA, 45d. As outlined in the EA (Table 6-3) he predicted noise levels at Darrell Bay, Britannia Beach and Watts Point (adjacent to Murrin Provincial park) exceed BC's pristine area standard.	6.1 Atmospheric Sound	The baseline noise levels at Britannia Beach, Darrel Bay and Watts Point are included in Table 6-3 of the Amendment Application. The results of the noise modelling demonstrate that the Woodfibre Project will contribute less than 1 dBA at these receptors.

Noise: The appropriateness of the noise estimation model	The KBR report "Can you hear me now – The Necessity for Noise Control in LNG plants" - http://www.gastechnews.com/wp-content/uploads/2015/10/Cowling-Jim-KBR-APP.pdf (states that noise modelling must be based on: – Field verified equipment and piping noise data and; – Proven field verified LNG plant noise models There is no data to show that the model used by the proponent (Computer-aided Sound Attenuation (CadnaA) prediction model (Version 4.2.140) has ever been used to estimate or verify LNG plant noise.	6.1 Atmospheric Sound	Baseline noise data was collected in support of the Application and is included in Appendix 5.4-1. CadnaA is the same software that was used to model atmospheric sound for the Application. It is a widely accepted and preferred model by regulators that is used across Canada and it is the most commonly used model to predict atmospheric noise associated with 20 proposed LNG facilities in BC. In addition, the atmospheric sound from the plant will be assessed and will comply with the British Columbia Noise Control Best Practices Guideline (OGC 2009). Mitigation of individual sources will be applied where necessary to achieve full compliance.
Noise: Abatement/ mitigation measures?	In the event that noise emanating from the plant proves excessive, what noise control measures does the Proponent propose? From the BCOGC Liquefied Natural Gas Facility Permit Application and Operations Manual [November 2016] - http://www.bcogc.ca/node/11268/download "*Noise is both a safety issue for workers on site, and a nuisance issue in the surrounding area. Permit holders should ensure that mitigation measures are built into the design and operating procedures using the Noise Control Best Practices Guideline. In some cases a noise management plan may be used rather than the prescriptive requirement in the guideline. Operations must also adhere to any conditions of the provincial or federal environmental assessment approval and the LNG facility permit.*" The EA statement (Appendix E) that "*Woodfibre LNG Limited will schedule high noise emitting maintenance activities during the day whenever possible*" and *will set up and implement means (e.g., an office in Squamish*) to people to provide input when experiencing a high-noise activity" are not noise abatement measures (like insulation, noise baffles, elastomeric foam etc.). Rather, they are pre-notices to neighbouring communities that they will have to "grin and bear it" when it comes to excessive noise. This is simply unacceptable.	6.1 Atmospheric Sound	Noise considerations are well addressed by existing permitting requirements. Facility-related noise levels during Project operation are an important component of the LNG Facility Permit, and section 15 of the LNG Facility Regulation will require that any noise emissions are not excessive. In addition, Woodfibre LNG has made a commitment to Squamish Nation to conduct noise monitoring during the Operation Phase, to verify the results of the noise model.
Noise: Appendix D (significant? underestimates of noise emissions from plant equipment)	The noise emissions from a typical LNG plant have been detailed in the KBR report (http://www.gastechnews.com/wp-content/uploads/2015/10/Cowling Jim-KBR-APP.pdf). The figures, reproduced below, show significantly higher noise emissions than those used by Woodfibre LNG in Appendix D. • Total sound power level for typical LNG Train – 125 dBA • Air Coolers – 121 dBA • Compressors & G/T Drivers 118 dBA –Compressors 114 dBA – G/T Drivers – 116 dBA • Compressor Piping – 121 dBA • All other equipment – 114 dBA For instance: The KBR data shows an average of 90dba per cooling fan. Yet the Woodfibre Appendix D shows a total of 74.9 dBa for all 32 of these, and much less noise from other components than the KBR data	Appendix D	The referenced paper reports sound power levels which are a measure of the amount of acoustic energy being radiated by a noise source. The noise model inputs provided in Appendix D are the sound pressure levels, which are what a person would hear and could be measured as noise, at 1 m from the noise source. The values reported in the paper and the estimated values in the amendment cannot be compared, as was confirmed by the author of the KBR report. The atmospheric sound from the plant will be assessed and will comply with the British Columbia Noise Control Best Practices Guideline (OGC 2009). Mitigation of individual sources will be applied where necessary to achieve full compliance. Note that the refrigeration air coolers are listed as the MR Compressor Intercoolers and the MR Compressor Aftercoolers. The expected sound level at 1 m from the coolers is 85.5 as stated in the table. The Blower Fans listed in the table are for the heating and ventilation systems.

	shows. An explanation of the discrepancy is more than necessary before any credibility can be attached to the Woodfibre LNG estimates.		
Noise: Attenuation over water	It is unclear if the Woodfibre LNG noise modelling (Computer-aided Sound Attenuation (CadnaA) prediction model (Version 4.2.140) took into account the minimal attenuation available at that location, where most of the carry to receptors is over water, which is a poor attenuator of generated noise. A fuller explanation of the model parameters is necessary. Golder and Associates conducted the initial Baseline Atmospheric Sound and Sound Effect study. However, the amendment appears to be based on information from Hemerra Consulting with no reference to the Golder studies. Since the actual studies are not included with this amendment, what confidence can we have in the methodology used to arrive at the conclusion that there is no impact? For example, on the original application noise from transmission lines was included in the modeling as were many other factors. There is no mention of transmission lines in the amendment. Considering more power is required for an air cooling system it is not clear how any changes to BC Hydro's project to supply power for an air cooling system will impact noise and the visual impact. Without this information it is not certain the impacts are complete. Transport Canada's TERMPOL review is not complete for this project. The noise in this amendment considers 3 tugs at the terminal, but four tugs could be escorting the ship. It is my opinion that BC Oil and Gas industry standards for rural environments are not applicable to Howe Sound as this is a marine environment with some commercial shipping. Noise from an LNG plant and increased noise from LNG carriers and escort tugs will adversely affect recreation users and residents along the shipping route.	6.1 Atmospheric Sound	The noise modelling undertaken as part of the Amendment Application includes the same baseline noise levels determined in accordance with Oil and Gas Commission guidelines and Health Canada guidance that were used in the Application. Further, the noise modelling uses the same software package (CadnaA). The operating power requirement is not anticipated to increase with the change to air cooling (Section 6.2 of the Amendment Application). As noted in the Application, the Project will have an operating power requirement of approximately 140 MW under normal conditions and 185 MW under peak loading. In addition, transmission lines were not included in the noise modelling for the original Application. Woodfibre LNG has reviewed the original noise model sources in order to respond to this comment and concluded that you are likely referring to the '138 kV/69 Stepdown transformers'. Transformers were inadvertently left off the list of equipment when updating for the Amendment Application. They were added to the noise model and updated noise modelling was provided to the EAO. The addition of these components does not change the results of the modelling. The modelling undertaken in support of the Amendment Application includes the following assumptions that result in conservative estimates of sound levels: • all noise-generating components of the Project operate continuously (including all fans); • the wind is blowing towards the receptors at 5 m/s; • three tug boats assist with berthing; • both main and auxiliary LNG carrier engines are operating; and • there is no ground absorption. Even with these conservative assumptions, noise modelling conducted in support of the Amendment Application shows that noise levels generated by the facility reduce to background levels at about 1.5 km from the facility. Noise modelling shows that the Project will meet available guidance, including the OGC guidelines and Health Canada guidance.
Noise: Consultation with area communities	BC's Noise Control Best Practices Guideline (2004) (https://www.bcogc.ca/node/8152/download) states that "*Operators moving into an area should establish good relationships by discussing noise matters with area residents during the design, construction, and operating phases of an energy facility*" and "*Applicants should complete an Noise Impact Assessment (NIA) for any new facility where there is reasonable expectation of a continuous noise source; for modifications to existing facilities where there is a reasonable expectation of changes in noise source or level";* Woodfibre LNG has made little effort to complete a NIA, or to hold such discussions with residents, including during the period of this EA,	6.1 Atmospheric Sound	Noise modelling for the plant design including the air cooling system was undertaken and is provided in Section 6.1 of the Amendment Application. Noise is also an important component of the LNG Facility Permit. Modelling included in the Amendment Application shows that the noise generated by the LNG facility reduces to background levels at about 1.5 km from the facility and meets available guidance, including the OGC guidelines and Health Canada guidance. Woodfibre LNG would like to note that as part of the stakeholder and tenure holder meeting held at the Woodfibre LNG site on January 18, 2017, the potential changes in noise due to the use of air cooling were reviewed and discussed. The purpose of the stakeholder meeting was to inform the Amendment Application and ongoing Project design.

	about the noise effects of these EA amendments. The lack of any Open House consultations in this process has compounded this glaring omission.		
Noise: Absence of marine noise effects. "The Project no longer has the potential to affect marine mammals from a reduction of forage fish due to the installation and operation of the seawater cooling system ".	Although the transmission of on-land plant noise into the marine environment is a well-known phenomenon (especially in rocky areas), this report ignores the effect of increased plant noise affecting marine receptors. Given the documented sensitivity of important marine species in the Sound (e.g. herring, salmon, orcas, dolphins) to marine noise, this omission is especially egregious and must be addressed by the Proponent. Marine noise effects featured prominently in the environmental assessment ofthe Cacouna LNG plant proposed for the Gulf of St. Lawrence (see http://www.acee.gc.ca/050/documents_staticpost/cearref_7440/C-0098.pdf)	Section 5.2.5 Marine Mammals	One of the effects of the seawater cooling system was an increase in marine noise. By using an air cooling system, this potential effect is eliminated. As noted in the Amendment Application, detailed modelling showed that overall noise levels with air cooling will be approximately equivalent to those with seawater cooling. In accordance with the Squamish Nation Environmental Agreement, Woodfibre LNG will be undertaking underwater noise monitoring during Project construction and operation.
Visual Impacts: "*The air cooling system will be mounted on top of the LNG facility (train). The heat exchangers adjacent to the train remain the tallest structures at the LNG process structure. As described in the Application, the effects during construction and operation include effects to visual quality from the addition of potentially visible Project activity or components".*	This statement of impact on the visual quality of the plant is frustratingly vague. Cooling fans will be mounted on top of the liquefaction structure – adding to the visual impact of the plant in a high-tourist area – Woodfibre's summary statement that "*The predicted effects are within the range assessed in the Application; therefore, additional mitigation measures are not required and residual effects in the Application are not changed*" is entirely inadequate. A description of **how tall these fans will be**, and how the mitigation measures in the original EA viz. • Screen land-based infrastructure (M7.5-2). • Monitor and maintain natural screening (M7.5-4). are supposed to mitigate these changes in the visual impact of the plant is mandatory!	Section 6.9 Visual Quality	The air coolers are mounted on a structure that is approximately 21 m above grade, and as described in the Amendment Application, the air cooling units will increase this height by approximately 3 m. The heat exchanger structure will remain the tallest part of the LNG train. The mitigation measures included in the Application will continue to apply to the Project regardless of the cooling technology. Similarly, Condition 20 of the EAC will continue to apply, and Woodfibre LNG will be required to develop a visual quality management plan in consultation with the Ministry of Forests, Lands and Natural Resource Operations, the OGC, Aboriginal groups, Tourism Squamish and the Sea to Sky Gondola. This plan will be based on FEED-level design and will incorporate the mitigation measures from the Application.
Visual Impacts: BC Hydro transmission line	When BC Hydro illustrated the swath of trees that needed to be cut to bring the transmission lines to the project the visual impact of the project was very different from Woodfibre's illustration. The storyboards are available for viewing on BC Hydro's Woodfibre LNG website. Woodfibre's amendment should illustrate the visual impact of the transmission lines and pipeline otherwise the illustration on page four of the power point used for consultation continues to be misleading. BC Hydro's website regarding this project has not been updated for a long time. The site still states "*At this time, we are waiting for authorization from Woodfibre LNG to move forward with additional studies.*" What is the result of the studies with this change to the Air Cooling? This information is important in order to understand what assumptions this amendment is based upon. It is not understood how this change to Air Cooling does not impact the Value Components specific to the economy. It is misleading to the public to not include the economic and visual impacts of Hydro's service to power this project. The visual impacts of tree removal for the pipeline to serve this project should also be included.	Section 6.9 Visual Quality	As described in Section 6.9 of the Amendment Application, the air cooling system will be mounted on top of the LNG facility (train) on a pipe support structure. The structure will extend approximately 3 m above the height of the structure in the artists rending of the Woodfibre LNG Project (June 2014), and will not have a notable visual effect. In addition, the heat exchangers (two towers) in the artist's rendering will remain the tallest part of the LNG processing facility (Slide 4 of Amendment Application Appendix C). We also note that the artist's rendering available includes both BC Hydro and FortisBC right-of-ways. For clarity, neither the FortisBC pipeline within the Project area nor the BC Hydro interconnection infrastructure are considered Project components as they are not within the scope of the Project as defined in the section 11 order. Potential effects from FortisBC pipeline and BC Hydro substation projects are acknowledged and considered in the Cumulative Effects Section 7.5.4 of the original Application, based on the information available at the time of the assessment. Woodfibre LNG Limited continues to work with BC Hydro to determine the most appropriate transmission interconnection option. Condition 20 of the EAC requires Woodfibre LNG to consult with BC Hydro and FortisBC on the

			final designs of the Woodfibre interconnection and Eagle Mountain-Woodfibre Pipeline projects, and determine whether additional mitigation measures are required to ensure that cumulative effects to visual quality are no greater than identified in the Application.
Concerns of the TWN: Tsleil-Waututh Nation (other than seawater cooling)	TWN raised many more concerns, including cumulative effects, during the EA process, both inside and outside the Technical Working Group. How does this EA amendment address those concerns?	Section 3.1.2 Tsleil-Waututh Nation	The scope of the Amendment Application is determined by the proposed changes to the Project. The consultation section of the Amendment Application references comments related to those Project components.
Summary	Given Woodfibre LNG's history of contradictions and misrepresentations regarding critical project information, it is necessary that an independent source provide the information requested above. The proponent should fund that source. It is entirely insufficient to blindly accept the unsupported claims presented by Woodfibre LNG in this amendment.	-	For more than three years, Woodfibre LNG has worked hard to build a project that is right for Squamish and right for BC. We've taken the feedback of government, the public and First Nations and made meaningful changes to our Project. These are changes that are setting the standard for responsible economic development in BC. For example, we made the switch from a floating LNG facility to a land-based facility over community concerns about marine noise; we will power our facility with clean renewable electricity from BC Hydro, instead of natural gas, over community concerns about air emissions, which will reduce our greenhouse gas emissions by more than 80% and make Woodfibre LNG one of the cleanest LNG facilities in the world; and, we've made the switch from seawater cooling to air cooling as a result of our agreement with Squamish Nation and its Squamish Nation Process. The Squamish Nation process is likely the first of its kind in Canada, one that considers traditional land, water and heritage resources.