Woodfibre LNG

Application for an Amendment to Environmental Assessment Certificate #E15-02

January 2017

Woodfibre LNG Limited
1020 – 1075 W Georgia St.
Vancouver, BC V6E 3C9

Woodfibre LNG

EXECUTIVE SUMMARY

Woodfibre LNG Limited (Woodfibre LNG or Proponent) is proposing the development and operation of a liquefied natural gas (LNG) production facility with marine storage and off-loading (Project) at the former Woodfibre pulp mill site near Squamish, British Columbia (BC). The BC Environmental Assessment Office (EAO) issued an Environmental Assessment Certificate (EAC) #E15-02 for the Project on October 26, 2015, and the federal government issued its decision letter on March 18, 2016. The Application for an Environmental Assessment Certificate (Application) identified a seawater cooling system as the cooling technology for the Project, and the assessment was based on this cooling medium.

Squamish Nation conducted an independent review of the Application under its own environmental assessment process. On October 14, 2015, Squamish Nation issued an Environmental Certificate for the Project that included conditions to be met by Woodfibre LNG. One of the conditions was that Squamish Nation would evaluate and choose the cooling technology that is acceptable to Squamish Nation. In a letter dated October 19, 2016, Squamish Nation informed Woodfibre LNG of its decision to choose air cooling as the technology to be used for the Project (**Appendix A**).

As a result of the Squamish Nation decision as well as the ongoing front-end engineering design (FEED) work, Woodfibre LNG is proposing changes to the Project, and is applying to amend Schedule A Certified Project Description and Schedule B Table of Conditions of EAC #E15-02, pursuant to section 19(1) of the BC *Environmental Assessment Act* (SBC 2002, c. 43). The proposed Project changes addressed in this Amendment Application are to:

- Change the cooling technology from seawater cooling to air cooling;
- Use the existing Mill Creek intake, including screenhouse, flume, and penstock, as an alternative to constructing a new intake for water withdrawals; and
- Use Woodfibre Creek for short-term water needs during construction.

Removal of the seawater cooling system will eliminate some of the interactions that were identified and assessed in the Application. The mitigation measures committed to in the Application will all be implemented, and the characterization of the residual changes or effects does not change. Monitoring the interactions between the warm air from the fans and birds and bats will be added to the Wildlife Management Plan, and a minimum instream flow release (IFR) for Woodfibre Creek will be established prior to use of the water for construction. In accordance with a commitment to Squamish Nation, noise monitoring will be undertaken during Project operation to confirm modeling.

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
7Q10	Seven-day rolling average low flow with a 10-year return period
Application	Application for an Environmental Assessment Certificate
BC	British Columbia
BMP	best management practice
DFO	Fisheries and Oceans Canada
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office
FEED	front-end engineering design
HHRA	Human Health Risk Assessment
IC	intermediate component
IFR	instream flow release
LAA	local assessment area
LNG	liquefied natural gas
MOE	Ministry of Environment
OGC	Oil and Gas Commission (British Columbia)
OGC Guideline	British Columbia Noise Control Best Practices Guideline
Project	liquefied natural gas (LNG) production facility with marine storage and off-loading
Proponent	Woodfibre LNG Limited
RAA	regional assessment area
SR	sensitive receptor
Woodfibre LNG	Woodfibre LNG Limited
VC	valued component

SYMBOLS AND UNITS OF MEASUREMENT

Unit of Measurement	Definition
%	percent
°C	degrees Celsius
dBA	A-weighted decibel
km	kilometre
km^2	square kilometres
L_{eq} day	daytime noise level
L_{eq} night	nighttime noise level
m	metre(s)
m^3/day	cubic metres per day
m^3/s	cubic metres per second

1.0 INTRODUCTION

Woodfibre LNG Limited (Woodfibre LNG or Proponent) is proposing the development and operation of a liquefied natural gas (LNG) production facility with marine storage and off-loading (Project) at the former Woodfibre pulp mill site near Squamish, British Columbia (BC). The BC Environmental Assessment Office (EAO) issued an Environmental Assessment Certificate (EAC) #E15-02 for the Project on October 26, 2015, and the federal government issued its decision letter on March 18, 2016. The Application for an Environmental Assessment Certificate (Application) identified a seawater cooling system as the cooling technology for the Project, and the assessment was based on this cooling medium.

Squamish Nation conducted an independent review of the Application under its own environmental assessment process. On October 14, 2015, Squamish Nation issued an Environmental Certificate for the Project that included conditions to be met by Woodfibre LNG. One of the conditions was that Squamish Nation would evaluate and choose the cooling technology that is acceptable to Squamish Nation. In a letter dated October 19, 2016, Squamish Nation informed Woodfibre LNG of its decision to choose air cooling as the technology to be used for the Project (**Appendix A**).

As a result of the Squamish Nation decision as well as the ongoing FEED work, Woodfibre LNG is proposing changes to the Project, and is applying to amend Schedule A Certified Project Description and Schedule B Table of Conditions of EAC #E15-02, pursuant to section 19(1) of the BC *Environmental Assessment Act* (SBC 2002, c. 43). The proposed Project changes addressed in this Amendment Application are to:

- Change the cooling technology from seawater cooling to air cooling;
- Use the existing Mill Creek intake, including screenhouse, flume, and penstock, as an alternative to constructing a new intake for water withdrawals; and
- Withdraw water from Woodfibre Creek for short-term needs during construction.

2.0 DESCRIPTION OF PROPOSED PROJECT CHANGES

2.1 AIR COOLING

The LNG facility will be air cooled using fin fan coolers. This cooling method uses coolers with tubes containing the liquid to be cooled. These tubes have fins to increase the heat transfer surface area. Fans force air over the finned tubes and the air provides cooling by carrying heat away from the fins and tubes. The finned tubes are closely packed in a tube bundle to optimize the cooling, based on the air flow. The coolers are arranged in banks, which include tube bundles and fans in a cooler assembly mounted on top of the LNG process structure. Representations of the type of air fin cooler system that will be used for the Project are shown in **Figure 2-1** and **Figure 2-2**. The configuration of the air fin cooler system will be determined through FEED.

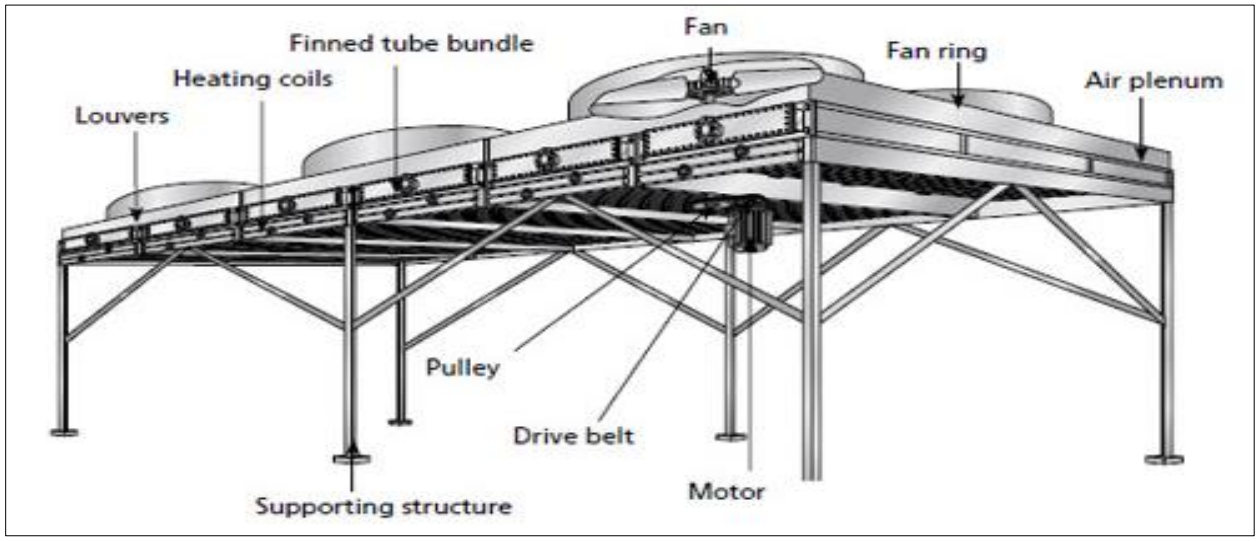


Figure 2-1 Air Cooler Assembly Diagram 1

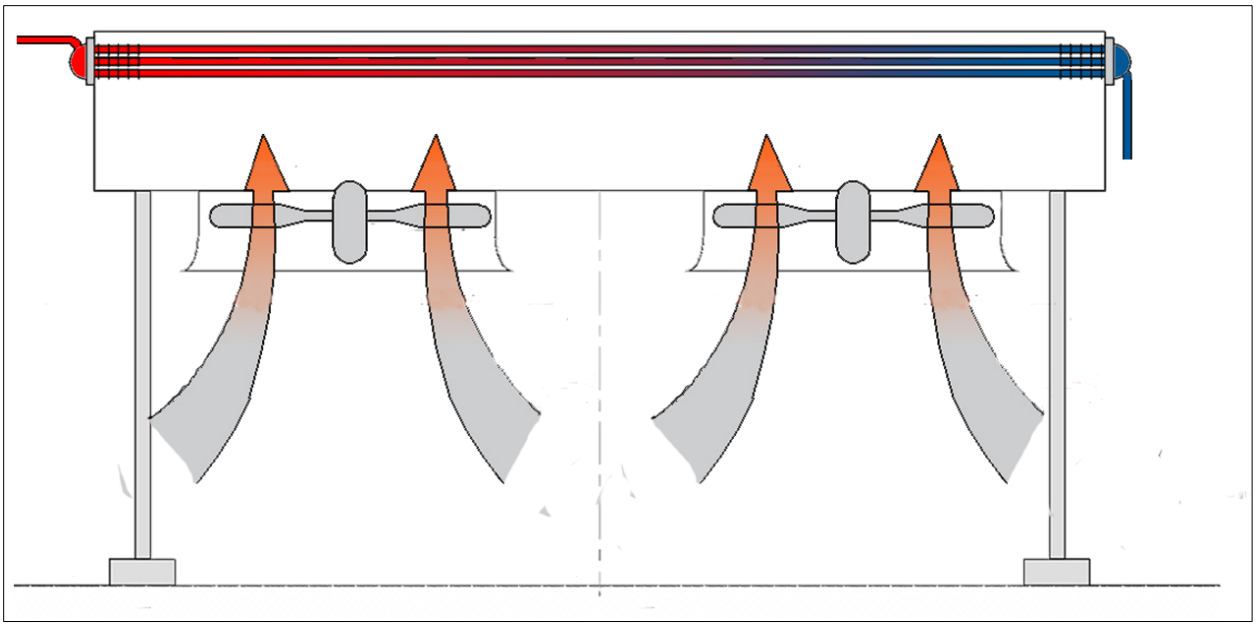


Figure 2-2 Air Cooler Assembly Diagram 2

Air cooling systems are designed for a specific ambient air temperature. When the air temperature exceeds the ambient air design temperature, the production of the LNG plant is reduced because of reduced cooling efficiency. Air cooling will be based on a design ambient air temperature of 12 degrees Celsius (°C) and a nameplate or rated production of 2.1 million tonnes per annum. The monthly average temperature in the Project area ranges from 1°C to 18°C. Due to air temperatures above the ambient design in the summer months, the expected LNG production would be reduced by approximately 2 percent (%) as compared to seawater cooling. Conversely, when the air temperature is below the ambient design, not all fans are needed to provide the necessary cooling. The number of fans operating at any given time will vary with the ambient temperature, with more fans operating during periods of higher ambient air temperatures and fewer fans at lower ambient air temperatures.

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 temperature within 32 metres (m) of the system considering an 11°C ambient air temperature (as shown in **Figure 2-3**). The temperature gradient shown in **Figure 2-3** assumes that the air is directed straight upwards (i.e., no wind). Mixing associated with wind would reduce the distance that it takes the air to reach ambient temperature.

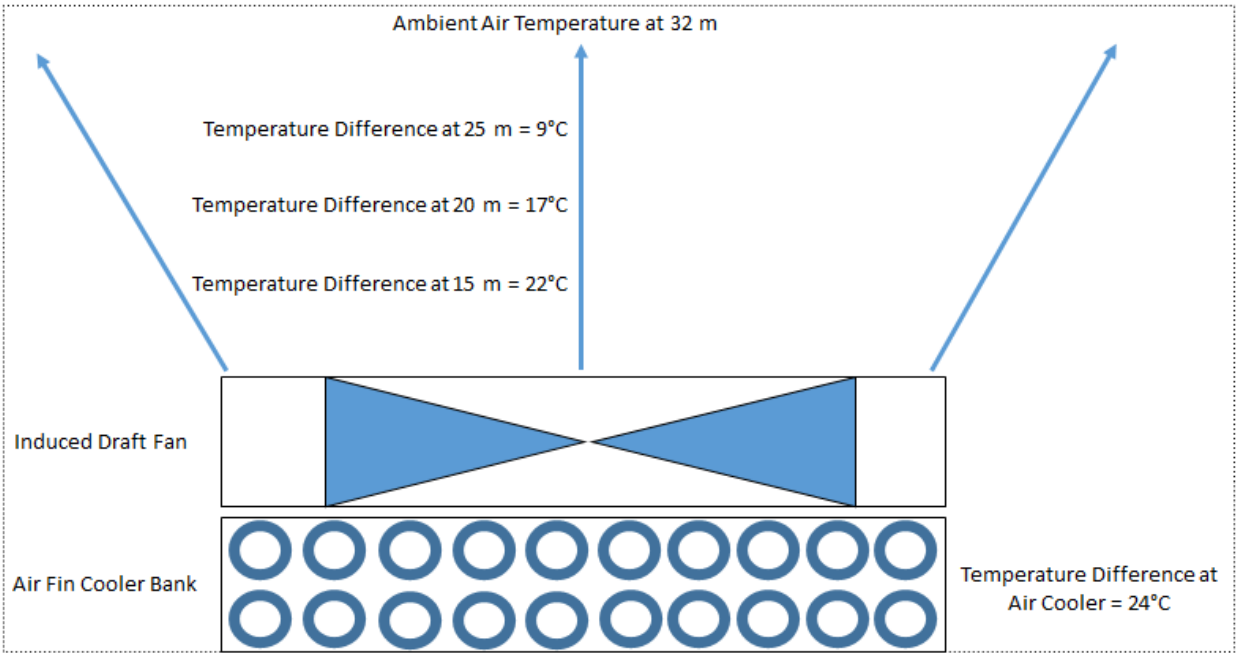


Figure 2-3 Heat Transfer from Air Cooling

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.

2.2 USE OF EXISTING MILL CREEK INTAKE SITE

Fresh water will be used during both the construction and operation phases of the Project, and maximum diversion flows at the existing Mill Creek intake are anticipated to remain consistent with those reported in the Application (**Table 2-1**). Fresh water uses during construction include dust control, concrete batching, and worker facilities. Fresh water uses during operation include fire, service water for the LNG facility, and domestic use water.

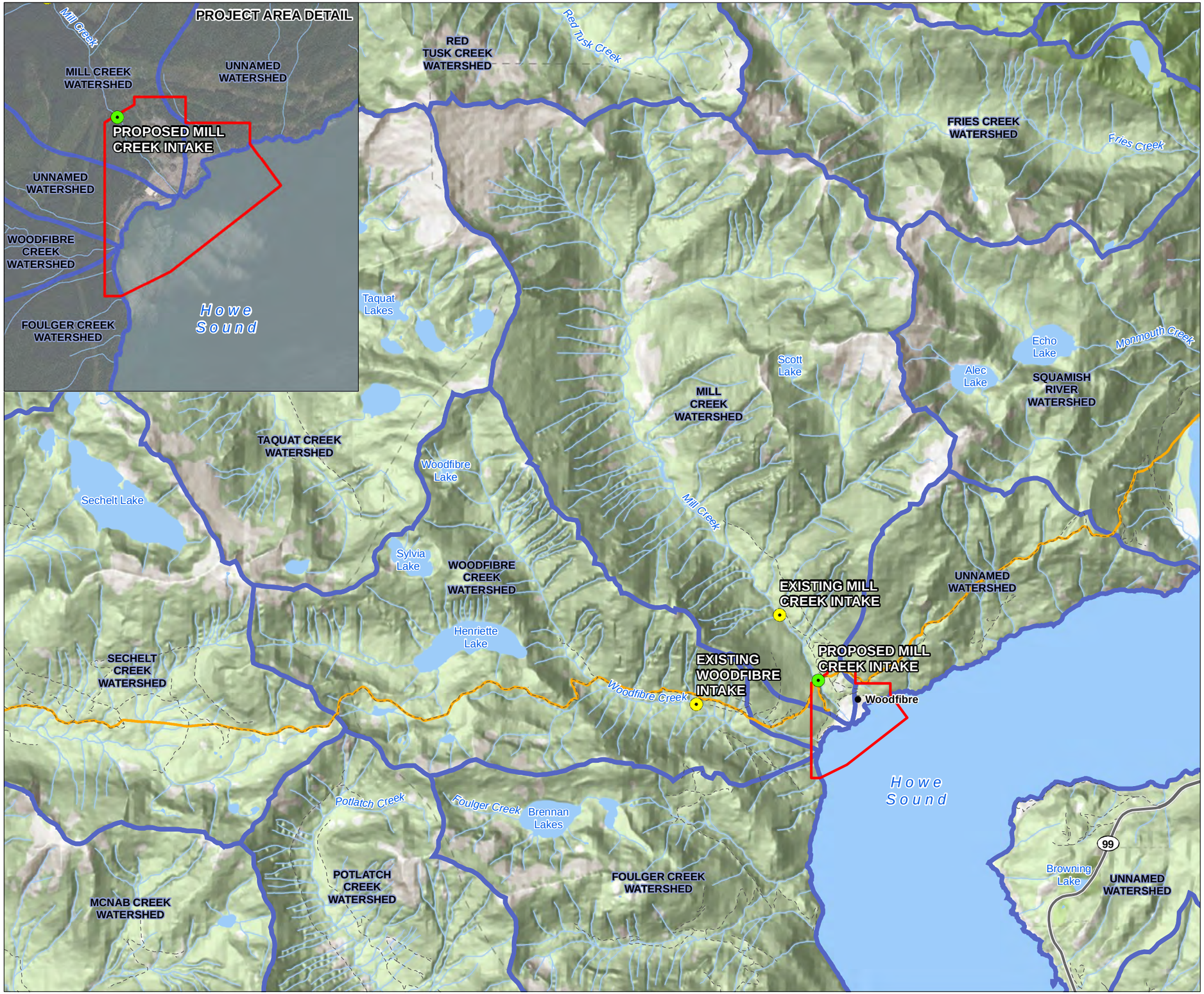
Table 2-1 Surface Water Demand

Project Phase	Water Demand	
	m^3/s	(L/s)
Construction	0.07 m^3/s	70 L/s
Operation (Typical)	0.007 m^3/s	7 L/s
Operation (Firefighting)	0.03 m^3/s	30 L/s

Notes: m^3/s – cubic metres per second; L/s – litres per second

The construction and use of a new water intake on Mill Creek, located approximately 1 kilometre (km) upstream of Howe Sound, is included in the EAC. Water from the new water intake was to be conveyed via buried pipe to the fire water and raw water tank. Woodfibre LNG is currently investigating the feasibility of using the existing Mill Creek intake as an alternative to constructing a new intake. The existing Mill Creek intake site is located approximately 1 km upstream of the site proposed in the Application, approximately 2 km upstream of Howe Sound (**Figure 2-4**), and is covered by a Permit over Crown Land (No. 17347) under the provincial *Water Sustainability Act*, SBC 2014, c. 15.

The existing intake is likely to require upgrades prior to use; these required upgrades will be determined as part of ongoing investigations. If upgrading the existing intake is not feasible, a new intake may be constructed at the same location as the existing intake or remain in the location proposed in the Application. Regardless of the intake location, water will be diverted into a pipe and stored in a raw water tank located within the Project area before being used as part of Project construction and operation.



LEGEND

- APPROXIMATE LOCATION OF EXISTING INTAKE
- APPROXIMATE LOCATION OF PROPOSED INTAKE
- WATERSHED BOUNDARY
- PROJECT AREA
- FORTIS BC PIPELINE
- HIGHWAY
- ROAD
- LIMITED ACCESS ROAD
- WATERCOURSE
- WATERBODY

SOURCES

Data courtesy of Canvec - GeoGratis, Government of British Columbia, ESRI

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Metres

WOODFIBRE LNG LIMITED.
WOODFIBRE, HOWE SOUND, B.C.

WATER INTAKE SITES

Figure 2-4	27/01/2017

HEMMERA

Woodfibre LNG

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2.3 WITHDRAWAL OF WATER FROM WOODFIBRE CREEK DURING CONSTRUCTION

Withdrawal of water from Woodfibre Creek was not included in the Application; however, more detailed construction planning has shown that an alternate water source to Mill Creek may be required during construction. Accordingly, Woodfibre LNG is proposing to use water from Woodfibre Creek (if required) for short-term water requirements. The water withdrawals required for the Project will not change (see **Table 2-1**); however, water may be extracted from either creek singly or in combination. Water would either be drawn from existing infrastructure (i.e., the existing hydropower penstock) or directly from Woodfibre Creek using pumps. The location of the existing intake and penstock are shown on **Figure 2-4**. Pumps withdrawing water directly from Woodfibre Creek will incorporate best management practices (BMPs) for approach velocities and screen spacing, as outlined in *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO 1995).

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 maximum amount of water to be diverted from Woodfibre Creek will be consistent with the construction-phase diversion rates included in the Application (2,500 cubic metres per day (m^3/day) or 0.07 cubic metres per second (m^3/s)).

3.0 CONSULTATION

Below is a summary of the consultation activities that have occurred prior to and during the Application Review period as well as in preparation of this Amendment Application.

3.1 FIRST NATIONS CONSULTATION

The proposed activities included in the Amendment Application fall within the asserted traditional territory of Squamish Nation. The property on which the facility is to be constructed does not fall within the asserted traditional territories of any other Aboriginal Group, although it is adjacent to the Tsleil-Waututh Nation's Consultation Area. Per the Application, LNG carriers and supporting marine vessels such as escort tugs will pass through areas of Howe Sound within proximity to the asserted traditional territory of Squamish Nation, the Tsleil-Waututh Nation's Consultation Area, and several other Aboriginal groups' asserted traditional territories.

The EAO's section 11 Order, which was issued on in March 21, 2014, sets out three Aboriginal Group Schedules with different consultation requirements as follows:

- Schedule B: Squamish Nation – Consultation on all Project Components
- Schedule C: Tsleil-Waututh Nation – Consultation on Offsite Project Effects
- Schedule D: Notification by the EAO as per part 12.2 of the section 11 Order
    - Musqueam Indian Band
    - Cowichan Tribes First Nation
    - Halalt First Nation
    - Lake Cowichan First Nation
    - Lyackson First Nation
    - Penelakut Tribe
    - Stz'uminus First Nation
    - Métis Nation BC

Continuing with Woodfibre LNG's Application engagement strategy and the direction per the section 11 Order, as well as in concert with the Engagement Policy and Engagement Principals described in the Application, Woodfibre LNG engages with Squamish Nation regarding all Project components and the Tsleil-Waututh Nation regarding offsite Project-related effects. Woodfibre LNG also keeps Schedule D Aboriginal groups notified of Project activities. The scope of engagement efforts is influenced by each of the Amendment Application's components and activities as well as their potential effect on the continued exercise of Aboriginal Interests, including effects on traditional and current Aboriginal use of lands and resources.

Woodfibre LNG is committed to documenting Project-related consultation activities in a manner that satisfies the regulatory requirements of the Canadian Environmental Assessment Agency and the EAO, and respects how Aboriginal groups prefer consultation activities to be reported.

3.1.1 Squamish Nation

Woodfibre LNG and Squamish Nation entered into an agreement to conduct a separate Project review process (Squamish Nation Process) to discuss the potential effects of the Project on Squamish Nation's Aboriginal interests. Information shared and issues raised during that process were not reported in the Application as all discussions between Woodfibre LNG and Squamish Nation under the Squamish Nation Process were considered confidential. The Squamish Nation Process is likely the first of its kind in Canada, one that considers traditional land, water, and heritage resources. More information about the Squamish Nation Process is included in **Appendix B**.

On October 14, 2015, Squamish Nation issued an Environmental Certificate for the Project that included conditions to be met by Woodfibre LNG. One of the conditions was that Squamish Nation would choose the cooling technology that is acceptable to Squamish Nation. Through its participation in the EAO Technical Working Group (via PGL Environmental Consultants), Squamish Nation had previously raised issues regarding the use of seawater cooling technology, including the use of biofouling and dechlorination agents, design of the intake screens, and mortality from entrainment.

To address those issues and concerns, and to fulfill a condition of the Squamish Nation Environmental Certificate, the Woodfibre Environmental Working Group, which is supported by Woodfibre LNG and consists of Squamish Nation and Woodfibre LNG representatives, compared three alternative cooling technologies: a seawater cooling system, an air cooling system, and a system that combines air cooling with freshwater spray. The Woodfibre Environmental Working Group determined that of the three cooling technologies, seawater cooling has the highest net environmental effect and that air cooling is considered to have the lowest net environmental effects. On October 19, 2016, Squamish Nation sent a letter to Woodfibre LNG advising that Squamish Nation had chosen air cooling as the cooling technology to be used for the Woodfibre LNG Project (**Appendix A**).

Pursuant to the section 13 Order issued on November 6, 2014, Woodfibre LNG continues to notify and provide Squamish Nation with all of the same information that is provided to the other Aboriginal groups listed on Schedule C of the section 11 Order. Woodfibre LNG sent formal notification to Squamish Nation on January 3, 2017 confirming the proposed Project changes to appear in the Amendment Application. Woodfibre LNG will continue to discuss the proposed Project changes with Squamish Nation through regular Woodfibre Environmental Working Group meetings, the Amendment Application Technical Working Group, and direct discussions with Squamish Nation representatives. Woodfibre LNG will report on non-confidential consultative activities with Squamish Nation, as required by Canadian Environmental Assessment Agency and EAO.

3.1.2 Tsleil-Waututh Nation

Woodfibre LNG began initial discussions with the Tsleil-Waututh Nation in early 2014 following the EAO's issuance of the section 11 Order. The Tsleil-Waututh Nation participated in the EAO Technical Working Group. Outside the Technical Working Group, consultation activities with the Tsleil-Waututh Nation have included a mix of formal and informal meetings and discussions, provision of capacity funding, and support of Current and Traditional Aboriginal Use and Values studies. Per the Woodfibre LNG-Tsleil-Waututh Nation Memorandum of Understanding (signed December 16, 2014), the Tsleil-Waututh Nation provided the results of the Traditional Land Use Study in March 2015, and Woodfibre LNG submitted an updated Tsleil-Waututh Nation Current Use report to EAO in June 2015.

The Tsleil-Waututh Nation raised concerns regarding seawater cooling during the review of the Application for an EAC. Comments from the Tsleil-Waututh Nation regarding the seawater cooling system included those listed below.

- [The conclusion of negligible residual effects] … is not acceptable to Tsleil-Waututh Nation. The listed residual effects are considered significant concerns by Tsleil-Waututh Nation and their true magnitude would be better assessed through a cumulative effects assessment.
- Tsleil-Waututh Nation requires a de-chlorination process, as well as mitigation for water temperature prior to discharge in Howe Sound. Tsleil-Waututh Nation requires a 'net gain' in water quality and habitat throughout its territorial lands and waters. Discharging a toxic substance into the marine environment is not acceptable.
- Tsleil-Waututh Nation requires that cumulative effects of larvae – particularly crab and prawn –- mortality due to impingement and entrainment at water intakes is to be assessed for commercial, recreational, and Aboriginal fisheries.

The switch from seawater cooling to air cooling proposed herein will address the Tsleil-Waututh Nation's concerns noted above.

The Tsleil-Waututh Nation also had questions regarding the withdrawal of water from Mill Creek and the associated environmental effects, including that diversions could potentially leave Mill Creek dry in the summer months. The mitigation measures implemented to address these concerns will also be implemented with respect to the two water-related changes proposed herein, particularly the development and implementation of instream flow releases (IFRs) and screening pump intakes in accordance with BMPs. The mitigation measures included in Section 3 (fish and fish habitat) of the federal Decision Statement and Condition 5 of the EAC will also be implemented.

Woodfibre LNG sent a notification letter to the Tsleil-Waututh Nation on January 3, 2017 advising of the proposed Project changes appearing in the Amendment Application. Woodfibre LNG has offered to meet to discuss the proposed Project changes with the Tsleil-Waututh Nation at their earliest convenience. Woodfibre LNG has received a response from the Tsleil-Waututh Nation acknowledging receipt of the letter and confirming that they will be involved in the Amendment Application review. Woodfibre LNG remains committed to meeting with the Tsleil-Waututh Nation to discuss the proposed Project changes.

3.1.3 Schedule D Aboriginal Groups.

The EAO's section 11 Order to Woodfibre LNG, issued March 21, 2014, includes a Schedule D, which lists the Aboriginal groups that Woodfibre LNG was required to notify on major Project developments. In accordance with Sections 2.10 and 2.11 of the federal Decision Statement, Woodfibre LNG sent notification letters to the Schedule D Aboriginal Groups on January 3, 2017 advising of the proposed Project changes. To date, Woodfibre LNG has received acknowledgement of receipt of the letters from Musqueam Nation and Métis Nation BC. Woodfibre LNG is committed to providing information relating to the proposed Project changes as requested by Aboriginal groups.

3.2 PUBLIC AND LOCAL GOVERNMENT CONSULTATION

In May 2013, Woodfibre LNG began meeting with key stakeholders in the District of Squamish and Howe Sound to introduce the Project and obtain early input regarding interests, issues, and concerns. From the pre-Application stage through the Application review stage, representatives of Woodfibre LNG met with more than 30 local organizations, including local governments, non-profit organizations, businesses, charities, sporting groups, and others.

During the public comment period for the Application, which occurred from January 22 to March 23, 2015, a total of 1,702 submissions were submitted to the EAO. Approximately 25% of the submissions sent to the EAO raised the issue of seawater cooling and marine water quality. Specifically, the concerns cited by the public include the following:

- Warm water discharged into Howe Sound will have an adverse effect on the marine ecosystem.
- Residual chlorine contained in seawater discharge will have adverse effects on benthic organisms, fish, and other marine life.
- The seawater cooling system intake will injure or kill marine life.

The switch from seawater cooling to air cooling will address issues raised by the public regarding potential effects of seawater cooling on the marine system.

During the public comment period for the Application, Woodfibre LNG also received comments from people concerned that removal of water from Mill Creek would result in water levels that would be too low to support fish life, especially during the summer. The mitigation measures implemented to address these concerns will also be implemented with respect to the two water-related changes proposed herein, particularly the development and implementation of IFRs and screening pump intakes in accordance with BMPs. The mitigation measures included in Section 3 (fish and fish habitat) of the federal Decision Statement and Condition 5 of the EAC will also be implemented.

As part of Woodfibre LNG's commitment to going beyond what is required in order to build a better Project, prior to submitting this Amendment Application, Woodfibre LNG hosted a stakeholder meeting at the Woodfibre site on January 18, 2017. The attendees included 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. A copy of the invitation that was sent to stakeholders is included in **Appendix C**. In particular, Woodfibre LNG reviewed the potential noise effects associated with the use of air cooling instead of seawater cooling.

The following stakeholders were invited to the meeting:

- Alpine Club of Canada – Vancouver Section
- Alterra Power Corp.
- BC Hydro
- BC Marine Trails Network Association
- Black Mount Logging
- Coastal Inlet Adventures
- David Ellis (Trapper)
- Federation of Mountain Clubs of BC
- FortisBC Energy Inc. (tenure holder)
- Garibaldi Forest Products
- Marine Adventure Company
- Rogers Communications Inc.
- Sea to Sky Adventure Company
- Sea to Sky Gondola
- Sea to Sky Nordics
- Sqomish Forestry LP
- Squamish Harbour Marine Adventures
- Squamish Harbour Tours
- Squamish Marine Services
- Squamish River Watershed Society
- Squamish Streamkeepers
- Squamish Windsports Society
- Squamish Yacht Club

A summary of the questions related to the Amendment Application raised during the stakeholder meeting is provided in **Table 3-1**. The presentation from the stakeholder meeting is included in **Appendix C**.

Table 3-1 Comments from Stakeholder Meeting

Topic	Comments, Issues, and Concerns	Proponent Response and Action Items
Cooling Technology	What is the difference between seawater cooling and air cooling?	Much of the cooling system remains the same despite the switch from seawater cooling to air cooling. The main difference is that instead of transferring heat from the liquefaction process to seawater it is transferred to air. The air cooling system is described in **Section 2.1** of the Amendment Application.
Cooling Technology	Are there changes to the air emissions? What are the emissions and smells from the air cooling system?	The change in cooling technology will not result in changes to air emissions from the Project as the air cooling fans are only transferring heat into the air. For the same reason, there is no smell associated with air cooling for the LNG facility.
Cooling Technology	How high is the LNG facility?	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.
Cooling Technology	How are the fans constructed – will they affect birds? The assumption that an industrial site would not attract birds is incorrect – they are attracted.	The fans are mounted horizontally and shrouded for protection. Birds are potentially attracted to heat associated with the air cooling; however, the fans will be in the middle of an industrial facility and birds will avoid the fans due to the noise and air flow. Avifauna species at risk that have a potential to be present at the site (e.g., western screech owl) would not be expected to be attracted to the facility area because of a lack of habitat. 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.
Cooling Technology	Will the fans direct air down or up?	The fans will direct the warm air upwards.
Cooling Technology	How is it possible that air cooling will have less energy consumption that seawater?	As the design of the Project is being further refined, we know that not all of 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 reduced as compared to seawater cooling.
Cooling Technology	Can you give an example of what to expect in summer – how many fans, how many hours per day.	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.
Cooling Technology	Will I hear the Project from Nexen or the Sea to Sky Gondola?	The modeling shows that the Project will not be heard from the Nexen lands or from the Sea to Sky Gondola. The results of the noise modeling are included in **Section 6.1** and **Appendix D**.
Cooling Technology	How does the model take into account the terrain, existing noise?	The noise model includes terrain, and is based on worst-case meteorology. The modeling results assume that all noise-generating components of the Project are operating and that wind is blowing towards the receptors at 5 metres per second.

Topic	Comments, Issues, and Concerns	Proponent Response and Action Items
Cooling Technology	The wind in Howe Sound is a thermal-based pattern in the summer. How will the heat from the air cooling system affect the wind?	As described in the Air Quality and Meteorology Baseline Report (Golder Associates 2015), winds in the Sea-to-Sky airshed follow a north to south pattern. Winds in the winter are from the north when large-scale, low-pressure systems dominate the area, and in the summer, high pressure systems incur winds from the south. A land-sea breeze draws wind from the south into the mountains primarily due to daytime heating of the mountain slopes. In addition, solar heating of the surrounding area creates anabatic or upflow winds. These predominant wind pattern systems are large-scale and will not be affected by the air cooling design.
Cooling Technology	Have you done a lifecycle analysis for the cost of the Project? With air cooling the initial investment is higher, but with seawater cooling system the maintenance costs are likely higher.	The switch to air cooling was Squamish Nation's decision for environmental reasons. Woodfibre LNG analyzed the potential production impacts, and there is a slight loss of production with air cooling.
Cooling Technology	What is the visual profile of the air cooling system? Is there further opportunity for reducing visual impact?	The switch to air cooling will not have a material effect on the visual effects of the Project. It does not change the Green Zone or the colour of the buildings, which are the primary mitigation measures. Regardless of the cooling technology, the LNG train is expected to be a natural metal colour. Effects to visual quality will be addressed through a visual quality management plan (EAC Condition 20), which will be developed in consultation with the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO), OGC, Aboriginal Groups, Tourism Squamish, and the Sea to Sky Gondola.
Water Use	How do you handle flows during peak season when water flow is low? What happens in summer when you need water?	Minimum IFRs will be developed as part of the water management plan (EAC Condition 5). Water will preferentially be directed to the IFR pipe, and there will be no water withdrawn if streamflows are lower than the IFR. Woodfibre LNG will be responsible for locating alternate water sources during these periods.
Water Use	What percentage of the water will be diverted during the summer?	Because streamflows are variable, this percentage will vary. When streamflows are less than the IFR, there will be no water diverted from the creek.
Water Use	What are the lowest flows in summer?	The hydrology of Mill and Woodfibre creeks is described in Section 5.9 of the Application. The lowest flows typically occur in August, and the mean monthly flow in August is 1.9 cubic metres per second (m^3/s) for Mill Creek and 1.1 m^3/s for Woodfibre Creek. The 10-year return period 7-day low flow is estimated to be approximately 0.09 m^3/s for Mill Creek and 0.03 m^3/s for Woodfibre Creek.
Water Use	What made you choose the Mill Creek intake proposed in the Application?	Originally, the intake location was selected based on the amount of head (water pressure) required and the location within the Woodfibre property. As the design has evolved, the engineering team is considering upgrading and reusing the existing intake. The decision regarding which intake to use is also dependant on the condition assessment of the existing intake. Studies are ongoing.

Topic	Comments, Issues, and Concerns	Proponent Response and Action Items
Water Use	Monitoring and reporting to the OGC is like the fox reporting to the henhouse. Isn't there DFO (others) to report to?	The OGC will be responsible for the short-term use approval, and Ministry of Forests, Lands and Natural Resource Operations is responsible for the existing water licences. There is also a commitment to report to Squamish Nation. The primary mitigation is the Water Management Plan, which will be reviewed by Squamish Nation.
Water Use	How much of a contingency is it if there is a fire?	There will a fire water storage tank that will stay full. The storage volume is regulated by the Canadian Standards Association and the OGC.

3.3 GOVERNMENT AGENCY CONSULTATION

Federal, provincial, and local government agencies were invited to participate in the pre-Application and Application review as members of the EAO's Technical Working Group; they reviewed and provided comments on materials prepared for the pre-Application and Application review. It is anticipated that the Technical Working Group will continue to undertake reviews and provide comments during the review period for the Amendment Application.

During the Application review, government agencies, elected officials, and village representatives raised a number of issues about the seawater cooling system technology, including the following:

- Effects from the seawater cooling system discharge on water quality to other receptors (Ministry of Environment, District of Squamish, District of West Vancouver, Bowen Island Municipality); and
- Effects on marine organisms at the intake screen (District of Squamish, District of West Vancouver, Village of Lions Bay).

During the Application review period, Woodfibre LNG submitted additional information on the seawater cooling system to the Technical Working Group, via the EAO. That supplemental information is posted on the EAO website.

Prior to submission of this Amendment Application, Woodfibre LNG contacted Technical Working Group members to advise them of the changes. As potential concerns related to the Project changes have been identified during these discussions, information has been added to this Amendment Application.

4.0 ASSESSMENT METHODOLOGY

The assessment methodology for this Amendment Application follows a two-step screening process to identify potential effects to the valued components (VC) and intermediate components (IC) identified in the Application. The first step screens the potential for an interaction between the new Project components (i.e., air cooling, Mill Creek water intake, and use of Woodfibre Creek water) with the VC or IC (**Table 5-1**). The VCs and ICs with the potential to interact are carried forward for further assessment, and a rationale for those VCs and ICs not carried forward is provided (**Section 5.0**). The second step identifies whether the new Project interactions are likely to result in a new or increased effect with the VC or IC (**Section 6.0)**. If potential new or increased effects are identified, additional mitigation to that in the Application may be proposed, and a determination of residual effect will be made for the VCs. The assessment methodology used for this Amendment Application is consistent with the methodology used in the Application (refer to Section 4.6 of the Application). Proposed changes to the EAC as a result of the Project-related changes and assessment in the Amendment Application are included in **Section 8.0**.

Interactions between the Project activity and each IC or VC are classified as follows:

- **No interaction**: where no interaction is likely between a Project component and a VC or IC.
- **No new interaction**: where no new interaction beyond those already included in the Application is identified.
- **Minor interaction**: where an adverse effect may result from an interaction, but standard measures to avoid or minimize the potential effect are available and well understood to be effective, and any residual effects would be reduced to negligible. Interaction is not discussed further.
- **Carried forward** – where interactions have the potential to result in an adverse effect.

Interactions identified in **Table 5-1** are discussed in the relevant sections of **Section 6.0**. Each anticipated interaction, and how it translates to an adverse effect on each VC, is discussed in the relevant section. If an interaction has the potential to create a new or increased effect compared to the Application, additional mitigation measures are proposed. Where applicable, the mitigation from the Application is noted in the text. Woodfibre LNG is committed to implementing the mitigation measures listed in the Application.

Once the additional mitigation measures are applied, a determination of adverse residual effect on VCs will be applied. An adverse residual effect for the VCs will be rated as negligible, not significant, or significant; definitions for these ratings are as follows:

Significant (S) The basis for determining that a residual effect is significant will be provided in the section for each VC, if required. The determination of significance will be the same as identified for each VC in the Application.

Not significant (NS) Effects determined to be not significant are those likely to be greater than negligible; however, they do not meet the definition of significant.

Negligible (N) Defined as undetectable or unmeasurable. If, following mitigation, negligible residual effects are anticipated, the effect is not carried forward for an assessment of the significance of residual effects.

Consistent with the Application, a determination of significance is only made for VCs.

The new Project activities are as follows:

- Construction phase:
  - upgrading of the Mill Creek intake
  - installation of the air cooling system
  - extraction of water from Woodfibre Creek
- Operation phase
  - liquefaction of natural gas at the LNG facility using air cooling.

There are no new Project activities identified for the decommissioning phase. Dismantling and removal of the Mill Creek intake and air cooling system are considered to be within the scope of decommissioning activities identified and assessed in the Application.

Project interactions that are no longer applicable (i.e., interaction with the seawater cooling system) due to the Project changes are identified and discussed in **Section 5.2**. These could be considered as benefits from the switch to air cooling, and as such are not included in the assessment of adverse residual effects, which are described in **Section 6.0**.

5.0 INTERACTION OF PROPOSED PROJECT CHANGES WITH INTERMEDIATE COMPONENTS AND VALUED COMPONENTS

5.1 PROJECT INTERACTIONS WITH PROPOSED PROJECT CHANGES

The ICs and VCs considered in the Application are also considered for the Amendment Application. A summary of the ICs and VCs and their potential to interact with the proposed Project changes are provided in **Table 5-1**. The table identifies interactions between the Project changes (components) and VC and IC that have the potential to cause an adverse effect with a checkmark. Only those ICs and VCs that have a potential to interact adversely with the proposed Project changes are considered further in this amendment.

Table 5-1 Summary of the Potential for Intermediate Components and Valued Components to Interact with Proposed Project Changes

Intermediate Component or Valued Component	Application Section	Interaction with Proposed Project Changes			Included in Amendment Application	Rationale
		Air Cooling	Upgrading Mill Creek intake	Use of Woodfibre Creek		
Intermediate Component						
Atmospheric Sound	5.4	✓			Yes	Potential for additional sound generated during operation by the air cooling system
Light	5.5				No	No new interactions with Project
Geotechnical and Natural Hazards	5.6				No	No new interactions with Project
Site Contamination	5.7				No	No new interactions with Project
Surface Water Quality	5.8				No	No new interactions with Project
Surface Water Quantity	5.9		✓	✓	Yes	Longer Mill Creek diversion reach New interaction with use of Woodfibre Creek water
Marine Water Quality	5.10				No	No new interactions with Project
Valued Components						
Atmospheric Environment (Air Quality)	5.2	✓			Yes	Potential for heat generated from the air cooling system
Greenhouse Gas Management	5.3				No	No new interactions with Project
Vegetation Communities	5.11				No	No new interactions with Project

Intermediate Component or Valued Component	Application Section	Interaction with Proposed Project Changes			Included in Amendment Application	Rationale
		Air Cooling	Upgrading Mill Creek intake	Use of Woodfibre Creek		
Avifauna	5.12	✓			Yes	Potential for sensory disturbance due to noise and heat exhaust
At-risk Bats	5.13	✓			Yes	Potential for sensory disturbance due to noise and heat exhaust
Amphibians	5.14		✓	✓	Yes	Potential for effects from water withdrawals
Freshwater Fish and Fish Habitat	5.15		✓	✓	Yes	Potential for effects from water withdrawals
Marine Benthic Habitat	5.16				No	No new interactions with Project
Marine Birds	5.17	✓			Yes	Potential for sensory disturbance due to noise and heat exhaust.
Forage Fish and Other Fish	5.18				No	No new interactions with Project
Marine Mammals	5.19				No	No new interactions with Project
Labour Market	6.1				No	No new interactions with Project
Sustainable Economy	6.2				No	No new interactions with Project
Infrastructure and Community Services	7.2				No	No new interactions with Project
Marine Transport	7.3				No	No new interactions with Project
Land and Resource Use	7.4	✓			Yes	Potential for sensory disturbance due to noise and visual quality.
Visual Quality	7.5	✓			Yes	Air cooling system will be mounted on top of a building and will be visible
Current Use of Lands and Resources for Traditional Purposes	7.6	✓			Yes	Potential for sensory disturbance due to noise and visual quality.
Heritage Resources	8.2				No	No new interactions with Project
Community Health and Well-being	9.2.1				No	No new interactions with Project
Human Health Risk Assessment	9.2.2	✓			Yes	Potential for sensory disturbance from increase in sound

5.2 ENVIRONMENTAL INTERACTIONS WITH THE SEAWATER COOLING SYSTEM

The Application assessed the proposed Project interactions with the seawater cooling system, which are no longer applicable with the switch to air cooling. A summary of the Project interactions that are no longer applicable and the corresponding reduction in potential effects due to the switch from seawater cooling to air cooling are reviewed below. Although the removal of the seawater cooling system will eliminate some of the interactions that were identified and assessed in the Application, the mitigation measures committed to in the Application will still be implemented. Proposed revisions to the EAC due to the change to air cooling and the associated elimination of some interactions are included in **Section 8.0**.

5.2.1 Marine Water Quality

The potential interactions between the installation and use of the seawater cooling system and marine water quality included temporary re-suspension of sediments from seafloor disturbance during construction and seawater discharge from the seawater cooling system (temperature, residual chlorine) during operation. The Project no longer has the potential to affect marine water quality from discharge of seawater from the seawater cooling system.

5.2.2 Marine Benthic Habitat

The potential interactions between marine benthic habitat and the installation of the seawater cooling system included a physical disturbance and loss of habitat from the placement of intake, outlet, and diffuser pipes on the seafloor, and may have also resulted in re-suspension of sediment, thereby increasing turbidity and total suspended solids. There may have also been effects on marine benthic communities from changes in marine sediments (e.g., smothering). During the operation phase, both juvenile and adult benthic invertebrates would have been susceptible to impingement and entrainment at the water intake, thereby causing direct or indirect mortality. The Project no longer has the potential to affect marine benthic habitat due the installation and use of the seawater cooling system.

5.2.3 Marine Fish

During construction, the potential effects to marine fish from the installation of the seawater cooling system included direct loss of habitat from construction of infrastructure and adverse change in habitat quality due to seabed disturbance and siltation. During operation, the potential effects included fish mortality from impingement or entrainment and indirect loss of habitat from avoidance of warm water. The Project no longer has the potential to affect marine fish from installation and use of the seawater cooling system.

5.2.4 Marine Birds

The potential effects of the seawater cooling system on marine birds included the direct loss of foraging habitat due to the placement of the structure and an indirect loss of habitat caused by a potential reduction of food availability (forage fish). The Project no longer has the potential to affect marine birds from the installation of the seawater cooling system, and a reduction of food (i.e., forage fish) is no longer considered as a potential result of the operation of the seawater cooling system. Other potential effects to marine birds are discussed in **Section 6.8**.

5.2.5 Marine Mammals

The potential effects to marine mammals from the installation and use of the seawater cooling system included changes in food availability due to mortality or behavioural changes of forage fish. 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.

6.0 ASSESSMENT OF ADVERSE EFFECTS FROM PROPOSED PROJECT CHANGES

The potential interactions between the proposed Project activities and the relevant ICs and VCs are discussed in the following sections. Each anticipated interaction and how that translates to an adverse change (IC) or effect (VC) are discussed. If an interaction has the potential to create a new or increased effect compared to the Application, additional mitigation measures are proposed. Where applicable, the mitigation from the Application is noted in the text. A list of the mitigation measures from the Application referenced in the text is included as **Appendix E**.

6.1 ATMOSPHERIC SOUND

As identified in the Application, an increase in atmospheric sound associated with Project activities is likely to occur. For the construction phase, these noise levels are not anticipated to materially change with the new activities from those identified and assessed in the Application. During the operation phase, air cooling has the potential to generate more atmospheric sound than the seawater cooling system due to the use of fans. The identified interactions for the upgrading of the Mill Creek water intake remain the same as those identified in the Application (**Table 6-1**).

Table 6-1 Potential Project Interactions with Atmospheric Sound

New Project Activities and Physical Works	Atmospheric Sound Interaction
Construction Phase	
Upgrading of existing Mill Creek water intake	Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the construction of new Mill Creek intake.
Installation of air cooling system	Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the construction of land-based civil works, including structures.
Extraction of water from Woodfibre Creek	Minor interaction - noise levels are not anticipated to materially change for the construction phase from those identified and assessed in the Application.
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	Interaction is carried forward – potential increase in sound levels in the Project area.
Extraction of water from Mill Creek	Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the use of water from Mill Creek.

As discussed in Section 5.4 of the Application, seven sound receptor (SR) locations were included in the sound assessment. Receptors SR1, SR2, and SR3 correspond to locations used for baseline sound monitoring. Receptors SR4, SR5, SR6, and SR7 represent unoccupied locations on the *British Columbia Noise Control Best Practices Guideline* (OGC Guideline) (OGC 2009) criteria boundary in the four cardinal directions from the Project. These receptors characterize the OGC Guideline criteria boundary at specific locations. Permissible sound levels are based on the OGC Guideline. The permissible sound level values for receptors within the communities of Britannia Beach (SR1) and Darrell Bay (SR2) and at Watts Point (SR3) are higher than permissible sound levels at the other receptors because of increased dwelling unit density and proximity to a heavily traveled road or rail line. See Section 5.4 of the Application for additional information.

Generally, the sound assessment is completed for locations where it is expected that sound effects from Project activities could potentially affect humans. Specific study areas have been identified as representing all sensitive receptors that could be affected by sound emissions associated with Project activities. **Table 6-2** provides some reference sound levels for additional context.

Table 6-2 Sound Pressure Levels of Typical Sound Sources

Activity / Sound Source	Sound Pressure Level (dBA)
Jackhammer at 15 m*	95
Loud Shout	90
Heavy Truck at 15 m*	85
Vacuum Cleaner at 3 m*	70
Automobile (100 km/hr) at 30 m*	65
Normal Conversation at 1 m	60
Quiet Living Room	40
Soft Whisper at 2 m*	35
Unoccupied Broadcast Studio	28
Threshold of Hearing	0

Notes: *Harris 1997; dBA – A-weighted decibel

The Application noise modeling results have been updated to include the air cooling system and to incorporate additional details from the ongoing FEED-level design (**Appendix D**). The sound prediction model used is the Computer-aided Sound Attenuation (CadnaA) prediction model (Version 4.2.140). The model was used to predict the daytime noise level ($L_{eq,day}$) and nighttime noise level ($L_{eq,night}$) in A-weighted decibels (dBA) over the local assessment area (LAA) and regional assessment area (RAA) during operation. In order to be conservative, the noise modeling was done for a 'worst-case' scenario for the assessment, and includes the following assumptions:

- All noise-generating equipment operates continuously (i.e., 24 hours per day over seven days per week).
- Berthing of the LNG carrier is modeled, as it is the most conservative approach with shipping-related noise sources.

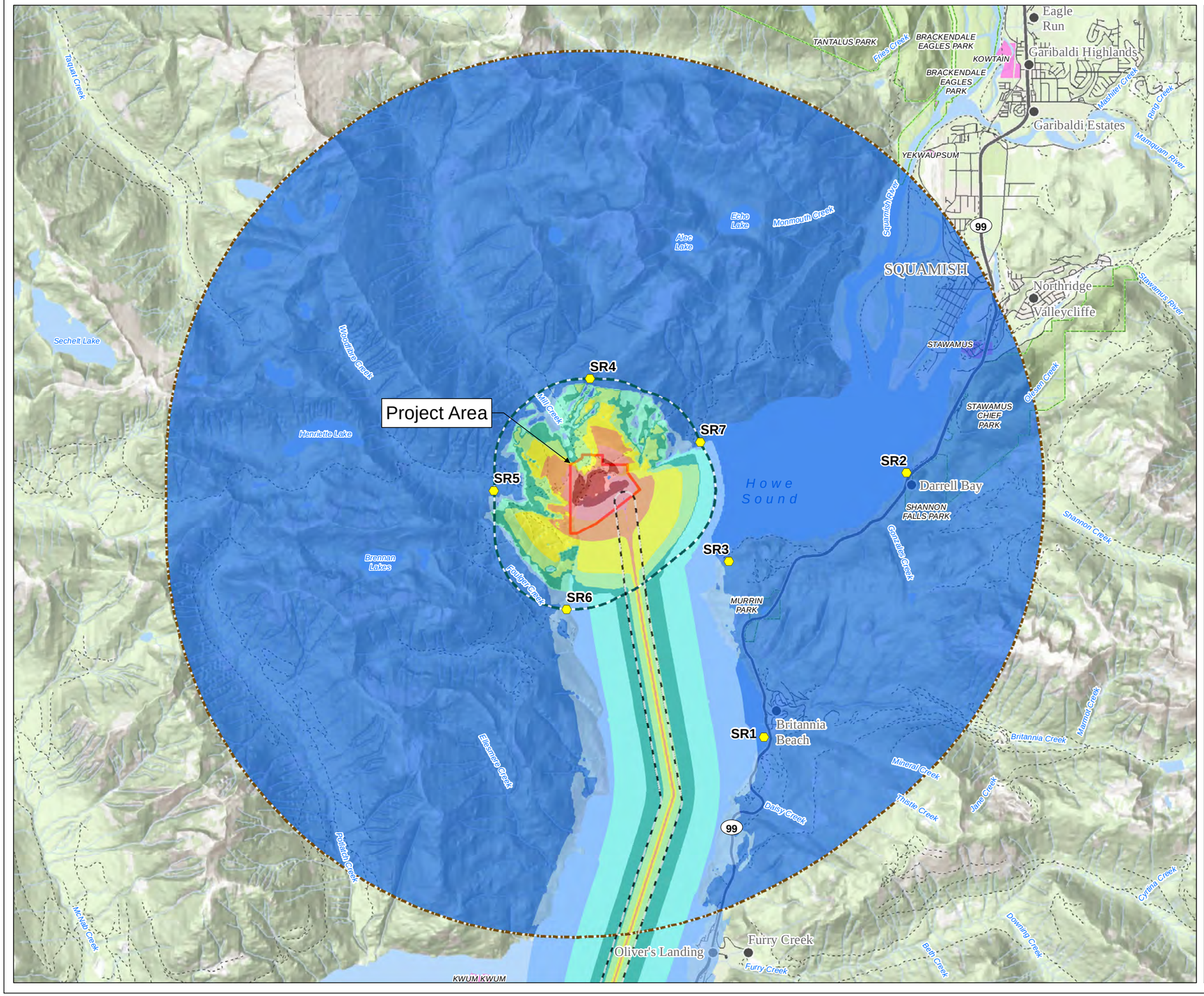
- Three tug boats assist with berthing.
- Both main and auxiliary engines for the LNG carrier are running during berthing.
- No ground absorption is used.
- No sudden or unexpected noise (e.g., blasting) is expected during the operations phase.

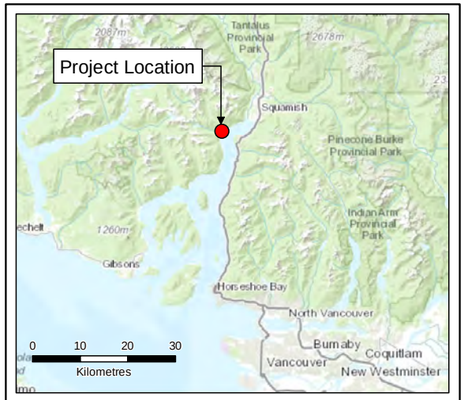
The operation-phase sound levels with the air cooling technology at the SR locations are reported in **Table 6-3**. Baseline-case sound levels and permissible sound levels are consistent with those reported in the Application (refer to Table 5.4-23 of the Application).

Table 6-3 Operation-phase Sound Levels

Assessment Receptors	Permissible Sound Level (dBA)		Baseline-case Sound Level (dBA)		Application Case Woodfibre LNG Project with Air Cooling (dBA)		Comment
	$L_{eq, day}$	$L_{eq, night}$	$L_{eq, day}$	$L_{eq, night}$	$L_{eq, day}$	$L_{eq, night}$	
SR1 – Britannia Beach	58	48	53	43	53.0	43.1	Below permissible sound level
SR2 – Darrell Bay	55	45	50	40	50.0	40.1	Below permissible sound level
SR3 – Watts Point	55	45	50	40	50.1	40.9	Below permissible sound level
SR4 - OGC	50	40	45	35	45.0	35.1	Below permissible sound level
SR5 - OGC	50	40	45	35	45.1	35.6	Below permissible sound level
SR6 - OGC	50	40	45	35	45.5	38.5	Below permissible sound level
SR7 - OGC	50	40	45	35	45.1	35.6	Below permissible sound level

Results from the Application-case Woodfibre LNG Project with air cooling noise modeling 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. Detailed modeling conducted in support of the Application calculated that the sound levels emitted by the Project as a whole are approximately 55 dBA to 60 dBA at the shoreline of the Project area, but would still be well within the OGC guidelines (2009), and aligned with Health Canada guidance (2010). The revised noise modeling results also calculate that sound levels emitted by the Project as a whole are approximately 50 dBA to 60 dBA at the shoreline of the Project area. By comparison, sound levels emitted by the Project as a whole, approximately 50 dBA to 60 dBA at the shoreline of the Project area, are equivalent to what a person would hear from a normal conversation when standing 1 m away (**Table 6-2**). **Figure 6-1** presents contours representing the Project sound levels across the LAA and RAA for the operation phase. Sound levels at SR1, SR2 and SR3 will range between 50 dBA to 53 dBA during the day and 40.1 dBA to 43.1 dBA during the night. By comparison, 40 dBA is equivalent to a sound level inside a quiet living room (**Table 6-2**).





Legend

Sound Contours (dBA)

- < 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- > 65
- Sound Receptor
- Atmospheric Sound Local Assessment Area
- Atmospheric Sound Regional Assessment Area
- Project Area
- First Nations Reserve
- Certified Marine Route
- Park or Protected Land

SOURCES

- Parks and Protected Lands, First Nations Reserves from GeoBC, all other data courtesy of Canvec - GeoGratis.
- Background image from ESRI World Topographic Map.

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WOODFIBRE LNG LIMITED.
WOODFIBRE, HOWE SOUND, B.C.

EQUIVALENT SOUND CONTOURS

Figure 6-1	26/01/2017

HEMMERA Woodfibre LNG

Path: O:\1160\016620006\02\map\Fig6-1_1662_006_02_Noise_sound-cont_terrain_170119.mxd

The Project design (see Section 2.2 of the Application) incorporates several noise mitigation measures in the different Project phases. In general, these measures include sourcing low noise-emitting equipment and locating high noise-emitting equipment inside buildings where possible. The mitigation measures from Section 5.4 of the Application that would avoid or reduce changes to Project noise levels during operations are as follows:

- Schedule noise emitting maintenance during the day (M5.4-6).
- Notify residents (M5.4-7).
- Receive feedback about high-noise activity (M5.4-8).

Woodfibre LNG will establish and implement a means (e.g., an office in Squamish) for people to provide input when experiencing a high-noise activity related to the Project.

Based on the noise modeling, the predicted changes in sound are below guidelines and within the range assessed in the Application; therefore, additional mitigation measures are not required and the assessment of the residual changes inclusive of the air cooling system do not change from those in the Application.

In accordance with a commitment made to Squamish Nation, noise monitoring during operation will be conducted to confirm the results of the modeling.

6.2 ATMOSPHERIC ENVIRONMENT

Potential interactions between the Project and the atmospheric environment will be in the form of maximum offsite (outside of Project area) concentrations resulting from emission-producing activities during each phase of the Project (construction, operation, and decommissioning). These emissions were identified and assessed in the Application, and no additional emissions (i.e., indicator compounds: nitrogen dioxide, sulphur dioxide, carbon monoxide, total suspended particulates, particulate matter) from the Project will occur with the proposed Project changes.

As noted in **Section 2.1**, the use of the air cooling system will emit heat exhaust from the fans. The potential effect of the heat on the environment has been identified as a potential concern during pre-Amendment Application consultation with stakeholders; therefore, the interaction of the heat exhaust from the air cooling system has been included in the amendment (**Table 6-4**).

Table 6-4 Potential Project Interactions with Atmospheric Environment

Project Activities and Physical Works	Atmospheric Environment Interaction
Construction Phase	
Upgrading of existing Mill Creek water intake	Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the construction of new Mill Creek intake.
Installation of air cooling system	Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the construction of land-based civil works, including structures.
Extraction of water from Woodfibre Creek	Interaction is not carried forward as this is a minor interaction that will be consistent with the scope of activities identified and assessed in the Application.
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	Interaction is carried forward - potential interaction due to the heat exhaust from the system.
Extraction of water from Mill Creek	Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the use of water from Mill Creek.

As described in the Air Quality and Meteorology Baseline Report (Golder Associates 2015), winds in the Sea-to-Sky Airshed follow a north-to-south pattern. Winds in the winter are from the north when large-scale, low-pressure systems dominate the area; in the summer, high-pressure systems incur winds from the south. A land-sea breeze draws wind from the south into the mountains during the day primarily due to daytime heating of the mountain slopes. In addition, solar heating of the surrounding area creates anabatic or upflow winds. These predominant wind pattern systems are large-scale and will not be affected by the air cooling design. As noted in the heat transfer diagram (**Figure 2-3**) the temperature of the air reaches ambient within 32 m of the cooling fans (**Section 2.1**).

The air cooling fans are electrically driven and the facility electricity consumption is expected to remain within the 140 MW considered in the Application; thus, no additional air emissions are released into the atmosphere due to the change to air cooling.

Accordingly, additional mitigation measures are not required and the assessment of the residual changes, inclusive of the air cooling system, in the Application do not change.

6.3 SURFACE WATER QUANTITY

The scope of the analysis for the Surface Water Quantity IC in Section 5.9 of the Application includes both Mill Creek and Woodfibre Creek. The scope of the analysis related to the proposed Project changes is consistent with the scope presented in Section 5.9 of the Application with one exception: water withdrawals from Woodfibre Creek during construction are an additional interaction. The changes to the potential interactions associated with the proposed Project changes are outlined in **Table 6-5**.

Table 6-5 Potential Project Interactions with Surface Water Quantity

Project Activities and Physical Works	Surface Water Quantity Interaction
Construction Phase	
Upgrading of existing Mill Creek water intake	No new interaction identified. Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the construction of new Mill Creek intake.
Installation of air cooling system	No interaction
Extraction of water from Woodfibre Creek	Interaction is carried forward – reduction in streamflows due to Project water demand.
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	No interaction.
Extraction of Water from Mill Creek	Interaction is carried forward – potential interaction occurs over a longer distance than that identified in the Application.

Potential effects to water flows as a result of Project-related activities were assessed in the Application based on annual average, dry month average, and extreme low-flow estimates for Mill Creek and Woodfibre Creek. Extreme low flows were characterized with the seven-day rolling average low flow with a 10-year return period (7Q10). As reported in the Application, the Project is not expected to have a notable effect on the extreme high flows of Mill Creek or Woodfibre Creek due to the small flows being diverted.

Annual average flows in Mill Creek and Woodfibre Creek are estimated to be 3.4 cubic metres per second (m^3/s) and 2.0 m^3/s respectively, with the lowest flows typically occurring in August. Based on the synthetic hydrographs, the average August flow is 1.9 m^3/s for Mill Creek and 1.1 m^3/s for Woodfibre Creek. These flow estimates represent natural flows, and have not been reduced to account for water diversions. The 7Q10 was estimated from regional charts as approximately 0.09 m^3/s for Mill Creek and 0.03 m^3/s for Woodfibre Creek.

As reported in the Application, water diversions during the Project's construction phase are estimated to be a maximum of 2,500 m^3/day. Assuming water is extracted at a constant rate during the daily 10-hour shifts, the water diversion rate would be equivalent to 0.07 m^3/s (**Table 2-1**). During construction, this water may be sourced from either Woodfibre Creek under a short-term use approval or Mill Creek under the existing water licences.

The potential effects from the use of the existing Mill Creek intake site are not anticipated to change from those identified in the Application; however, these effects will occur over up to an approximately 2-km-long section of the creek rather than a 1-km-long section. The diversion reach for Woodfibre Creek will be dependent on whether water is taken from the existing infrastructure; the maximum diversion reach would be approximately 2 km.

The primary mitigation measure related to surface water quantity is the establishment of minimum IFRs; this was included as mitigation measure M5.9-1 in the Application to address potential changes in water quantity in Mill Creek and Condition 5 of the EAC. Mitigation measure M5.9-1 will be applied to water withdrawals from Woodfibre Creek; it is anticipated that IFRs will be included in the short-term use approval issued by the OGC. Woodfibre LNG will ensure that the IFRs on Mill Creek and Woodfibre Creek are established by a qualified professional. When required, water diversions will be interrupted or reduced to maintain IFRs downstream of intakes.

The predicted changes are within the range assessed in the Application for Mill Creek; therefore, additional mitigation measures are not required and the residual changes in the Application do not change. The Application concluded that during construction, proposed water withdrawals are not expected to result in substantial changes to surface water quantity based on the average, average low, and extreme low-flow estimates for Mill Creek. Water diversions will be interrupted or reduced during extreme low flows to maintain IFRs. Changes to surface water quantity, after the incorporation of the mitigation measures listed above, are expected to be of low magnitude, local in effect, and reversible.

Since the changes proposed to Woodfibre Creek are similar to those proposed for Mill Creek and water withdrawals from Woodfibre Creek will be subject to the same mitigation measures and Condition 5 of the EAC (**Section 8.0**), it is expected that the same results will occur as when water is withdrawn from Mill Creek. Changes to surface water quantity, after the incorporation of the mitigation measure listed above, are therefore expected to be of low magnitude, local in effect, and reversible.

6.4 AVIFAUNA

As described in the Application, for the purposes of the assessment, avifauna are categorized as a diverse group of species that occur in habitats ranging from forest to urban communities. Two subcomponents were selected to assess effects on avifauna – platform and cavity nesting birds, and Passeriformes and Columbiformes. Within these two subcomponents, the following six representative species were selected to focus the environmental assessment on the avifauna VC:

- Platform and Cavity Nesting Birds
  - Bald eagle *(Haliaeetus leucocephalus)*
  - Osprey *(Pandion haliaetus)*
  - Western screech-owl *(Megascops kennicottii kennicottii)*
- Passeriformes and Columbiformes
  - Barn swallow (*Hirundo rustica*)
  - Band-tailed pigeon (*Patagioenas fasciata*)
  - Olive-sided flycatcher (*Contopus cooperi*)

The changes to the potential interactions associated with the proposed Project changes, from the construction and operation phases of the Project activities and physical works are outlined in **Table 6-6**.

Table 6-6 Potential Project Interactions with Avifauna

Project Activities and Physical Works	Avifauna Interaction
Construction Phase	
Upgrading of Mill Creek water intake	No new interaction identified. Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and assessed in the Application for the construction of a new Mill Creek intake.
Installation of air cooling system	No new interaction identified. Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and assessed in the Application for the construction of land-based civil works, including structures.
Extraction of water from Woodfibre Creek	No interaction predicted.
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	Interaction is carried forward – potential for increase in sensory disturbance (noise) greater than that identified and assessed in the Application; potential for interaction with heat from the fans.
Extraction of water from Mill Creek	No new interaction identified. Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the use of water from Mill Creek.

During construction and operation, the potential effects on avifauna are an indirect loss of foraging and nesting habitat due to sensory disturbance. The potential effects related to the installation of the air cooling system are within the scope of the interactions for Project activities and physical works (Table 5.12-9 of the Application); no additional footprint is required so there is no additional loss of foraging and nesting habitat. Although an increase in sound from the use of fans in the air cooling system was identified as a potential effect, detailed noise modeling has shown that the noise levels will be within the range assessed in the Application (as identified in **Section 6.1 Atmospheric Sound**).

The Application reported that noise levels modeled during the operation phase will be the highest in the immediate vicinity of the LNG facility, where noise levels from operating equipment are predicted to reach a maximum of 85 dBA. For comparison, noise levels predicted to reach a maximum of 85 dBA are equivalent to standing 15 m away from a heavy truck (**Table 6-2**). Noise levels during the operation phase are not expected to exceed 60 dBA outside the Project area, with the exception of the maximum noise levels immediately surrounding marine vessels. Because the sound levels in the Project area will be within the range assessed in the Application (refer to Section 5.4 of the Application), additional mitigation measures are not required and the residual effects on sensory disturbance from sound in the Application do not change.

The heat exhaust from the air cooling fans has the potential to cause a sensory disturbance in birds; however, the heat exhaust from the air cooling fans is not expected to cause direct mortality of birds. Species sensitive to the increase in heat are anticipated to avoid the air cooling system due to the lack of suitable habitat in the immediate vicinity of the LNG facility, and air from the cooling system is expected to return to ambient temperature within approximately 32 m of the air cooling system. To confirm this conclusion, wildlife monitoring will be included in the operation-phase wildlife management and monitoring plan required under Condition 12 of the EAC to confirm that the warm air from the fans does not have any meaningful adverse interactions with avifauna.

The proposed changes to Mill Creek do not change the interactions with avifauna that were identified and assessed in the Application. Further, there is no identified interaction with birds due to the use of water from Woodfibre Creek.

The mitigation measures from Section 5.12 of the Application that are listed below would avoid or reduce effects to avifauna for the proposed Project changes:

- Implement the Wildlife Management Plan (M5.12-1).
- Retain snags and wildlife trees (M5.12-2).
- Establish and retain vegetative buffers around raptor nests (M5.12-3).
- Manage light (M5.12-5).

- Install nesting structures (M5.12-8).
- Design buildings to reduce bird strikes (M5.12-9).

The mitigation measures included in Section 4 (migratory birds) of the federal Decision Statement and the wildlife management and monitoring plan (EAC Condition 12) will also be implemented.

The predicted effects to foraging and nesting habitat and sensory disturbance are within the range assessed in the Application; therefore, additional mitigation measures are not required and the assessment of the residual effects inclusive of the air cooling system does not change from those in the Application.

In accordance with a commitment made to Squamish Nation, additional wildlife monitoring will be included in the operation-phase wildlife management and monitoring plan (EAC Condition 12) to confirm that the warm air from the fans does not have any meaningful adverse interactions with birds. With the implementation of Project design measures and other mitigation measures, the Application determined that the residual effects to avifauna were not likely to be significant. There will be no change to the implementation of the mitigation measures listed in the Application; the conclusions of the Application related to avifauna are still valid.

6.5 AT-RISK BATS

The potential effects of the Project on at-risk bats were assessed in Section 5.13 of the Application. During construction and operation, these effects include indirect loss of roosting and foraging habitat due to sensory disturbance. The changes to the potential interactions associated with the proposed Project changes are outlined in **Table 6-7**.

Table 6-7 Potential Project Interactions with At-risk Bats

Project Activities and Physical Works	At-risk Bats Interaction
Construction Phase	
Upgrading of Mill Creek water intake	No new interaction identified. Interaction is not carried forward as there is no change to the nature of the interaction or rating identified and assessed in the Application for the construction of new Mill Creek intake.
Installation of air cooling system	No new interaction identified. Interaction is not carried forward as there is no change to the nature of the interaction or rating identified and assessed in the Application for the construction of land-based civil works, including structures.
Extraction of water from Woodfibre Creek	No interaction predicted

Project Activities and Physical Works	At-risk Bats Interaction
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	Interaction is carried forward due to the potential increase in sound and heat from the fans.
Extraction of water from Mill Creek	No new interaction identified. Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the use of water from Mill Creek.

As reported in Section 5.13 of the Application, during construction up to approximately 18.9% of the foreshore habitat in the LAA and approximately 13.1% in the RAA is predicted to occur within the 70-dB noise threshold. Because the sound levels in the Project area will be within the range assessed in the Application (refer to Section 5.4 of the Application), there will be no additional effects to at-risk bat populations from the air cooling system.

The proposed changes to Mill Creek do not change the interactions with at-risk bats that were identified and assessed in the Application. Further, there is no identified interaction with at-risk bats due to the use of water from Woodfibre Creek.

The mitigation measures from Section 5.13 of the Application that are listed below would avoid or reduce effects to at-risk bats for the proposed Project changes:

- Implement Wildlife Management Plan (M5.12-1).
- Retain Snags and Wildlife Trees (M5.12-2).
- Avoid Clearing during Bat Maternity Season (M5.13-1).
- Minimize the Amount of Ultraviolet Light (M5.13-2).
- Install Bat Boxes (M5.13-3).

The predicted indirect loss of at-risk bat species habitat due to sensory disturbance is within the range assessed in the Application; therefore, additional mitigation measures are not required and residual effects inclusive of the Project amendments do not change from those in the Application.

In accordance with a commitment made to Squamish Nation, monitoring will be included in the wildlife management and monitoring plan (EAC Condition 12) to confirm that the warm air from the fans does not have any meaningful adverse interactions with bats. With the implementation of Project design measures and other mitigation measures, the Application determined that the net residual effects to at-risk bats were not significant. There will be no change to the implementation of the mitigation measures listed in the Application; the conclusions of the Application related to at-risk bats are still valid.

6.6 AMPHIBIANS

The BC Conservation Data Centre lists three regionally occurring federally and provincially designated at-risk amphibian species: coastal tailed frog (*Ascaphus truei*), western toad (*Anaxyrus boreas*), and northern red-legged frog (*Rana aurora*). These species were selected as representative species to focus the assessment on the Amphibians VC due to their potential presence (based on the presence of available suitable habitat within the Project area) and provincial or federal designation for conservation concern. Western toads and red-legged frogs were not observed during the field surveys in the LAA, and no suitable breeding habitat was observed within the LAA.

The scope of the analysis on the Amphibians VC related to the proposed Project changes is consistent with the scope presented in Section 5.14.1 of the Application. The changes to the potential interactions associated with the proposed Project changes for the construction and operation phases of the Project activities and physical works are outlined in **Table 6-8**.

Table 6-8 Potential Project Interactions with Amphibians

Project Activities and Physical Works	Amphibians Interaction
Construction Phase	
Upgrading Mill Creek water intake	No new interaction identified. Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the construction of new Mill Creek intake.
Installation of air cooling system	No interaction
Extraction of water from Woodfibre Creek	Interaction is carried forward – indirect loss of habitat due to water withdrawal for coastal tailed frog.
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	No new interaction identified. Interaction is not carried forward as there is no change to the nature of the interaction or rating identified and assessed in the Application.
Extraction of water from Mill Creek	Interaction is carried forward – potential interaction occurs over a longer distance than that identified and assessed in the Application.

The proposed change of the Mill Creek intake site does not change the interactions with amphibians that were identified and assessed in the Application; however, any interactions will occur over a longer section of the creek.

As described in Section 5.14 of the Application, coastal tailed frog has been confirmed in the headwaters of Woodfibre Creek downstream of Henriette Lake (FSCI 2010) within the RAA and is expected to occur in the headwaters of Mill Creek. The basin of Woodfibre Creek is 22 square kilometres (km^2), and based on research presented in Dupuis and Friele (2003), it is expected that the majority of suitable coastal tailed frog habitat in the RAA is situated within tributaries and the upper reaches of Woodfibre Creek. The basin size of the mainstem of Woodfibre Creek (22 km^2) likely limits the amount of suitable coastal tailed frog habitat.

Coastal tailed frog presence has not been confirmed in Mill Creek. The Mill Creek basin area is approximately 40 km^2. While it is expected that coastal tailed frogs are limited to the upper reaches and tributaries, a conservative approach has been applied to the assessment of Project-related effects to coastal tailed frog by considering that the species could be present in the lower reaches of Mill Creek and Woodfibre Creek.

As reported in Section 5.14 of the Application, the potential Project-related effects to amphibians as a result of extraction of freshwater are expected to include loss of amphibian breeding and tadpole rearing habitat (stream breeding species) due to water withdrawals. A minimum IFR will be developed and implemented that will minimize potential effects from changes in water quantity to amphibians; therefore, increased water removal from Woodfibre Creek is not anticipated to affect amphibians. The predicted effects for Woodfibre Creek are similar to those for Mill Creek, and the mitigation measures for Mill Creek will be applied to Woodfibre Creek. To ensure that sufficient water remains in Woodfibre Creek, a minimum IFR regime will be developed and implemented to minimize potential effects from changes in water quantity to amphibians.

The mitigation measures from Section 5.14 of the Application that are listed below would avoid or reduce effects to amphibians in and around Mill Creek and Woodfibre Creek.

- Bury water lines where feasible to allow for amphibians crossings (Project Design).
- Implement Wildlife Management Plan (M5.12-1).
- Identify sensitive habitat (M5.14-2).
- Salvage and replace coarse woody debris (M5.14-3).
- Implement an Environmental Protection Plan for works in and about Mill Creek (M5.14-4).
- Implement a Water Management Plan (M5.15-2).

The predicted effects for Mill Creek are within the range assessed in the Application; therefore, additional mitigation measures are not required and assessment of the residual effects inclusive of the activities on Mill Creek does not change from those in the Application. Re-fueling will be undertaken more than 30 m away from a watercourse, and will follow industry BMPs for storage and handling of such substances. With the implementation of Project design measures and other mitigation measures, the Application determined that the net residual effects to amphibians were negligible.

6.7 FRESHWATER FISH AND FISH HABITAT

The potential interactions between freshwater fish and fish habitat and Project-related works and activities on Mill Creek, and the potential effects resulting from the interactions were identified and discussed in Section 5.15 of the Application. The scope of the analysis on the Freshwater Fish and Fish Habitat VC related to the proposed Project changes is consistent with the scope presented in Section 5.15.1 of the

Application. The changes to the potential interactions associated with the proposed Project changes for the construction and operation phases of the Project activities and physical works are outlined in **Table 6-9**.

Table 6-9 Potential Project Interactions with Freshwater Fish and Fish Habitat

Project Activities and Physical Works	Freshwater Fish and Fish Habitat Interaction
Construction Phase	
Upgrading of Mill Creek water intake	No new interaction predicted. Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the construction of new Mill Creek intake.
Installation of air cooling system	No interaction.
Extraction of water from Woodfibre Creek	Interaction is carried forward – potential for a reduction in Woodfibre Creek flows; entrainment or impingement of fish.
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	No interaction.
Extraction of water from Mill Creek	Interaction is carried forward – potential interaction occurs over a longer distance than that identified and assessed in the Application.

The following information on fish presence in Woodfibre Creek and Mill Creek is from the Freshwater Fish Baseline Study (Golder 2014), which is presented as Appendix 5.15-1 of the Application.

Woodfibre Creek rises steeply out of the ocean, and is characterized by steep gradients and a boulder cascade-pool morphology. The creek is confined within steep canyon walls and passage of fish is blocked in multiple locations by barriers such as falls and bedrock slides (Moon and Brierley 1988). The lowest barrier is within 150 m of Woodfibre Creek's outfall to the marine environment, limiting the habitat available for anadromous fish to use the creek in large numbers. Documented fish include rainbow trout (*Oncorhynchus mykiss*) and cutthroat trout (*Oncorhynchus clarkii*) (CMN 2013; MOE 2013a; MOE 2013b), although only rainbow trout along with sculpin *(Cottus* sp.) and one juvenile chinook salmon (*Oncorhynchus tshawytscha*) were captured in the baseline survey. 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.

Results of fish sampling efforts in Mill Creek and Woodfibre Creek were comparable to other regional watercourses within the RAA (Moon and Brierley 1988; MOE 2013a; MOE 2013b), with the confirmed presence of rainbow trout, pink salmon (*Oncorhynchus gorbuscha*), coho salmon (*Oncorhynchus kisutch*), and sculpin within both creeks. Cutthroat trout have been documented in the LAA in past site reviews, although none were captured during the site surveys for the Project. It is possible that fry identified as rainbow trout may be juvenile cutthroat trout as they are difficult to distinguish at that life-stage (Cox and Peatt 1979).

Individually, the fish production potential from Mill and Woodfibre creeks is habitat-limited and neither stream is likely to contribute significantly to fish production. These creeks contribute to the total fish production within Howe Sound, which relies on cumulative inputs from many small nursery streams (Cox and Peatt 1979; Harding and Erickson 1975).

As identified in the Application, potential effects from the construction and operation of the water intake on Mill Creek include a loss of fish habitat through the footprint of those works, fish mortality through the use of construction equipment in and around Mill Creek, and reduction of fish habitat through the extraction of water, and potential for entrainment or impingement at the intake site. These effects do not change with the change in location of the Mill Creek intake. Project design measures include designing the water supply infrastructure to adhere to BMPs 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). The Mill Creek water intake will incorporate BMPs for approach velocities and screen spacing as outlined in *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO 1995) and *Measures to Avoid Causing Harm to Fish and Fish Habitat* (DFO 2013).

Similar to the potential effects on Mill Creek from water extraction, water withdrawals on Woodfibre Creek have the potential to result in dewatering of habitat and a reduction in the wetted width of the channel, thereby reducing benthic invertebrate habitat and the transport of leaf litter from the riparian vegetation. A decrease in the food and nutrient content of the creek water may in turn cause a downstream reduction in productive capacity of the creek. The primary mitigation measure to reduce effects to fish associated with water withdrawals is IFRs on both Mill Creek and Woodfibre Creek (see **Section 6.3 Surface Water Quantity**). The IFRs will be established by qualified professionals considering stream-specific hydrology and the fish species present.

If pumps are used to withdraw water from Woodfibre Creek during construction, they will incorporate BMPs for approach velocities and screen spacing as outlined in *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO 1995).

Additional mitigation measures that will be implemented to reduce or avoid these effects include the following:

- Follow Instream Works Best Management Practices for Fish (M5.15-1).
- Develop and Implement a Water Management Plan (M5.15-2).

The mitigation measures included in Section 3 (fish and fish habitat) of the federal Decision Statement will also be implemented.

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. The Application concluded that the residual adverse effects to freshwater fish and fish habitat are likely to be negligible.

The predicted effects for Woodfibre Creek are similar to those for Mill Creek, and the mitigation measures for Mill Creek will also be applied to Woodfibre Creek. With the implementation of these measures, the residual effects are predicted to be limited to the site, short-term, and reversible; therefore, the significance characterization is negligible.

6.8 MARINE BIRDS

Marine birds are bird species that depend on marine and coastal habitat for one or more of their life requisites. They have ecological and aesthetic value, and contribute to local and global biodiversity.

The scope of the assessment related to the proposed Project changes is consistent with the scope presented in Section 5.17 of the Application. The changes to the potential interactions associated with the proposed Project changes are outlined in **Table 6-10**.

Table 6-10 Potential Project Interactions with Marine Birds

Project Activities and Physical Works	Marine Birds Interaction
Construction Phase	
Upgrading of Mill Creek water intake	No interaction.
Installation of air cooling system	No new interaction predicted. Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the construction of land-based civil works, including structures.
Extraction of water from Woodfibre Creek	No interaction.
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	Interaction is carried forward – potential for increase in sensory disturbance (noise); potential for interaction with heat from the fans.
Extraction of water from Mill Creek	No interaction.

As reported in the Application, noise levels modeled during the operation phase (daytime and nighttime levels equivalent) will also be highest in the immediate vicinity of the LNG facility, where noise levels from operating equipment are predicted to reach a maximum of 85 dBA. For comparison, a noise level predicted to reach a maximum of 85 dBA is equivalent to standing 15 m away from a heavy truck (**Table 6-2**). Noise levels during the operation phase are not expected to exceed 60 dBA outside the Project area, with the exception of the maximum noise levels immediately surrounding marine vessels,

which will intermittently reach 60 dBA along the shipping route. A noise level of 60 dBA is equivalent to normal conversation at 1 m (**Table 6-2**). Because the sound levels in the Project area will be within the range assessed in the Application (refer to Section 5.4 of the Application), no additional effect on bird populations from sensory disturbance due to sound is expected.

Species sensitive to the increase in heat are anticipated to avoid the air cooling system due to the lack of suitable habitat in the immediate vicinity of the LNG facility, and air from the cooling system is expected to return to ambient temperature within approximately 32 m of the air cooling system.

The proposed changes to Mill Creek do not change the interactions with avifauna that were identified and assessed in the Application. Further, there is no identified interaction with birds due to the use of water from Woodfibre Creek.

The mitigation measures from Section 5.17 of the Application that are listed below would avoid or reduce effects to marine birds for the proposed Project changes:

- Implement the Erosion Prevention and Sediment Control Plan (M5.8-1).
- Implement the Design for Stormwater Management (M5.8-2).
- Implement the Invasive Plant Management Plan (M5.11-1).
- Establish and maintain bird nest setbacks (M5.17-2).
- Establish and maintain marine bird breeding colony Setbacks (M5.17-3).
- Minimize the duration of construction activities in the intertidal zone (M5.17-5).
- Develop and implement a Marine Bird Management Plan (M5.17-8).

The mitigation measures included in Section 4 (migratory birds) of the federal Decision Statement and the wildlife management and monitoring plan (EAC Condition 12) will also be implemented.

With the continued implementation of this mitigation, the predicted residual effects are within the range assessed in the Application; therefore, additional mitigation measures are not required and the residual effects in the Application are not changed. In accordance with a commitment made to Squamish Nation, additional wildlife monitoring will be included in the operation-phase wildlife management and monitoring plan (EAC Condition 12) to confirm that the warm air from the fans does not have any meaningful adverse interactions with birds. With the implementation of Project design measures and other mitigation measures, the Application determined that the residual effects to marine birds were not likely to be significant. There will be no change to the implementation of the mitigation measures listed in the Application; the conclusions of the Application related to marine birds are still valid.

6.9 VISUAL QUALITY

The scope of the visual quality assessment related to the proposed Project changes is consistent with the scope presented in Section 7.5 of the Application. The changes to the potential interactions associated with the proposed Project changes are outlined in **Table 6-11**.

Table 6-11 Potential Project Interactions with Visual Quality

Project Activities and Physical Works	Visual Quality Interaction
Construction Phase	
Upgrading of Mill Creek water intake	No new interaction identified. Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and assessed in the Application for the construction of a new Mill Creek intake.
Installation of air cooling system	Interaction is carried forward - introduction of potentially visible Project activity or components.
Extraction of water from Woodfibre Creek	No interaction.
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	No interaction.
Extraction of water from Mill Creek	No interaction.

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.

The proposed changes to Mill Creek do not change the interactions with visual quality that were identified and assessed in the Application. There is no identified interaction with visual quality due to the extraction of water from Woodfibre Creek.

The Project components assessed in the Application included key elements of a Project's built components that were assessed relative to the character of the existing landscape and the landscape units. With the implementation of Project design measures and other mitigation measures, the Application determined that the residual effects to visual quality were not expected to be significant, as the average level of change for the affected visually sensitive units within the LAA is anticipated to be approximately 1%, which is considered an acceptable level of change from the baseline existing visual condition ratings.

The mitigation measures from Section 7.5 of the Application that are listed below would avoid or reduce effects to visual quality for the installation and use of the air cooling technology:

- Establish Green Zone (Project design).
- Complete external surface finishing (M7.5-1).
- Screen land-based infrastructure (M7.5-2).
- Monitor and maintain natural screening (M7.5-4).
- Re-finish and maintain external surfaces.

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.

6.10 LAND AND RESOURCE USE

The potential effects related to the proposed Project changes are within the scope of the interaction for Project activities and physical works (Table 7.4-5 of the Application); no additional footprint is required. The scope of the analysis on the Land and Resource Use VC related to the proposed Project changes is consistent with the scope presented in Section 7.4 of the Application.

The change in interactions with atmospheric sound (**Section 6.1**) and visual quality (**Section 6.8**) have the potential to change the Project interactions with the Land and Resource Use VC subcomponents (Recreational Hunting and Fishing, Other Outdoor Recreation Activities, and Parks and Protected Areas) (**Table 6-12**).

Table 6-12 Potential Project Interactions with Land and Resource Use

Project Activities and Physical Works	Land and Resource Use Interaction
Recreational Hunting and Fishing	
Construction Phase	
Upgrading of Mill Creek water intake	No interaction.
Installation of air cooling system	As identified in the Application, the Project is visible from parts of the LAA, but the effect from Watts Point was rated as not significant, which means there will be no noticeable decline in the visual quality from current conditions. Not carried forward, as there is no change to the nature or rating of the interaction identified and assessed in the Application.
Extraction of water from Woodfibre Creek	No interaction.

Project Activities and Physical Works	Land and Resource Use Interaction
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	As identified in the Application, at Watts Point, noise changes are projected to be less than 1 dBA during the day. No new interaction identified. Interaction is not carried forward, as there is no change to the nature or rating of the interaction identified and assessed in the Application.
Extraction of water from Mill Creek	No interaction.
Parks and Protected Areas	
Construction Phase	
Upgrading of Mill Creek water intake	No interaction.
Installation of air cooling system	As identified in the Application, the Project is visible from provincial parks but the effect is rated as not significant, which means there will be no noticeable decline in the visual quality from current conditions; as a result, the effect is considered minor on quality of experience. Not carried forward, as there is no change to the nature or rating of the interaction identified and assessed in the Application.
Extraction of water from Woodfibre Creek	No interaction.
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	As identified in the Application, at Watts Point, noise changes are projected to be less than 1 dBA during the day. Not carried forward, as there is no change to the nature or rating of the interaction identified and assessed in the Application.
Extraction of water from Mill Creek	No interaction.
Other Outdoor Recreation Areas	
Construction Phase	
Upgrading of Mill Creek water intake	No interaction.
Installation of air cooling system	As identified in the Application, the Project is visible from parts of the LAA, but the effect from Watts Point was rated as not significant, which means there will be no noticeable decline in the visual quality from current conditions. Not carried forward, as there is no change to the nature or rating of the interaction identified and assessed in the Application.
Extraction of water from Woodfibre Creek	No interaction.
Operation Phase	
Liquefaction of natural gas at the LNG facility using air cooling	As identified in the Application, at Watts Point, noise changes are projected to be less than 1 dBA during the day. Not carried forward, as there is no change to the nature or rating of the interaction identified and assessed in the Application.
Extraction of water from Mill Creek	No interaction.

As reported in the Application, indirect effects on recreational activities may include changes in quality of experience, such as changes to noise and visual quality. A review of potential residual changes to noise and air quality identified no change in the assessment in the Application (see **Section 6.1** and **Section 6.2**, respectively); therefore, no interactions as a result of the activities associated with the amendment are predicted.

The predicted effects to land and resource use (parks and protected areas and outdoor recreation) due to changes in sound and visual quality are within the range assessed in the Application; therefore, additional mitigation measures are not required and the residual effects in the Application do not change.

6.11 CURRENT USE OF LANDS AND RESOURCES FOR TRADITIONAL PURPOSES

The Current Use VC encompasses all land- and marine-based resources that may be used by Aboriginal groups for traditional purposes and may be affected by Project construction and operation. Current use resources are considered for the VCs and ICs discussed in **Section 6.0** including Atmospheric Sound, Avifauna, At-risk Bats, Visual Quality, and Land and Resource Use.

The potential interactions of the current use of lands and resources with the seawater cooling system and Mill Creek intake were identified and discussed in Section 7.6 of the Application. The scope of the proposed Project changes is consistent with the scope presented in Section 7.6 of the Application with the following exceptions: the change in cooling technology and water withdrawals from Woodfibre Creek during construction have the potential to change Project interactions. The changes to the potential interactions associated with the proposed Project changes are outlined in **Table 6-13**.

Table 6-13 Potential Project Interactions with Current Use of Lands and Resources for Traditional Purposes

Project Activities and Physical Works	Current Use Interaction
Construction Phase	
Upgrading of Mill Creek water intake	No new interaction predicted. Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and assessed in the Application with the construction of a new Mill Creek intake.
Installation of air cooling system	Interaction is not carried forward, as there is no change to the nature of the interaction or rating identified and considered in the Application for the construction of land-based civil works, including structures.
Extraction of water from Woodfibre Creek	Interaction is carried forward – potential interaction with amount and quality of resources.
Construction Phase	
Liquefaction of natural gas at the LNG facility using air cooling	Interaction is carried forward – potential sensory disturbance due to potential increase in sound from the fans.
Extraction of water from Mill Creek	No new interaction predicted. Interaction is not carried forward as there is no change to the nature or rating of the interaction identified and assessed in the Application.

As described in the Application, potential effects of the Project on current use include potential effects to the amount and quality of resources (i.e., freshwater and marine fish species, marine mammals), which would in turn affect current uses, as well as sensory disturbances during current use activities.

The Application concluded that the Project is not likely to result in any adverse residual effects to the current use of abundance, distribution, or quality of freshwater fish and fish habitat resources; no Project-related residual adverse effects are expected for the current use of forage fish; and Project-related effects on the current use of marine mammals are not likely. The Application also concluded that potential changes to the abundance, distribution, or quality of vegetation resources, avifauna resources, marine benthic habitat resources, and marine bird resources are not likely to affect current use. This Amendment Application demonstrates that the adverse residual effects to these VCs will be either the same as those described in the Application or, for receptor VCs along the pathway of effects from water withdrawal from Woodfibre Creek, assessed as not significant (Sections **6.3** to **6.8**). The Project amendments are therefore not likely to affect current use of resources.

The Application also concluded that sensory disturbance from noise during Project activities is not likely to adversely affect current use activities significantly. The Project noise levels associated with air cooling will remain within the range assessed in the Application (**Section 6.1**), and accordingly are not likely to produce significant adverse Project-related residual effects on current use from sensory disturbance.

In summary, with the mitigation noted for the resources, including an IFR on Woodfibre Creek and noise monitoring during Project operation to confirm modeling results, the residual effects to the Current Use of Land and Resources for Traditional Purposes VC are not changed from the Application. Residual effects were considered not likely to occur in the case of some VCs or in the case of other VCs are likely to be either negligible or not significant.

6.12 HUMAN HEALTH

As reviewed in this Amendment Application, the proposed Project changes that have the potential to interact with environmental components and were considered for inclusion in the Human Health Risk Assessment (HHRA) in the Application include atmospheric sound (**Section 6.1**), atmospheric environment (**Section 6.2**), and visual quality (**Section 6.9**). The proposed Project changes will not affect the conclusions of the HHRA that was submitted as part of the Application, for the following reasons:

- **Noise:** Construction and operation noise were not assessed using a formalized quantitative risk assessment in the Application, since the atmospheric sound predictions provided adequate confidence that changes in the acoustic environment in the vicinity of the Project will not result in adverse health effects. Because sound level predictions for the proposed Project changes s are expected to remain within guidelines, the conclusions of the Application do not change and public health will not be affected.

- **Visual Quality:** The effects of changes in visual quality from the Project were evaluated in Section 7.5 of the Application. The air cooling system will not extend beyond the height of the heat exchangers assessed in the Application; therefore, the conclusions of the Application related to visual quality do not change and public health will not be affected.

- **Air Quality:** Acute and chronic inhalation assessments were included in the HHRA in the Application, based on predicted air quality concentrations for the operation phase. Soil deposition modeling was carried out, and predicted soil concentrations were compared to screening criteria to determine whether further assessment of multimedia exposure was needed. The proposed Project changes, specifically the use of air cooling, will not change the air emissions identified and assessed in the Application; therefore, the conclusions of the Application related to air emissions and their potential effects on public health do not change.

6.13 SUMMARY OF EFFECTS OF PROJECT CHANGES

A summary of the changes to the mitigation measures presented in the Application and the characterization of residual effects and significance determination are presented in **Table 6-14**. In accordance with a commitment to Squamish Nation, noise monitoring will be undertaken to confirm modeling during the operation phase. Monitoring the interactions between the warm air from the fans and birds and bats will be added to the wildlife management and monitoring plan (EAC Condition 12), and a minimum IFR for Woodfibre Creek will be established prior to the withdrawal of water for construction.

Table 6-14 Summary of Changes to Mitigation Measures and Characterization of Residual Changes or Effects

Intermediate Component or Valued Component	Change to Application Mitigation Measures	Change to Application Characterization of Residual Changes or Effects
Intermediate Component		
Atmospheric Sound	Monitoring during Project operation to confirm modeling	No change
Surface Water Quantity	Minimum IFR for Woodfibre Creek will be established prior to withdrawal of water for construction (EAC Condition 5)	No change
Valued Component		
Atmospheric Environment	No change	No change
Avifauna	Monitoring to confirm that the warm air from the fans does not have any meaningful adverse interactions with birds and bats will be added to the Wildlife Management Plan (EAC Condition 12)	No change
At-risk Bats		No change
Amphibians	No change	No change
Freshwater Fish and Fish Habitat	No change	No change
Visual Quality	No change	No change
Land and Resource Use	No change	No change
Current Use of Lands and Resources for Traditional Purposes	No change	No change
Human Health Risk Assessment	No change	No change

7.0 ABORIGINAL INTERESTS

Aboriginal Interests are defined in Part A, Section 1 of the section 11 Order as "asserted Aboriginal rights, including title, or such determined Aboriginal or treaty rights". Section 35 of the *Constitution Act, 1982*, 30 & 31 Victoria, c. 3 (UK), provides constitutional protection to the Aboriginal Interests of Aboriginal peoples in Canada. Section 35 of the *Constitution Act* states:

RIGHTS OF THE ABORIGINAL PEOPLES OF CANADA

35. (1) The existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed.

(2) In this Act, "aboriginal peoples of Canada" includes the Indian, Inuit and Métis peoples of Canada.

(3) For greater certainty, in subsection (1) "treaty rights" includes rights that now exist by way of land claims agreements or may be so acquired.

(4) Notwithstanding any other provision of this Act, the aboriginal and treaty rights referred to in subsection (1) are guaranteed equally to male and female persons.

Aboriginal rights protect the activities, practice, custom, or traditions that are integral to the distinctive culture of the Aboriginal group claiming the rights, and have existed prior to European contact. Examples of Aboriginal rights include but are not limited to activities such as hunting, fishing, gathering, and trapping, and include Aboriginal title. The Canadian legal system recognizes Aboriginal title as a "unique collective right to the use of and jurisdiction over a group's ancestral territories" (Hanson 2009). Aboriginal title is a result of the occupation of and relationship with Aboriginal ancestral territories by Aboriginal groups, as well as their ongoing social structures and political and legal systems. Treaty rights protect and enforce agreements between the Crown and Aboriginal groups.

7.1 BACKGROUND

As described in **Section 3.0**, the EAO issued a section 11 Order on March 21, 2014 that set out three Schedules for consultation with Aboriginal groups. As per Schedules B and C, Woodfibre LNG is required to engage with Squamish Nation regarding all Project components and with the Tsleil-Waututh Nation regarding offsite Project-related effects. Schedule D lists the Aboriginal groups that Woodfibre LNG was to keep notified of major Project developments: Musqueam Indian Band, Cowichan Tribes First Nation, Halalt First Nation, Lake Cowichan First Nation, Lyackson First Nation, Penelakut Tribe, Stz'uminus First Nation, and the Métis Nation BC.

This section does not include a description of the current exercise of identified Aboriginal Interest by Squamish Nation. Pursuant to the section 13 Order, issued November 6, 2014, the assessment of potential effects to the Aboriginal Interests of Squamish Nation was assessed under the Squamish Nation Process. The focus of the information contained in this section is therefore on the identified Aboriginal Interests of the Tsleil-Waututh Nation. Information sources for this section include the following:

- Application;
- Engagement with the Tsleil-Waututh Nation; and
- Site-specific information provided in the Tsleil-Waututh Traditional Land Use Report, as submitted on June 16, 2015 per the Tsleil-Waututh Nation Current Use Addendum.

Given that potential effects to the marine environment are being reduced through the change to air cooling and that the Project will meet the OGC guidelines for noise, Schedule D Aboriginal groups are not expected to be adversely affected by the Project changes.

7.2 SQUAMISH NATION

The Squamish Nation Process for the Project was created to assert Squamish Nation's rights and title, and to protect its traditional lands and waters. The Squamish Nation Process is likely the first time in Canada that a First Nation has conducted its own environmental assessment that has resulted in an agreement with legally binding conditions.

On October 14, 2015, Squamish Nation issued an Environmental Certificate for the Project, which included conditions to be met by Woodfibre LNG. One of the conditions was that Squamish Nation would choose the cooling technology that is acceptable to Squamish Nation. The Woodfibre Environmental Working Group, which consists of Squamish Nation and Woodfibre LNG representatives, compared three alternative cooling technologies: a seawater cooling system, an air cooling system, and a system that combines air cooling with freshwater spray. The Woodfibre Environmental Working Group determined that of the three cooling technologies, seawater cooling has the highest net environmental effect and that air cooling is considered to have the lowest net environmental effects. On October 19, 2016, Squamish Nation sent a letter to Woodfibre LNG advising that Squamish Nation had chosen air cooling as the cooling technology to be used for the Woodfibre LNG Project (**Appendix A**). Woodfibre LNG will also implement the Woodfibre Environmental Working Group recommendation that wildlife monitoring be included in the operation-phase wildlife management and monitoring plan to confirm that warm air from the air cooling system does not have any meaningful adverse interactions with bats and birds.

7.3 TSLEIL-WAUTUTH NATION

Per Section 7.6 of the Application, and the June 16, 2015 Tsleil-Waututh Nation Current Use Addendum, Woodfibre LNG understands that the Tsleil-Waututh Nation has identified Aboriginal Interests relevant to this Amendment Application as described in **Table 7-1**.

Table 7-1 Tsleil-Waututh Identified Aboriginal Interests

Aboriginal Interest	Description of Interest
Aboriginal hunting, fishing (freshwater and gathering rights	Members of the Tsleil-Waututh Nation traditionally accessed the foreshore and marine waters of their territory for subsistence, spiritual, and cultural activities, and for a complex seasonal round cycle of harvesting seasonably available resources (Millenia Research Ltd. 1997, Tsleil-Waututh Nation 2014). Marine mammals, including seals, sea lions, and porpoises were also historically hunted by the Tsleil-Waututh Nation. Marine mammal harvests were prized and considered a delicacy, and the oil produced from each animal was used for dipping other food items such as dried berries and roe (Fediuk and Thom 2003). The Tsleil-Waututh Nation also hunted terrestrial wildlife and gathered terrestrial items for food, ceremonial, and social purposes.
Aboriginal fishing rights (marine fish)	Marine resources were and remain central to the Tsleil-Waututh Nation for subsistence and cultural life (Tsleil-Waututh Nation 2015). Salmon remains a food staple, and is supplemented by the harvest of a full range of shellfish (including crabs, oysters, and prawns), and a variety of forage and other marine fish (including halibut, flounder, and smelt) (Tsleil-Waututh Nation 2015). Under a Comprehensive Fisheries Agreement with DFO, the Tsleil-Waututh Nation holds a communal licence to provide for food, social, and ceremonial (FSC) fishery for sockeye, pink, chum, chinook, and coho salmon (DFO 2012). The area in which the FSC salmon fishery may take place includes the eastern aspect of DFO subarea 29-3, which does not extend into the Howe Sound and does not overlap with the scope of the Project assessment as outlined in the section 11 Order. The Tsleil-Waututh Nation also holds FSC allocations for crab and prawns under the Salish Seas joint venture with the Musqueam Indian Band and the Sliammon First Nation. Harvest of prawns occurs around the entrance to Howe Sound in the vicinity of Bowen Island, although much of southern Howe Sound has been identified as a priority harvest area for prawns (Tsleil-Waututh Nation 2015). Tsleil-Waututh Nation members are also permitted to fish for FSC purposes under communal licences issued by DFO in fisheries subareas 28-11, 28-12, 28-13, 28-14, 29-3, 29-4, 29-6, 29-7, 29-9, 29-10, 29-11, 29-12, 29-13, 29-14, and 29-17 (DFO 2012). These subareas are not located in Howe Sound and are not within the scope of assessment for the Project; however, the absence of an established DFO agreement for areas within Howe Sound does not preclude the Tsleil-Waututh Nation from harvesting or obtaining new licences for fisheries resources from the waters of Howe Sound.
Aboriginal right to exercise Tsleil-Waututh Nation cultural practices and beliefs	According to other Coast Salish literature, all areas used for traditional purposes, such as fishing, hunting, or gathering, are considered sacred (Thom 2005). Features associated with culturally significant landscapes include named places, transformer sites, village sites, travel routes, and wild spirit places. The Tsleil-Waututh Traditional Land Use Report indicates that are several smaller areas of low to moderate use to settlement and destination sites, numerous registered archaeological and cultural sites, and specific areas used as traditional travel routes. Woodfibre LNG acknowledges that these sites and locations have been identified through the Tsleil-Waututh Nation traditional land use data gathering process, and that this is an ongoing process. Woodfibre LNG respects the sensitivity and confidentiality of traditional use information and the context and particular use for which it was provided. Accordingly, Woodfibre LNG has agreed to disclose such information only to the extent agreed by the Tsleil-Waututh Nation.

The Application included an assessment of potential effects of the Project on Tsleil-Waututh Nation interests. Based on available information, as well as the VC effects summary provided in **Table 6-14,** the Amendment Application concludes that the proposed Project changes will result in no change to or less of an effect on the VCs. If there is no change from the original Application, the findings remain the same for Aboriginal Interests.

To ensure potential effects are managed and monitored, the Proponent will continue to meet the conditions and requirements set out in the EAC #E15-02 and the federal decision statement.

8.0 PROPOSED AMENDMENTS

In consideration of the above information and evaluation, Woodfibre LNG requests amendments to the Certificated Project Description and Schedule A of EAC #E15-02, as follows:

1. Re. Section 2.0
    - REMOVE: The seawater cooling system, including an intake and diffuser with a maximum diversion rate of 17,000 m^3/h is located within the Certified Project Area (Figure 1).
    - ADD: An air cooling system located within the Certified Project Area (Figure 1).
    - REMOVE: Fresh water supply infrastructure, including intake, piping and storage tank.
    - ADD: Fresh water supply infrastructure, including intake, piping and storage tank within or outside the Certified Project Area.

Woodfibre LNG requests amendments Schedule B Table of Conditions of EAC #E15-02, as follows:

1. RE: Instream Flow Requirements (Condition 5)

    ADD: The report must include the IFR regime for Woodfibre Creek.

    EDIT: The Holder must obtain the approval of the interim Mill Creek IFR regime, the long-term Mill Creek IFR regime, and the Woodfibre Creek construction-phase IFR regime from FLNR prior to the implementation of that flow regime.

2. REMOVE: Marine Water Quality – Operations (Condition 7)

    The Holder must develop, in consultation with MOE, DFO, OGC and Aboriginal Groups, a marine water quality management and monitoring plan for Operations. The plan must include at a minimum:

    - The means by which the mitigation measures related to Operations in the Application Table 22-1 under the heading “Marine Water Quality will be implemented;
    - Establishing an initial dilution zone for temperature, chlorine and all other contaminants, of each discharge;
    - Mitigation measures to ensure that any marine effluent discharge, including from the cooling water system diffuser, will meet CCME Water Quality and Interim Sediment Quality Guidelines and BC Water Quality Guidelines for the protection of marine life at the edge of the initial dilution zone;
    - A monitoring and follow-up program with respect to impacts to marine water quality during Operations; and
    - An adaptive management plan to address the effects of the Project on water quality in the event (i) those effects are not mitigated to the extent identified in the Application, or (ii) effects on water quality occur that were not predicted in the Application.

A Qualified Professional must develop the plan and supervise the implementation of the plan. The Holder must provide the plan to EAO, MOE, DFO, EC, OGC and Aboriginal Groups no less than 30 days prior to the Holder's planned date to commence Operations. The Holder must implement the plan to the satisfaction of EAO.

3. RE: Marine Fish and Fish Habitat (Condition 8)

   REMOVE:

   - Measures to monitor the effectiveness of the mitigation measures used for the intake to minimise the risk of killing fish and herring larvae, which must include:
     - A pre-Construction evaluation of fish species, including juvenile herring drive movement near the intake, modelled intake velocity and area of influence around the intake for individual fish species based on maximum burst speeds; and
     - A post-Construction monitoring program to verify actual intake velocity and to evaluate the fate and behaviour of fish species near the intake screen;
     - The seawater cooling system intake must be designed, built and operated to meet DFO Best Management Practice for approach velocity and screen size, as outlined in the *Guidelines for Minimizing Entrainment and Impingement of Aquatic Organisms at Marine Intakes in British Columbia* (DFO 1991).

4. Re: Wildlife – Operations (Condition 12)

   ADD: Include a monitoring and follow-up program with respect to impacts to wildlife associated with the air cooling system.

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APPENDIX A

Squamish Nation Letter

re: Cooling System Technology

October 19, 2016

Byng Giraud,
Vice President, Corporate Affairs
Woodfibre LNG
#1020-1075 W. Georgia St.
Vancouver, BC
V6E 3C9

Re: Squamish Nation Decision on Cooling Technology

The Squamish Nation's environmental objectives are unique to the Squamish Nation and are informed by cultural values, spiritual values and Aboriginal rights and title. The Squamish Nation conducted an environmental assessment process ("Squamish Process") of the Woodfibre Liquified Natural Gas Project and the results of the Squamish Process identified a number of issues with the Project that do not meet the Nation's environmental objectives, including the potential for seawater cooling to adversely impact on the marine environment in Howe Sound.

Based on the conclusions of the Squamish Process, WLNG agreed to enter into an Environmental Assessment Agreement that legally binds it to satisfy certain conditions, including a condition regarding further assessment of the cooling technology to be used for the Project. Under section 4.1 of the Agreement, an independent assessment of seawater cooling, air cooling with freshwater spray, and air cooling was to be done to determine the net environmental effects, including effects on Squamish traditional uses and expression of Aboriginal rights, associated with these three technologies ("Cooling Study Report") and the Squamish Nation is to make a decision on the cooling technology it finds acceptable.

Squamish Nation culture depends on an intact and healthy marine environment. Over the last century, industrialization of Howe Sound has contributed to marine degradation which has seriously impacted on Squamish Nation's practice of its culture and aboriginal rights in Howe Sound. The Howe Sound marine environment has only recently shown signs of revitalization. This trend must be protected and fostered. Thus deterioration of the marine environment, or impeding additional revitalization of the marine environment, may lead to significant impacts on Squamish Nation's culture and aboriginal rights and title. Seawater cooling has the potential to adversely impact on these values. WLNG has not provided any further information satisfactory to the Squamish Nation to demonstrate that seawater cooling will not adversely impact on these values. Therefore, the Squamish Nation rejects seawater cooling as an option for cooling the natural gas for the Project.

The Squamish Nation has concerns that air cooling with freshwater spray will result in mortality and/or injury of freshwater or anadromous fish or their freshwater ecosystem. There are only a small number of creeks that can support spawning salmon. All freshwater ecosystems must be protected from incremental cumulative effects, particularly those that support salmon. The

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measurable residual effects on freshwater habitat will impact on our cultural and spiritual values as well as the exercise of aboriginal rights.

Air cooling appears to have the lowest net environmental effects and least likely to adversely impact on Squamish Nation cultural, spiritual and environmental values and Aboriginal rights. Therefore, the Squamish Nation has chosen air cooling as the cooling technology to be used for the Project.

Yours truly,

SQUAMISH NATION

Byron Joseph
Ts'élkwílem Siýam
Co-Chair

syexwaliya
A. Whonnock

Ann Whonnock
Syexwáliya
Co-Chair

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APPENDIX B

Squamish Nation Process / Woodfibre LNG Project Update

SQUAMISH NATION PROCESS /

WOODFIBRE LNG PROJECT UPDATE

LEADERSHIP'S MESSAGE

We are writing to provide an important update on the Squamish Nation Process (SN Process) and the Woodfibre LNG Project (WLNG Project).

Our Nation created this Process to assert our rights and title and to protect our traditional lands and waters.

Woodfibre LNG Limited (WLNG) is proposing to build a liquefied natural gas (LNG) processing and export facility at the former Woodfibre pulp mill site, which is located at the ancestral village site of Swiyat.

One of the 13 conditions imposed on WLNG through the Squamish Nation (SN) Process and SN Environmental Assessment Agreement is that SN will decide which cooling technology will be used as part of the WLNG Project. If the company doesn't comply with SN decision on cooling technology, the Nation can take legal action.

The SN has decided that seawater cooling, WLNG's preferred cooling technology, is too impactful on cultural and environmental values, and has rejected this technology. Instead, we chose air cooling, which has been found to have the lowest net cultural and environmental impacts, and does not impact the marine environment of Howe Sound. Therefore, we have directed WLNG to use air cooling as the cooling technology for the WLNG Project.

If WLNG doesn't comply with the SN decision on cooling technology, the Nation may revoke its Environmental Assessment Certificate (EA Certificate) and terminate the Environmental Assessment Agreement or pursue legal remedies under the Environmental Assessment Agreement, which includes going to court.

SQUAMISH NATION PROCESS

Woodfibre LNG Project (and the associated FortisBC pipeline) is the first industrial project to undergo the SN's independent assessment, which began in July 2014.

On June 27, 2015 the Nation set out its "25 Conditions" for the LNG facility and pipeline proposals. On July 24, 2015, WLNG publicly announced it agrees to meet all 13 conditions that apply to its part of the proposal.

On October 14, 2015 Squamish Nation Council voted to approve an Environmental Assessment Agreement for the proposed Woodfibre LNG facility project and issued an Environmental Certificate to Woodfibre LNG Ltd ("WLNG").

The Nation has significant decision-making powers under the Agreement, specifically for the choice of cooling technology and approval of management plans.

If WLNG does not comply with a decision the Squamish Nation makes under the Environmental Assessment Agreement, the Squamish Nation may enforce compliance through the dispute resolution process under the agreement, which includes going to court.

The Environmental Assessment Agreement is legally binding including legal remedies to ensure WLNG complies with its commitments under the Agreement. If WLNG does not meet its commitments under the Agreement, the Nation may revoke the Environmental Certificate and terminate the Agreement or go to court.

"It is important to remind members that the Squamish Process was set in motion to ensure our Aboriginal rights and title interests are protected... We won't allow outsiders, whether they support the proposal or oppose it, to decide for us. It is our future — our decision to make."

Chief Ian Campbell

A NEW APPROACH FOR FIRST NATIONS AND INDUSTRY TO EMBRACE

To our knowledge, the SN Process is the first time in Canada that a First Nation has conducted its own environmental assessment process that has resulted in an agreement with legally binding conditions.

If any of the conditions aren't met, then the project can't move forward. SN has a lot to be proud of -- the Nation has developed a new approach for First Nations and for industry to embrace, as it's in their interest as well.

SN are leaders in developing a mechanism for consent post-Tsilhqot'in.

Other Nations, and a number of other groups, are now asking our Nation about the process, and how they may be able to achieve the same result.

"The Squamish Nation Process allows the Nation to make an informed decision based on the best information available from its perspective, feedback from its members, and advice from independent consultants and scientists."

Chief Ian Campbell

COOLING TECHNOLOGIES CONDITION

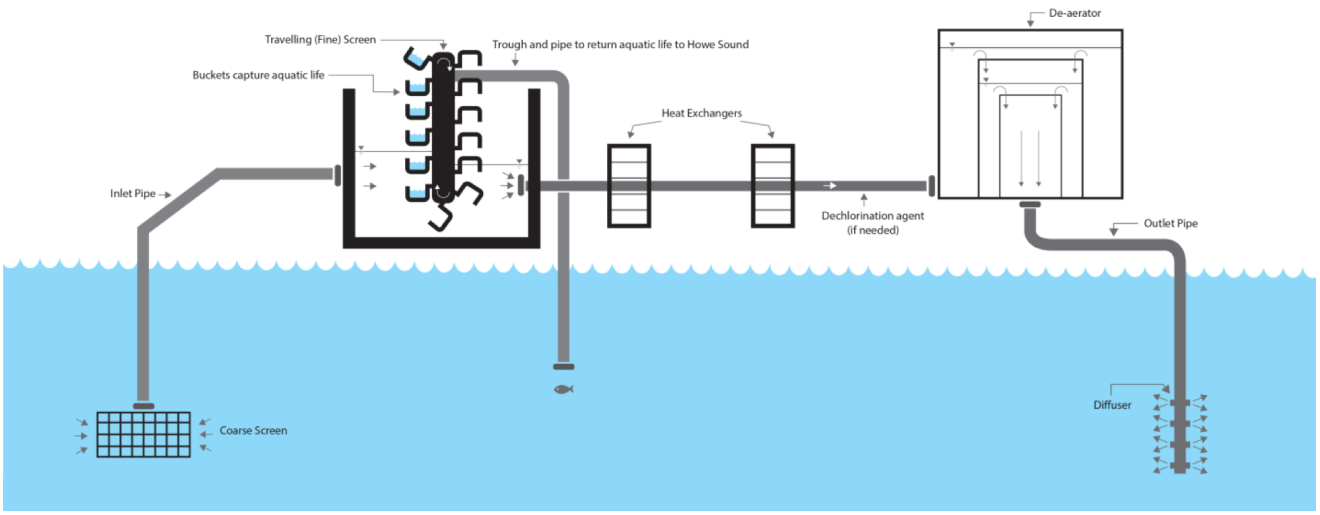
Similar to how a radiator cools a car's engine, WLNG needs a way to cool its plant during the production of LNG.

During the SN Process, Woodfibre LNG Limited failed to satisfy SN that its choice of seawater cooling would not create significant environmental effects, whether on the marine environment or on SN's relationship to the marine environment, and that even if seawater cooling did avoid significant adverse effects, some amount of residual marine impact would occur.

Under the terms of the SN Environmental Assessment Agreement, the Nation has been conducting further independent studies, distinct from the provincial and federal Environmental Assessment processes, on seawater cooling as well as two alternate cooling techniques - air cooling, and air cooling with freshwater spray.

ASSESSMENT OF COOLING TECHNOLOGIES

OPTION 1 / SEAWATER COOLING



How It Would Work:

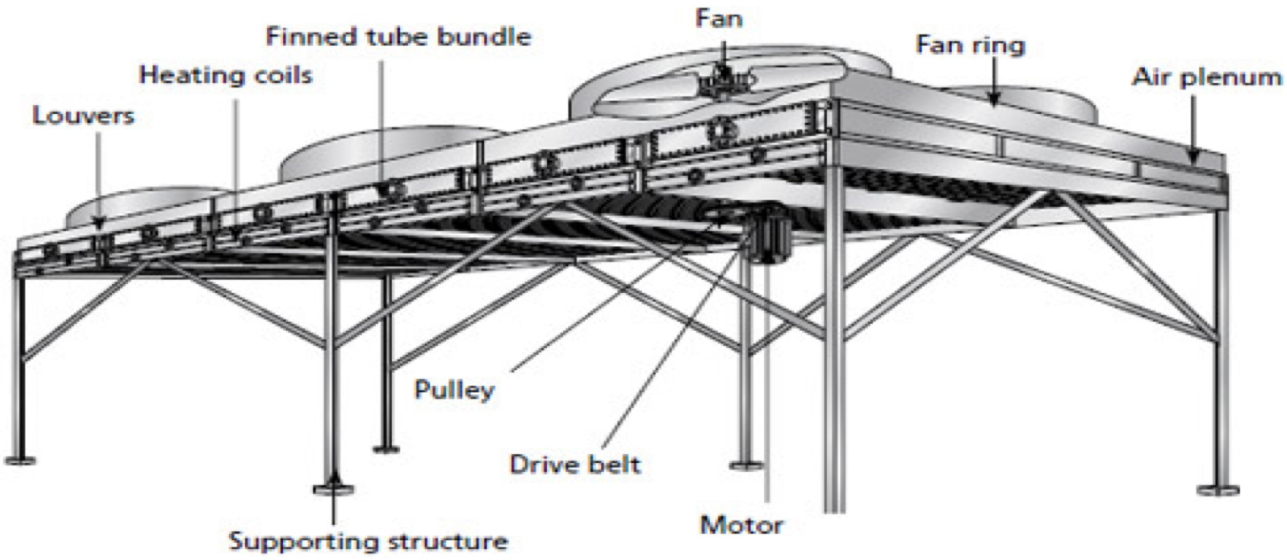
- An intake pipe near the sea floor draws in seawater, which is used as the cooling medium. Physical screens are used to reduce entrainment of fish or plankton.
- Water cycles through the cooling system and is discharged back to Howe Sound, with some residual chlorine and at a warmer temperature.
- Residual chlorine and water temperature would meet provincial and federal water quality guidelines.

Findings:

Seawater Cooling has the highest net environmental impact of the three cooling technologies. It was clearly a significant concern to SN's specific interests during the independent EA.

ASSESSMENT OF COOLING TECHNOLOGIES.... CONTINUED

OPTION 2 / AIR COOLING



How It Would Work:

- Air cooling uses air, instead of water, as the cooling medium.
- A series of fans are used to pass air over a cooler assembly made up of finned tubes with fluid inside.
- Fans are electrically driven.

Findings:

Air cooling has the lowest environmental impact, but would be expected to result in approximately a 2% production decrease. There are minimal environmental interactions with this process – primarily, the exhaust heat (similar to HVAC exhaust heat), and an increase in noise.

If air cooling is the chosen option, it is recommended that wildlife monitoring be included in the Wildlife Management Plan to confirm that the warm air from the fans does not have any meaningful adverse interactions with bats and birds.

ASSESSMENT OF COOLING TECHNOLOGIES.... CONTINUED

OPTION 3 / AIR COOLING WITH FRESHWATER SPRAY

How It Would Work:

- The air cooling with freshwater spray option is very similar to the air cooling option; the difference is the addition of a nozzle system that would mist fresh water onto the cooling assembly during hot weather. The addition of water mist increases the heat absorption and therefore can increase facility output relative to just using air cooling.
- Creek water would be stored in tanks to avoid the need to withdraw water during low-flow periods when water may not be available due to environmental flow needs.

Findings:

The potential environmental effects of using water from Mill Creek are less concerning than the potential marine effects of seawater cooling, but still significant in terms of the potential to impact on both freshwater and anadromous (salmon) fish.

COOLING TECHNOLOGIES DECISION

The three cooling technologies discussed above were assessed by an independent third party expert on behalf of SN. Council was then provided a report by the expert with recommendations on which technology has the lowest net cultural and environmental impacts.

On October 19, 2016, Squamish Nation Council rejected WLNG's preferred cooling technology - seawater cooling – as well as air cooling with freshwater spray, and directed WLNG to use air cooling as the cooling technology on the WLNG Project as it has the lowest net cultural and environmental impacts. WLNG must abide by this decision or the Nation may revoke its EA Certificate and terminate the Environmental Assessment Agreement or pursue legal remedies under the Environmental Assessment Agreement, which includes going to court.

SN PROCESS TIMELINE

July 2014:
Squamish Process launched.

November 6, 2014:
"LNG 101" sessions start.

November 24, 25, 29, 2014:
Focus group meetings held at Squamish and North Vancouver.

February 11, 2015:
Community meeting, Squamish.

February 24, 2015:
Community meeting, North Vancouver.

June 9, 2015:
Community meeting, Squamish.

June 11, 2015:
Community meeting, North Vancouver.

June 27, 2015:
Squamish Nation Council sets out its "25 Conditions."

July 24, 2015:
Woodfibre LNG accepts all Squamish Nation's "25 Conditions."

September 14, 2015:
FortisBC responds to some of Squamish Nation's "25 Conditions" and offers alternatives for its proposed pipeline route and compressor station location.

October 14, 2015:
Squamish Nation Council approves the Woodfibre LNG EA Agreement, saying it could be managed if proper technology and controls are in place. But the FortisBC EA Agreement remained unresolved.

May 3, 2016:
Responding to pressure from Squamish Nation, FortisBC withdrew the option of locating the compressor station in the industrial park.

May 11, 2016:
As an alternative FortisBC proposes the Mount Mulligan site for its compressor.

June 22, 2016:
After a detailed briefing, Council voted "yes" to approve the FortisBC EA Agreement.

October 19, 2016:
Squamish Nation rejects seawater cooling and directs WLNG to use air cooling as the method for the Project.

WHAT IS NEXT?

Subject to WLNG and FortisBC meeting the conditions set out in their Environmental Certificates and Environmental Agreements, this gives the companies approval to proceed to the next step of the process.

If WLNG or FortisBC do not, the Certificates and Agreements are terminated, which means the Squamish Nation cancels its approval of the project.

If WLNG and FortisBC do meet the conditions, the next steps include the negotiation of an economic benefits agreement with Woodfibre LNG, FortisBC, and the province of BC. This is the 25th condition the Squamish Nation imposed on all three parties.

ADDENDUMS

Woodfibre LNG Agreement & Environmental Certificate Conditions

1. The Agreement is a conditional approval of the LNG plant based on WLNG (Woodfibre LNG) meeting all 13 conditions by the Squamish Nation. If WLNG fails to meet even one condition the SN can revoke our agreement It provides legal strength for the Nation to hold WLNG to the Agreement. It legally binds WLNG to meet all conditions

2. **Forces WLNG to conduct further independent studies on current and alternate cooling techniques a. The Squamish Nation (SN) will have the final say on which technology gets picked. (Squamish Nation consent). b. If WLNG doesn't comply with SN decision the Nation can take Legal Action**

3. WLNG is bound to create a Green Zone in and around Mill Creek and develop a long term plan to re-mediate and restore Mill Creek. a. They also have to recognize that the project is located on former village of Swiyat.

4. WLNG must develop a Water Management Plan for Mill Creek to ensure adequate water levels for aquatic life and salmon a. SN will need to provide approvals for Water Management Plan.

5. WLNG will provide funding to SN to develop a SN Marine Use Plan to analyze the cumulative impacts of Industrial projects in the Howe Sound

6. WLNG will provide controlled and safe access to SN members to the surrounding area to practice Aboriginal Rights.

7. WLNG must develop an Environmental Management Program with SN, which gives the Nation authority and approval mechanisms on Environmental Management Plans.

8. WLNG will provide insurance coverage or Bond to protect ALL SN members to address personal loss or injury due to project.

9. WLNG cannot expand the project without Squamish Nation approval.

10. WLNG cannot allow transfer of any bunker fuel to LNG tankers anywhere in our waters.

11. WLNG will conduct noise monitoring studies on marine mammals that includes mitigation measures and monitoring programs to address impacts on mammals.

12. WLNG agrees to use only for LNG purposes, there will be no oil or diluted bitumen transported through project

13. WLNG and SN will develop co-management and monitoring plans to ensure all plans and mitigation measures are adhered to.

14. The agreement is conditional on WLNG and SN coming to an Impact Benefit Agreement.

Both Squamish Nation and WLNG will develop an Environmental Working Group to ensure the Agreement and all work/plans are implemented. The Agreement also creates a Dispute Resolution process along with legal remedies if conditions are not met.

CONTINUED ON BACK COVER

FortisBC Pipeline Agreement & Environmental Certificate Conditions

Entering into an Environmental Assessment Agreement ("EA Agreement") means that if FortisBC does not satisfy one of the Nine Conditions (listed below), the SN can either revoke the FortisBC EA Agreement or pursue legal remedies in court to force FortisBC to comply with the condition.

1. Avoid any industrial impacts in the Skwelwil'em Wildlife Management Area ("WMA") boundaries by constructing the new pipeline completely underneath or around the WMA so that the pipeline surfaces outside of the WMA boundaries.

2. No barges in WMA.

3. Relocating the compressor station from the location proposed in its EA Application to a location that poses no risk to Squamish members residing on any Indian Reserve in Squamish territory.

4. Routing the pipeline to avoid impacts within, and adjacent to, the following cultural sites that have been legally designated under land use agreement with BC: Monmouth Creek, Stawamus Creek and Indian River. For certainty, in order to minimize disturbance to the cultural sites FortisBC will come to agreement with the Squamish Nation on a reasonable buffer area around each of these cultural sites.

5. Partnering with the Squamish Nation to co-manage the environmental management programs and the monitoring of the programs (including the funding of SN participation).

6. Providing insurance coverage or form of bond to address personal loss and injury costs of members that may be impacted by an explosion caused by an accident or malfunction of project.

7. No future expansion of the pipeline without Squamish Nation approval.

8. Making certain mitigation measures proposed in its EA application that are considered voluntary measures legally binding under a Squamish Nation Certificate of Project Approval.

9. Entering into an economic benefits agreement with the Squamish Nation that will be reflective of the Squamish Nation's aboriginal rights and title interests.

It is important to note that the above Nine Conditions will be in addition to those already set out by the provincial government. And that SN will monitor and enforce all Nine Conditions.

SQUAMISH NATION

FOR MORE INFORMATION:

RIGHTS & TITLE MANAGEMENT TEAM
FOR THE SQUAMISH PROCESS

INTERGOVERNMENTAL RELATIONS,
NATURAL RESOURCES & REVENUE

SQUAMISH NATION
415 WEST ESPLANADE
NORTH VANCOUVER, BC
T: 604-998-0285
E: SQUAMISHPROCESS@SQUAMISH.NET

WWW.SQUAMISH.NET

APPENDIX C
Stakeholder Consultation

Woodfibre LNG Project

Stakeholder Meeting

Woodfibre LNG Project Site
January 18, 2017

Agenda

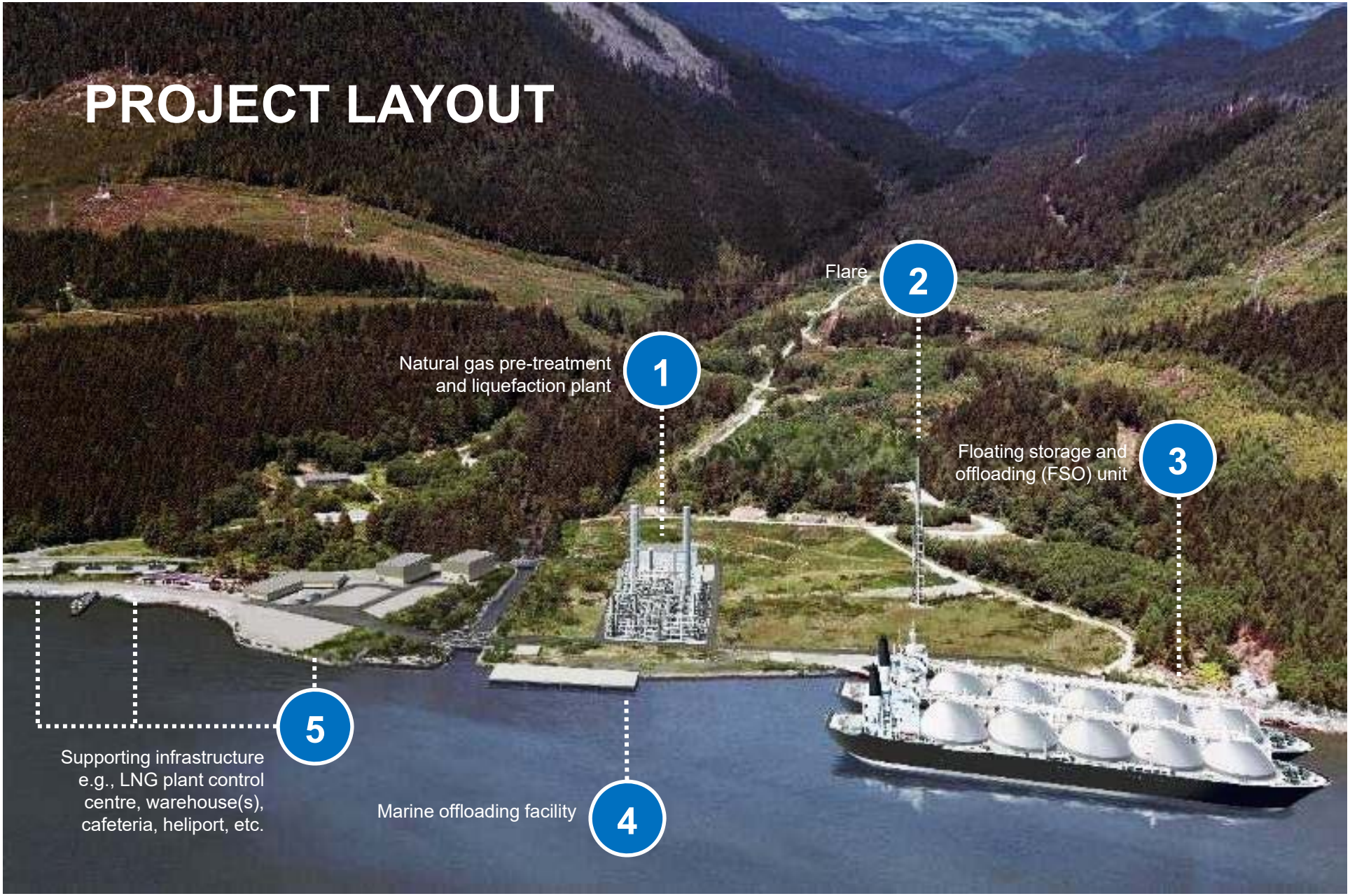
- Welcome and Introductions
- Project Overview
- Environmental Approvals
- Overview of Amendment Submission
- Squamish Nation Process
- Air Cooling Technology
- Mill Creek Intake
- Woodfibre Creek
- Next Steps
- Summary

Project Overview

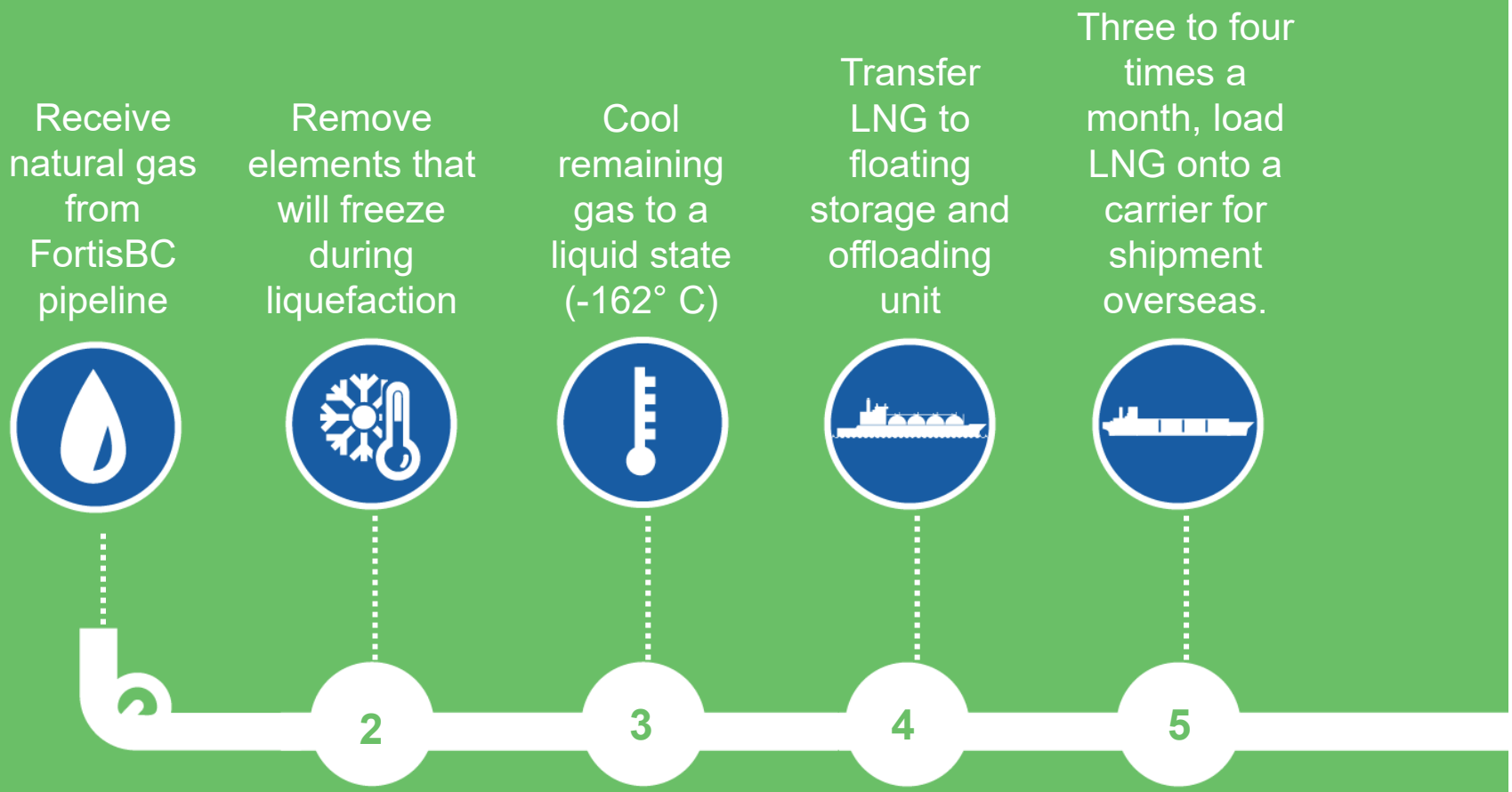
- Modestly-sized natural gas liquefaction and export facility in District of Squamish
  - Approx. 2.1 million tonnes of LNG per year for 25 years
  - Capital cost: $1.4 – 1.8 billion (CAD 2014)

- Site of the former Woodfibre pulp mill, which features:
  - Brownfield site
  - Industrial zoning
  - Deep water port
  - FortisBC pipeline access
  - BC Hydro access

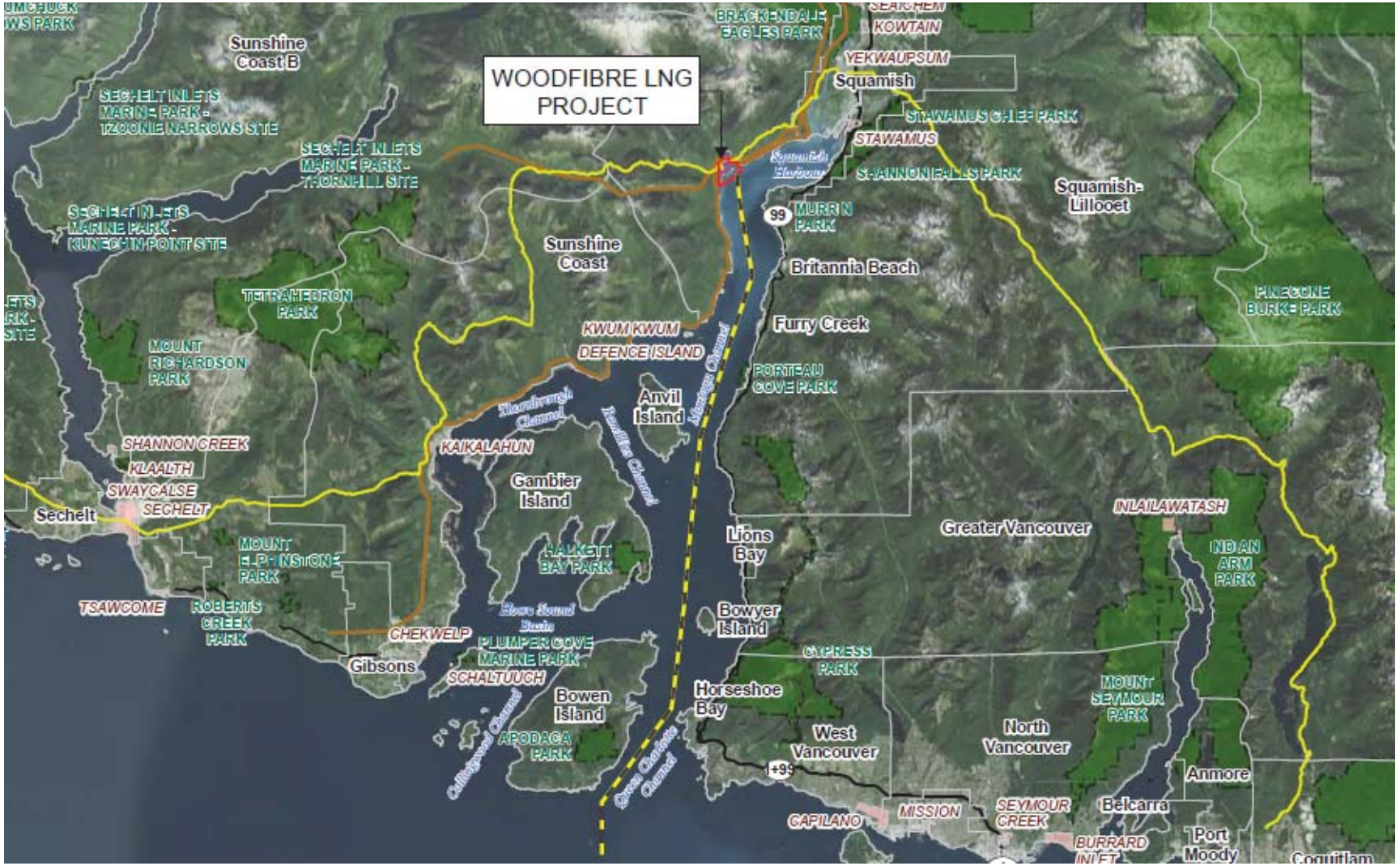
PROJECT LAYOUT



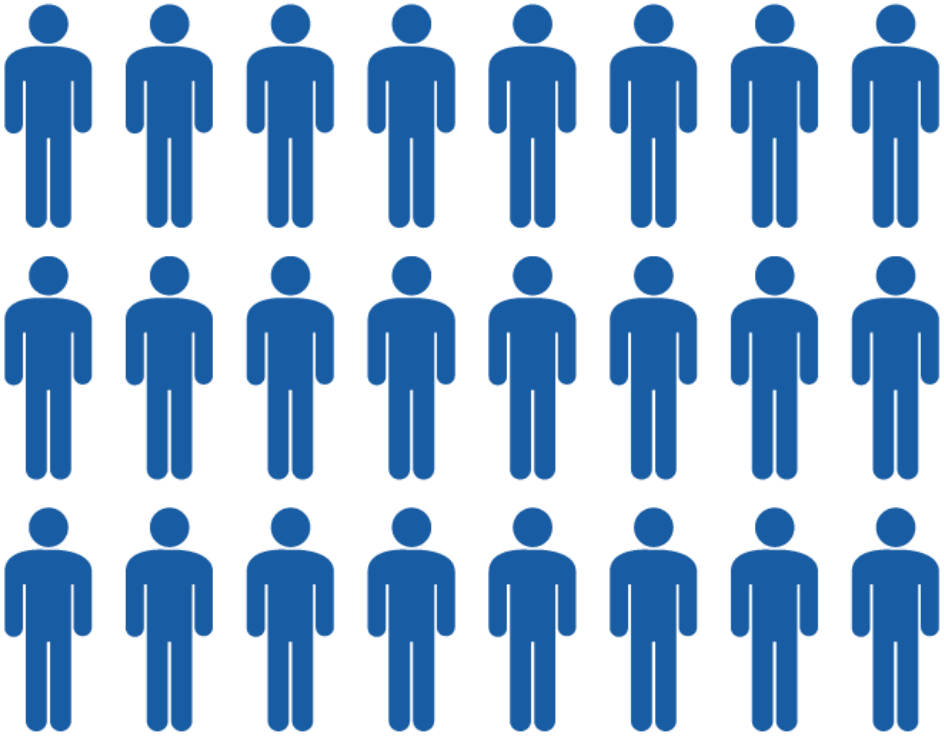
HOW WILL THE FACILITY WORK?



Shipping Route in Howe Sound



Economic Benefits



650(+) jobs

At peak of construction

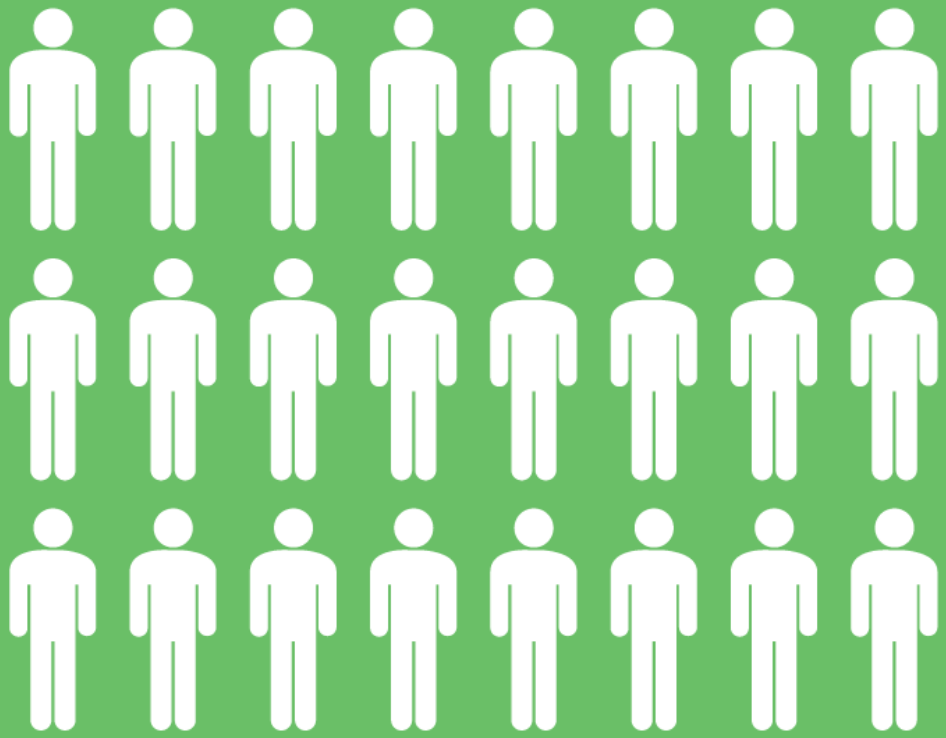
100(+) jobs

Fulltime jobs during operation

330(+) jobs

Indirect & induced during operation

ECONOMIC BENEFITS



$83.7 million

Estimated tax revenue for all three levels of government during construction phase of project.

$86.5 million

Estimated tax revenue for all three levels of government per year of operation.

Environmental Reviews

- October 14, 2015 - Squamish Nation Council voted to approve an Environmental Assessment Agreement with Woodfibre LNG Limited and issued an Environmental Certificate for the Woodfibre LNG Project.
- October 26, 2015 – Woodfibre LNG Limited received provincial environmental approval for Woodfibre LNG Project.
- March 18, 2016 – Woodfibre LNG Limited received federal environmental approval for Woodfibre LNG Project.

Environmental Approvals - Amendments

- Each environmental approval comes with a number of conditions, mitigation measures and management plans.
- Following provincial and federal environmental approvals, changes to a project may require an amendment(s).
- Woodfibre LNG will be applying to the BC Environmental Assessment Office (EAO) for an amendment to our Environmental Assessment Certificate (EAC) for three changes to the Woodfibre LNG Project.

Overview of Amendment Submission

The Application for an Amendment to the EAC will cover:

- Using air to cool the plant rather than seawater
- Potential use of an existing intake on Mill Creek
- Potential short-term use of water from Woodfibre Creek

EAC Amendments – The Process

- There are two main streams in the provincial and federal environmental assessment processes:
  - Technical Working Group
  - Public Consultation
- The BC Environmental Assessment Office oversees the Technical Working Group which includes:
  - Federal and provincial government agencies (e.g., Transport Canada, Fisheries and Oceans Canada)
  - Local governments (District of Squamish, Squamish-Lillooet Regional District)
  - Squamish Nation
  - Tsleil-Waututh Nation

EAC Amendments – The Process

- The EAO also oversees a public consultation period when members of the public can submit comments about the amendment application to the EAO. Woodfibre LNG Limited will then be required to provide responses to those public comments, which will be posted on the EAO web site (E-PIC).

- In addition, Woodfibre LNG is conducting its own consultation with stakeholders (i.e. today's meeting) as part of our commitment to going beyond what is required to build a better project.

Squamish Nation Process

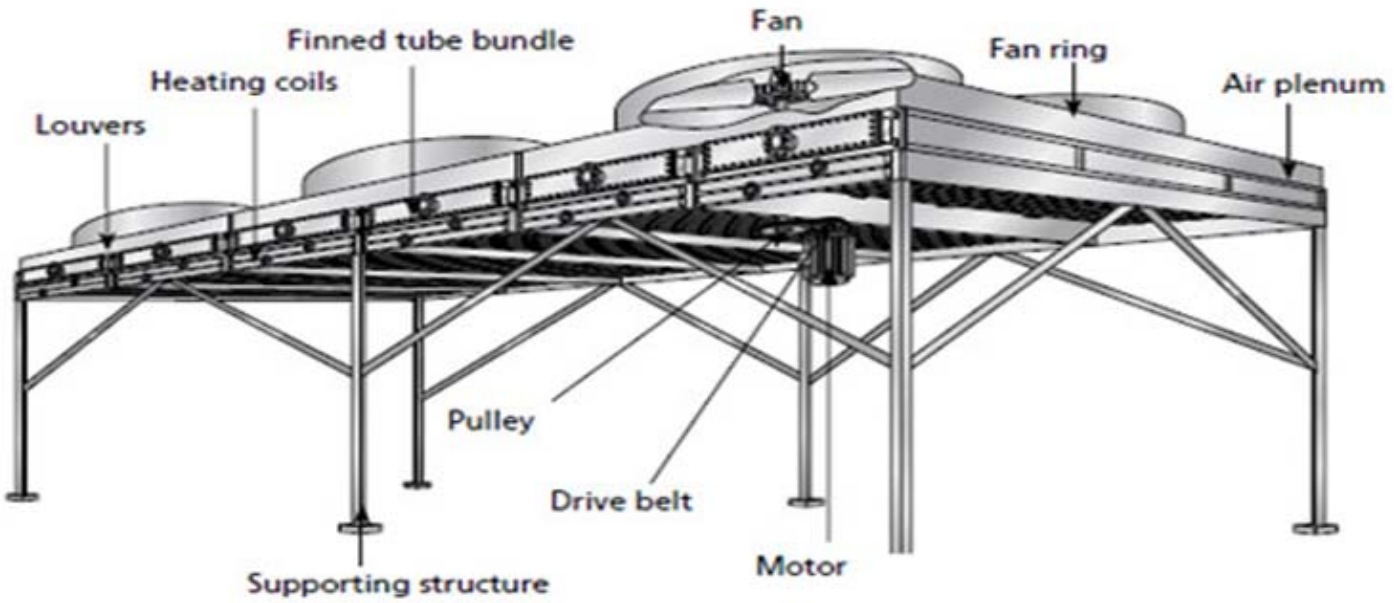
- Squamish Nation established its own independent environmental assessment process in 2014.
- Woodfibre LNG voluntarily entered into this new process.
- Squamish Nation issued an Environmental Certificate on October 14, 2015
    - Legally binding (contract)
    - Outlines the conditions for Woodfibre LNG to develop, build and operate the Project
    - **Squamish Nation selects the cooling technology**

Cooling Technology - Selection Process

- Squamish Nation and Woodfibre LNG established an Environmental Working Group.
- The Working Group engaged a third-party expert to review the effects associated with three different cooling techniques: air, seawater, and air with freshwater spray.
- The Working Group wrote a report summarizing the relevant information for Squamish Nation Chiefs and Council.
- In October 2016, Squamish Nation Chiefs and Council voted to select air cooling as the technology to be used for the Project.

Air Cooling

- Air cooling system will be mounted on the top of the LNG Facility on a pipe support structure
- Will extend approximately 3 m above the height of the LNG Facility



Air Cooling – How it Works

- Fluid to be cooled is channeled through the cooler assemblies in a group of sealed finned tubes.
- Electrically-driven fans force the air to pass over the finned tubes and cool the fluid inside.
- Number of fans operated depends on ambient air temperature.
- Energy consumption for air cooling is expected to be equivalent to (or slightly less than) the energy consumption for seawater cooling.

Air Cooling – Example

Donggi Senoro LNG

Central Sulawesi, Indonesia

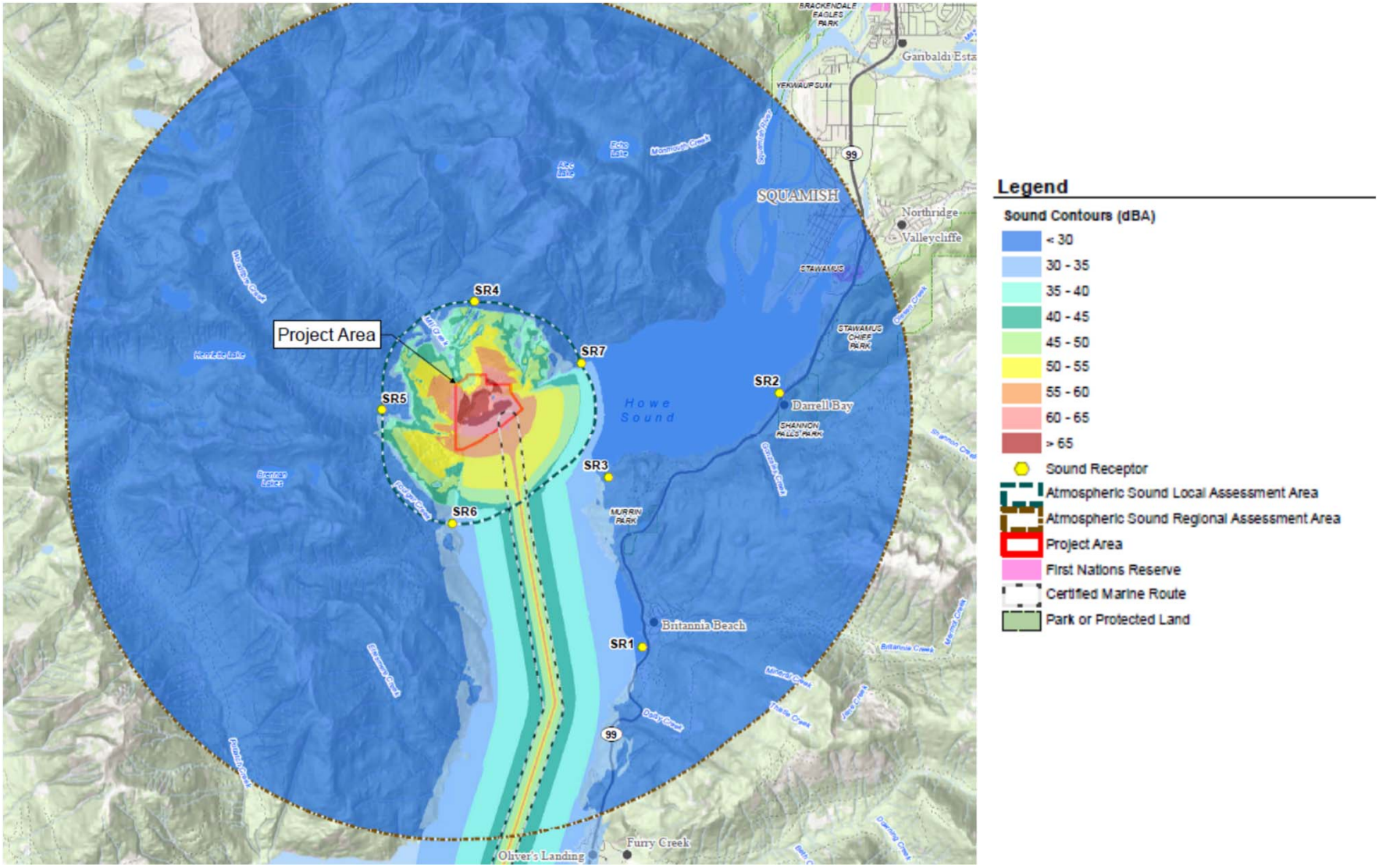
2.0 MTPA of LNG

Source: LNG World News

Air Cooling – Environmental Effects

- Anticipated to **reduce effects** to marine environment compared to seawater cooling system
    - Marine water quality
    - Marine fish
    - Marine benthic habitat
- **No additional effects** to terrestrial environment as no additional footprint is required.
- Monitoring the interactions between the warm air from the fans and birds and bats will be added to the Wildlife Management Plan.
- Noise monitoring will be undertaken during Project operation to confirm modelling.

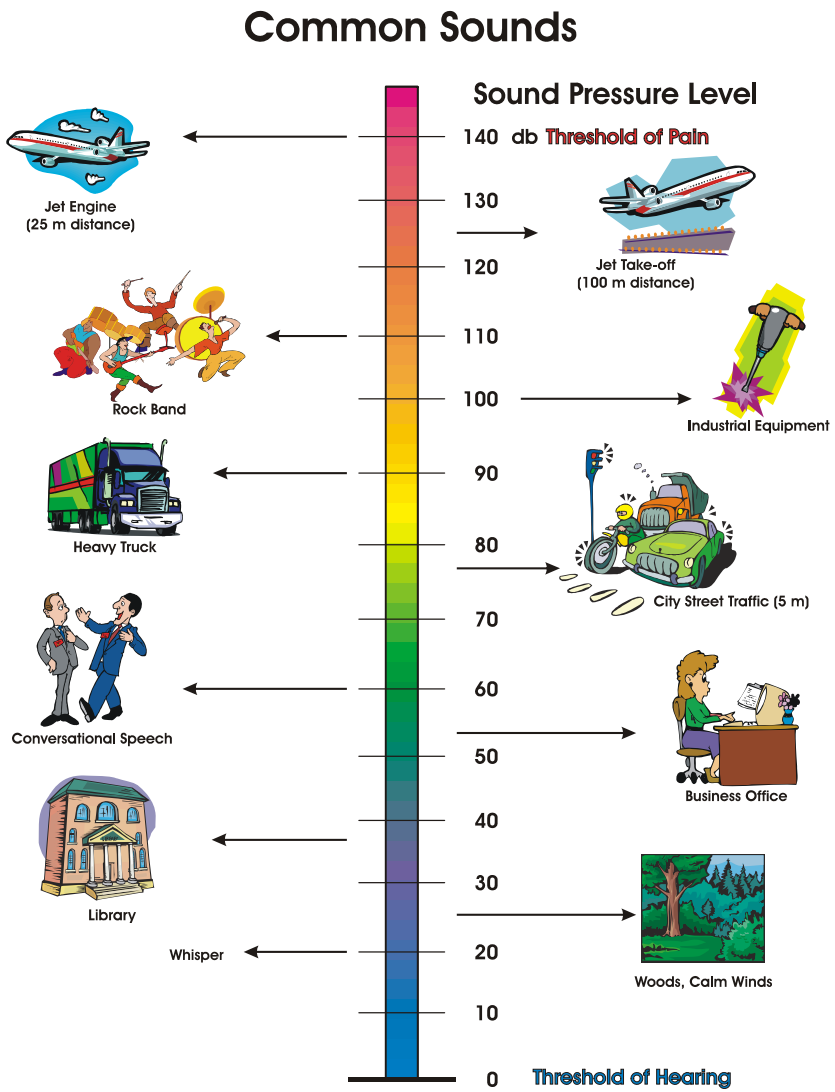
Air Cooling – Noise Modelling Results



Air Cooling – Noise Modelling Results

Assessment Receptors	Permissible Sound Level (dBA)		Baseline-case Sound Level (dBA)		Application Case Woodfibre LNG Project with Air Cooling (dBA)		Comment
	$L_{eq, day}$	$L_{eq, night}$	$L_{eq, day}$	$L_{eq, night}$	$L_{eq, day}$	$L_{eq, night}$	
SR1 - Britannia Beach	58	48	53	43	53.0	43.1	Below guideline
SR2 - Darrell Bay	55	45	50	40	50.0	40.1	Below guideline
SR3 - Watts Point	55	45	50	40	50.1	40.9	Below guideline
SR4 - OGC	50	40	45	35	45.0	35.1	Below guideline
SR5 - OGC	50	40	45	35	45.1	35.6	Below guideline
SR6 - OGC	50	40	45	35	45.5	38.5	Below guideline
SR7 - OGC	50	40	45	35	45.1	35.6	Below guideline

Air Cooling – Noise Comparison



Sound Pressure Levels of Typical Sound Sources Activity / Sound Source	Sound Pressure Level (dBA)
Jackhammer at 15 m	95
Loud Shout	90
Heavy Truck at 15 m	85
Vacuum Cleaner at 3 m	70
Automobile (100 km/hr) at 30 m	65
Normal Conversation at 1 m	60
Quiet Living Room	40
Soft Whisper at 2 m	35
Unoccupied Broadcast Studio	28
Threshold of Hearing	0

Overview of Amendment Submission

The Application for an Amendment to the EAC will cover:

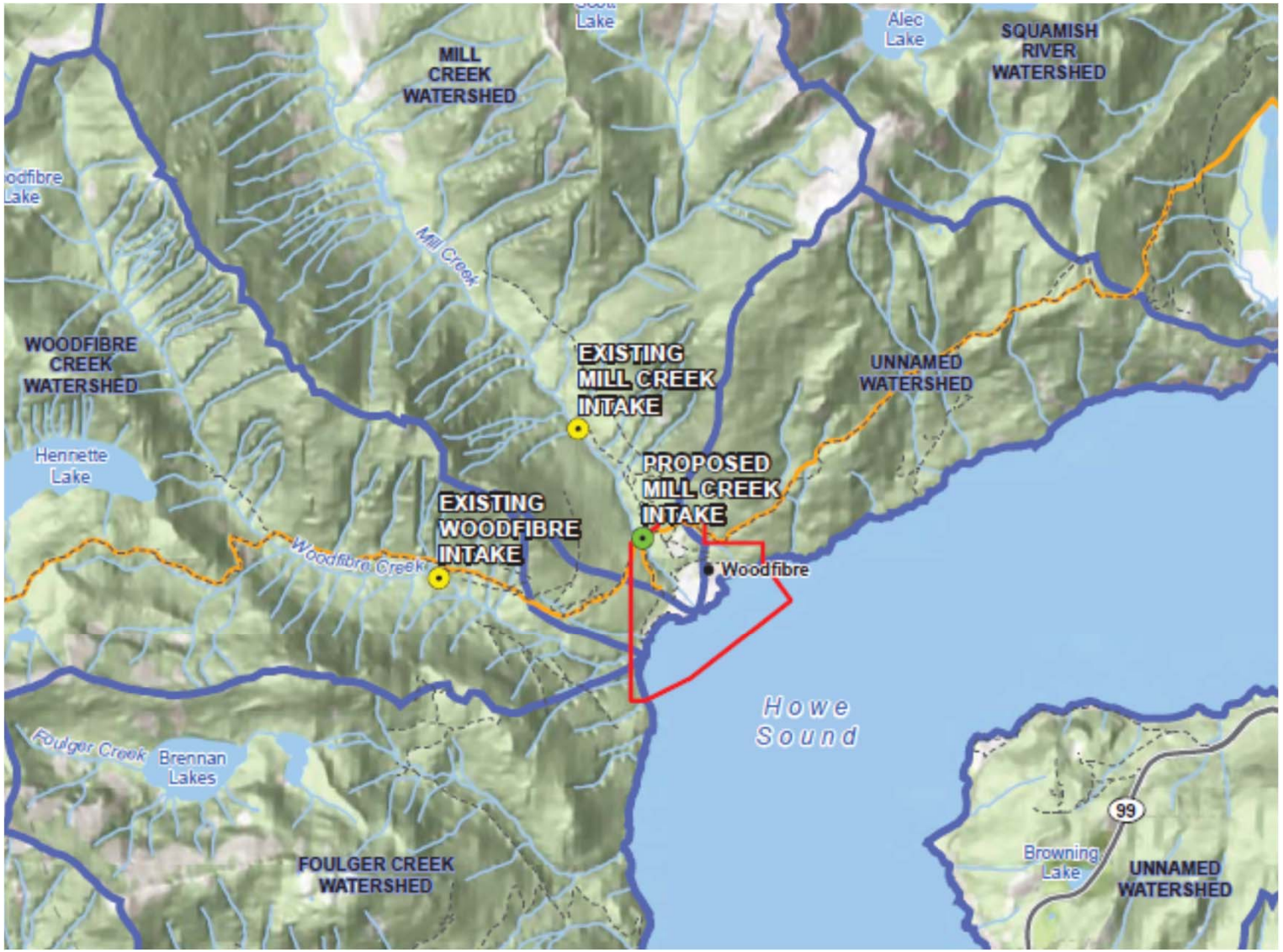
- ✓ Using air to cool the plant rather than seawater
- Potential use of an existing intake on Mill Creek
- Potential short-term use of water from Woodfibre Creek

Water Use for the Project

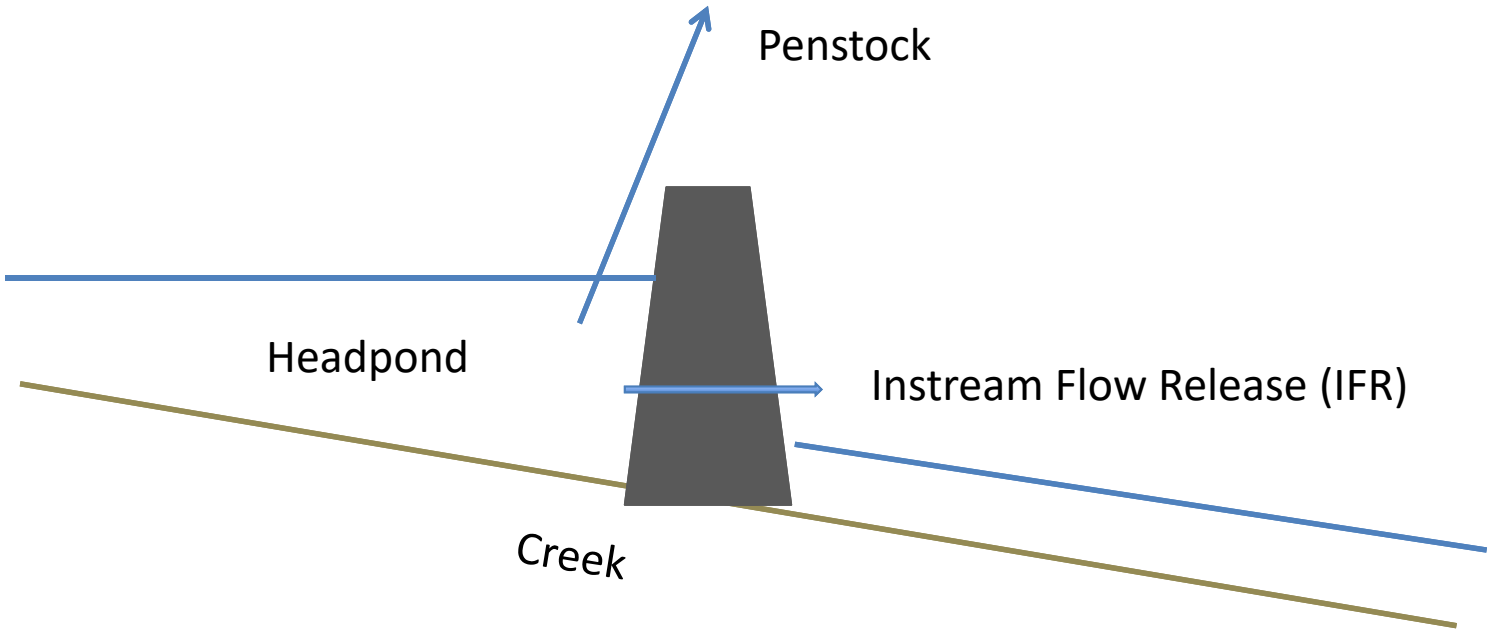
- Fresh water is required at the site for both Project construction and operation.
- During construction, water used for dust control, making concrete, worker facilities, etc.
- During operation, water used for process water, firefighting, worker facilities, etc.

Project Phase	Diversion (m^3/s)	Diversion (L/s)
Construction	0.07 m^3/s	70 L/s
Operation (Typical)	0.007 m^3/s	7 L/s
Operation (Firefighting)	0.03 m^3/s	30 L/s

Water Intake Locations



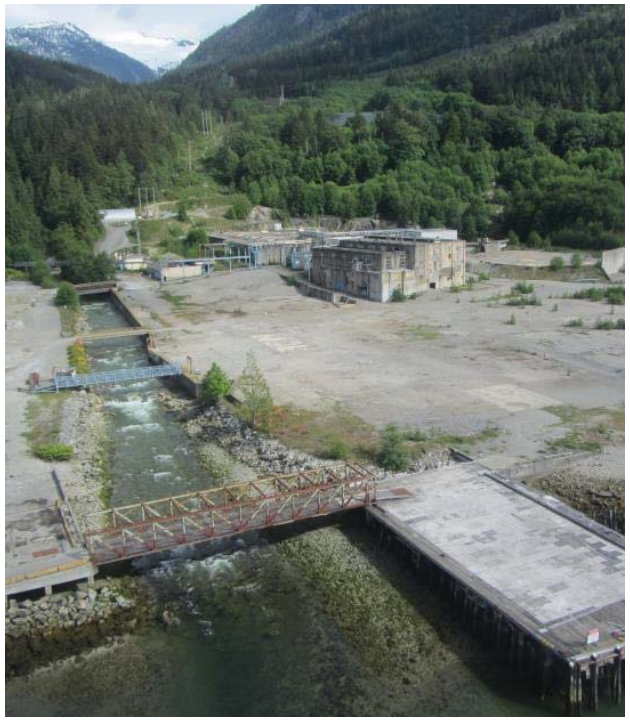
Water Intake Schematic



Mill Creek Intake

- Construction and use of a new intake on Mill Creek was included in the EAC Application.

- Investigating use of the existing Mill Creek intake as an alternative to constructing a new intake.



Mill Creek Intake – Description

- The existing Mill Creek intake site is located approximately 2 km upstream of Howe Sound.
- Mean annual flow 3.4 m^3/s (3,400 L/s).
- The existing intake is expected to require upgrades.
- If upgrading the existing intake is not feasible, a new intake may be constructed at the same location as the existing intake or remain in the location proposed in the Application.

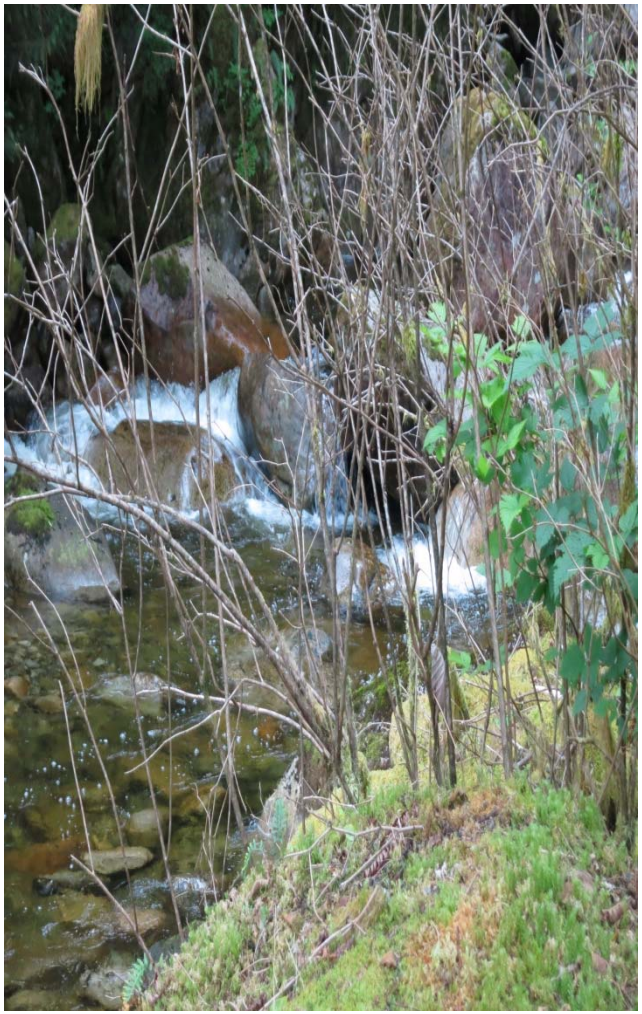
Mill Creek Intake – Environmental Effects

- No change to the effects identified in the Application.
- Reduced flows may occur over a longer reach of Mill Creek.
- The instream flow release (IFR) regime would be developed based on the selected intake location.
- If the existing intake is used it could reduce the amount of forest that is cleared.
- IFRs measured and reported to Forests, Lands and Natural Resource Operations (FLNRO) as part of water licence compliance.
- IFRs auditable by EAO under the Water Management Plan.

Woodfibre Creek Intake

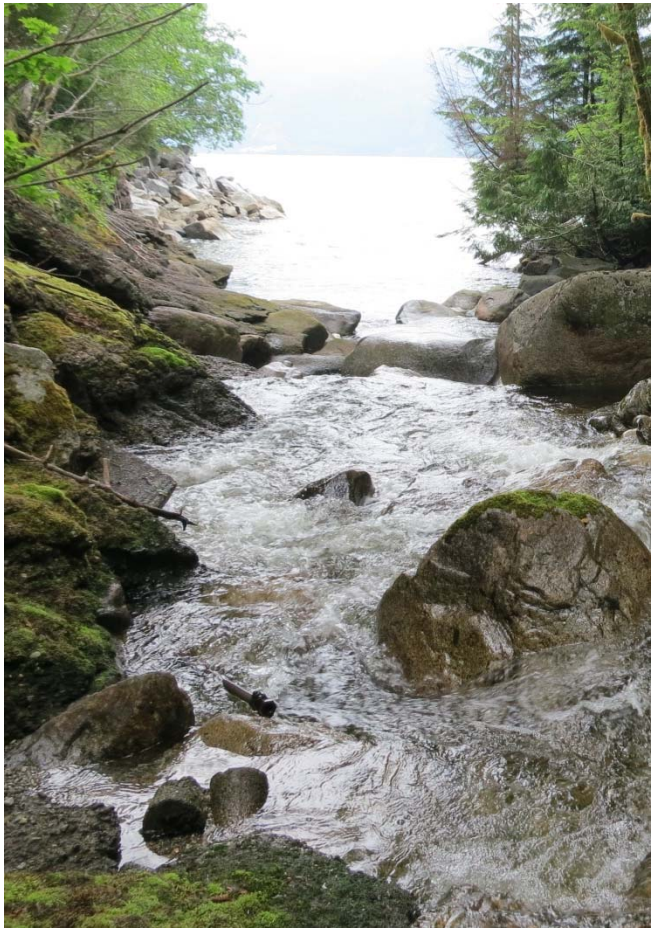
- During construction, the Mill Creek intake will either need upgrading or replacement and will therefore be unavailable.

- Woodfibre LNG will apply for a short-term use approval under section 10 of the *Water Sustainability Act*.



Woodfibre Creek Intake - Description

- Water would either be drawn from the existing penstock or directly from Woodfibre Creek with a screened pump.
- Adhere to IFR that will be established for the creek.
- The pumps will incorporate best management practices for screening.



Woodfibre Creek Intake - Effects

- With mitigation measures, minimal effects to fish and amphibians in Woodfibre Creek are anticipated to occur.

- IFRs would be monitored and reported to the Oil and Gas Commission (OGC) as part of use approval compliance.

Next Steps - Permits

- Permits that are expected to be required for the Project include:
  - LNG facility permit
  - Waste discharge permit (air and water)
  - *Navigation Protection Act* review
  - *Fisheries Act* review
  - District of Squamish site alteration permit
  - District of Squamish development permit

Next Steps – Amendment Application

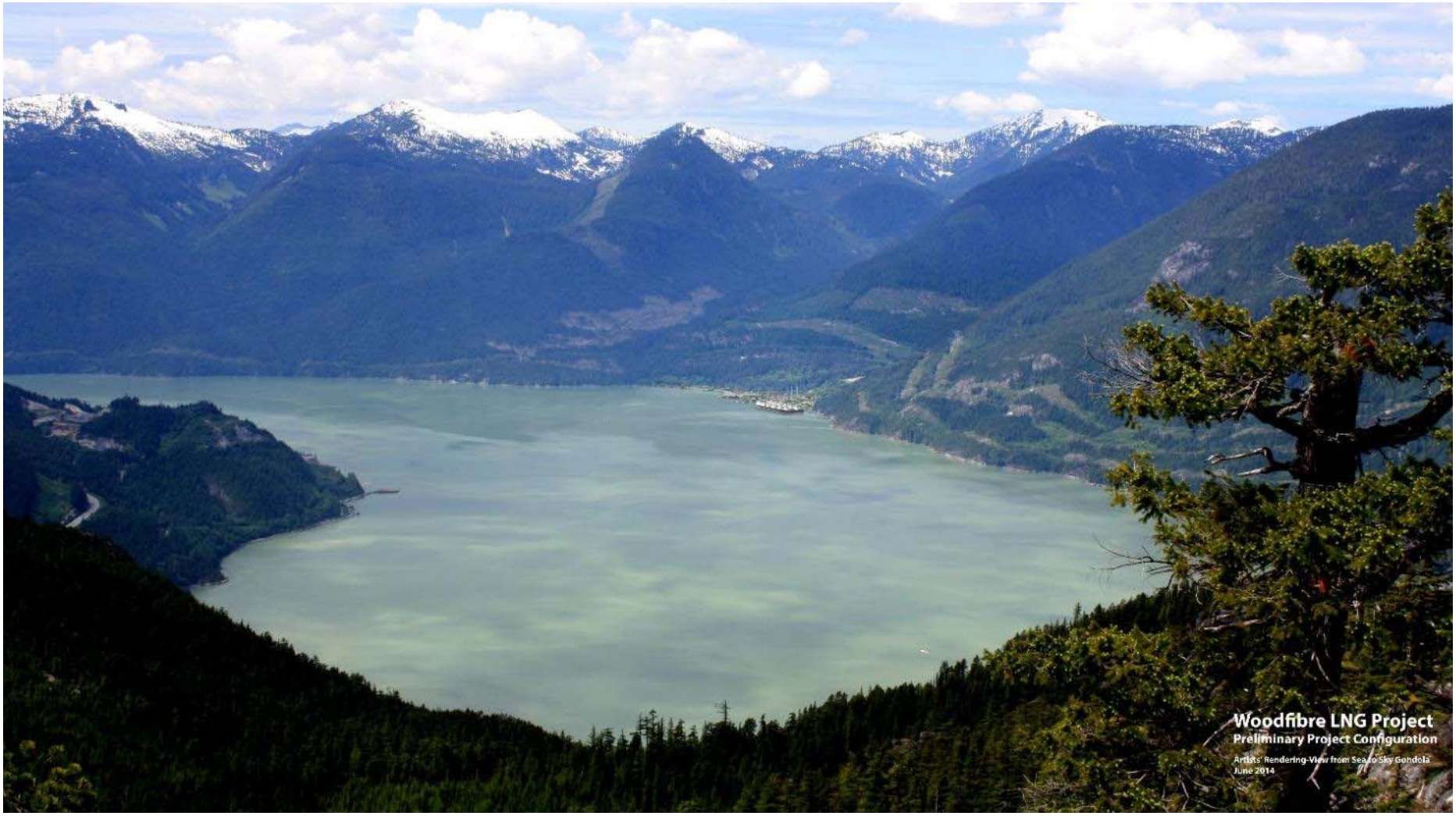
- We will prepare a transcript from this meeting
- The transcript will be included in the Application for an Amendment to the EAC
- Amendment submission to EAO in January 2017
- Technical working group review in February and March 2017
- Public Comment Period likely in February 2017
- Amendment decision - TBD

Summary

The Application for an Amendment to the EAC will cover:

- ✓ Using air to cool the plant rather than seawater
- ✓ Potential use of an existing intake on Mill Creek
- ✓ Potential short-term use of water from Woodfibre Creek

Thank you


Woodfibre LNG Project
Preliminary Project Configuration
Artists' Rendering-View from Sea to Sky Gondola
June 2014

January 03, 2017

Name
Address
Address 2 / Postal Code
Email:

RE: Woodfibre LNG Project – Amendment to the Environmental Assessment Certificate

Dear XX,

We are writing to invite you to attend a stakeholder meeting on January 18, 2017 at the Woodfibre site to discuss the proposed changes to the design of the Woodfibre LNG Project and to request any input that you may have on behalf of your organization regarding these changes. A stakeholder is an individual or group, including tenure holders, which is directly impacted by the proposed changes to the design of the Woodfibre LNG Project. First Nations, regulatory agencies and government are being consulted separately as part of an environmental assessment working group, and members of the general public will be consulted through an upcoming public comment period.

Since the provincial Environmental Assessment Certificate (EAC) and the federal decision statement were issued in October 2015 and March 2016, respectively, Woodfibre LNG Limited (Woodfibre LNG) has continued to work to implement the requirements associated with those approvals as well as to advance the design of the Project. In addition, we are working to implement the conditions of the Squamish Nation Environmental Certificate, which was issued following their independent review of the Project.

One of the conditions of the Squamish Nation Environmental Certificate was that the Woodfibre Environmental Working Group, which includes representatives from Squamish Nation and Woodfibre LNG, would commission a Cooling Study Report comparing the environmental effects of alternative cooling technologies. Following this process, Squamish Nation Chiefs and Council chose air cooling as the cooling technology to be used for the Project. Accordingly, Woodfibre LNG will be submitting an application for an amendment to the EAC to switch the Project from seawater cooling to air cooling.

In addition, as a result of ongoing front-end engineering design (FEED), Woodfibre LNG is proposing two additional changes within this application for an amendment. These changes are based on our increasingly-detailed understanding of Project construction.

- We are currently investigating the feasibility of refurbishing and using the existing Mill Creek intake rather than constructing a new intake. The existing intake is located upstream of the intake location shown in the Application for an EAC. If upgrading the existing intake is not feasible, a new intake may be constructed at the same location as the existing intake.

- During construction or refurbishing of the Mill Creek intake, Woodfibre LNG will require an alternate source of water. This water is proposed to be withdrawn from Woodfibre Creek

#1020 – 1075 W. Georgia St., Vancouver, BC, V6E 3C9 Canada
Telephone: 604-620-7883 Fax: 604-620-8860

under a short-term use approval. Water may either be withdrawn using existing infrastructure on the creek or temporary infrastructure (e.g., pumps) near the mouth of Woodfibre Creek.

In consideration of the changes outlined above, Woodfibre LNG is currently preparing an Application for an Amendment to the EAC. The changes that will be included in this amendment application are anticipated to be as follows:

- A reduction in the Project-related effects to the marine environment, including marine water quality, fish, and marine benthic habitat due to the switch from seawater cooling to air cooling.

- An increase in the noise associated with the Project (detailed modelling underway) due to the use of air cooling. A two-decibel increase in noise was predicted at the Woodfibre property shoreline during preliminary modelling; results of detailed modelling of the predicted two-decibel increase in noise will be included in the amendment.

- Reduction of effects associated with the Mill Creek intake, including a reduction of clearing of mature forest, reduction in instream work, and reduction of potential for archaeological effects.

- Review of the effects to surface water quantity, freshwater fish and amphibians on Woodfibre Creek.

It is predicted that air cooling has a relatively minor potential to interact with the environment. The noise limits established by the Oil and Gas Commission will continue to be followed. These guidelines establish permissible sound levels of 50 dBA (daytime) and 40 dBA (nighttime) 1.5 km from the Project. We are confident other potential concerns can be addressed through follow-up monitoring. For example, monitoring will be included in the Wildlife Monitoring Plan to confirm that the warm air from the air cooling fans does not have any meaningful adverse interactions with bats and birds.

Woodfibre LNG Limited is committed to implementing the mitigation measures previously identified in the Application for the EAC. In addition, the conditions included in the EAC and the federal decision statement will continue to apply. Examples of conditions that are applicable to the changes to the Project are:

- The instream flow requirements report (EAC Condition 5)

- Marine fish and fish habitat management and monitoring plan (EAC Condition 8)

- Wildlife management and monitoring plan for operations (EAC Condition 12)

- A follow-up monitoring program for fish and fish habitat (Decision Statement 3.14)

- A mechanism for receiving noise complaints (Decision Statement 6.2)

As mentioned above, we would like to invite you to attend a stakeholder meeting on Wednesday, January 18, 2017 at the Woodfibre site to discuss the proposed changes to the design of the Woodfibre LNG Project and to request any input that you may have on behalf of your organization regarding these changes. On January 18th, stakeholder meeting participants are asked to meet at the Squamish Government Dock at 10 am, where they will be transported by water taxi to the Woodfibre site (approx. 25 minutes). Following a safety and security briefing, there will be a presentation and discussion on the application for an amendment to the EAC (approx. 1.5 hours) and time permitting, a short tour of the Woodfibre LNG Project area. Once the tour is complete, participants will be transported back to the Squamish Government Dock.

Please note: space on the water taxi is limited, and restricted to invited guests only. The Woodfibre site is a century old and active industrial site, therefore, participants are asked to dress accordingly: sturdy shoes (steel toed preferred), and long pants and long-sleeve tops. Hard hats, eye protection and high visibility safety vests will be provided on site.

To confirm your participation in the stakeholder meeting, please RSVP by Friday, January 13, 2017 to Fay Thompson in our office at Fay_Thompson @wlng.ca or at (604) 620-7883. If you are unable to attend the stakeholder meeting but would like to discuss the proposed changes to the project, please contact Fay Thompson in our office and we can arrange an alternate meeting time and location.

Sincerely,

Woodfibre LNG Limited

Byng Giraud

Country Manager & Vice President, Corporate Affairs

604.620.7883

cc:
Squamish First Nation
BC Environmental Assessment Office

#1020 – 1075 W. Georgia St., Vancouver, BC, V6E 3C9 Canada
Telephone: 604-620-7883 Fax: 604-620-8860

APPENDIX D
Noise Model Inputs

Appendix D: Noise Model Inputs

Equipment	Number of Units	Total (dBA)
01-A-1203 PACKAGED ACTIVATED CARBON FILTRATION SKID	1	83.7
01-A-1205 ANTI-FOAM INJECTION PACKAGE	1	83.7
01-A-5806 HOT WATER INJECTION PACKAGE	1	83.7
01-A-7301 ATMOSPHERIC ETHANE/ETHYLENE VAPORISER PACKAGE	1	83.7
01-EA-1201 LEAN SOLVENT COOLER	1	72.3
01-EA-1209 SOLVENT REGENERATOR CONDENSER	1	72.3
01-EA-1301 TREATED GAS COOLER	1	85.5
01-EA-1306 REGENERATION GAS COOLER	1	85.5
01-EA-1511 HC CONDENSATE COOLER	1	85.5
01-EA-1603 MR COMPRESSOR INTERCOOLER	24	85.5
01-EA-1605 MR COMPRESSOR AFTERCOOLER	12	85.5
01-K-1602 MR COMPRESSOR	1	92.1
01-K-1308 REGEN GAS COMPRESSOR	1	92.1
01-P-1204-A LEAN SOLVENT PUMP	1	85.0
01-P-1204-B LEAN SOLVENT PUMP	1	85.0
01-P-1211-A SOLVENT REGENERATOR REFLUX PUMP	1	85.0
01-P-1211-B SOLVENT REGENERATOR REFLUX PUMP	1	85.0
01-P-1505-A SCRUB COLUMN REFLUX PUMP	1	85.0
01-P-1505-B SCRUB COLUMN REFLUX PUMP	1	85.0
01-P-1507-A LNG RUNDOWN PUMP	1	85.0
01-P-1507-B LNG RUNDOWN PUMP	1	85.0
01-P-5803-A HOT WATER CIRCULATION PUMP	1	85.0
01-P-5803-B HOT WATER CIRCULATION PUMP	1	85.0
01-P-5805-A HOT WATER CIRCULATION LT PUMP	1	85.0
01-P-5805-B HOT WATER CIRCULATION LT PUMP	1	85.0
01-P-7502 HC CONDENSATE PUMP	1	85.0
00-F-6505 HP FLARE STACK	1	84.6
00-F-6506 LP FLARE STACK	1	80.6
LNG OFFLOADING PUMP	20	85.1
00-P-7121 LNG SPRAY PUMP	10	85.1
01-A-5301 TEMPERED WATER MECHANICAL CHILLING PACKAGE	1	85.5
01-A-5305 TEMPERED WATER CHEMICAL INJECTION PACKAGE	1	85.5
01-A-5601-A AIR COMPRESSOR	1	89.5
01-A-5601-B AIR COMPRESSOR	1	89.5
01-A-5604 INSTRUMENT AIR DRYER PACKAGE	1	89.5
01-A-5701 LIQUID NITROGEN STORAGE AND VAPORIZATION PACKAGE	1	85.5
01-A-6005 POTABLE WATER PACKAGE	1	85.5
01-A-6601 ESSENTIAL DIESEL GENERATOR SET	1	84.8
01-A-6602 ESSENTIAL DIESEL GENERATOR SET	1	84.8
01-EA-1509 BOG COMPRESSOR INTERCOOLER	1	85.5
01-EA-1510 BOG COMPRESSOR AFTECOOLER	1	85.5
01-EA-5304 TEMPERED WATER COOLER	1	85.5
01-EA-5602 AIR COMPRESSOR AFTERCOOLER	1	85.5
01-K-1508 BOG COMPRESSOR	1	92.1
01-P-5303-A TEMPERED WATER CIRCULATION PUMP	1	85.1
01-P-5303-B TEMPERED WATER CIRCULATION PUMP	1	85.1
01-P-6004-A DEMINERALIZED WATER PUMP	1	85.1
01-P-6004-B DEMINERALIZED WATER PUMP	1	85.1
01-P-6007-A POTABLE WATER PUMP	1	85.1
01-P-6007-B POTABLE WATER PUMP	1	85.1
01-P-6502 WARM FLARE KO DRUM PUMP	1	85.1
Blower Fans	32	74.9
LNG Carrier	1	109.3
Tugboat	3	109.4

APPENDIX E
Relevant Mitigation Measures

Relevant Mitigation Measures

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
M5.4-6	Schedule Noise Emitting Maintenance During the Day	Woodfibre LNG Limited will schedule high noise emitting maintenance activities during the day whenever possible.	Operation	Operation	
M5.4-7	Notify Residents	When appropriate, Woodfibre LNG Limited will notify residents prior to high noise-emitting maintenance activities (if appropriate).	Operation	Operation	
M5.4-8	Receive Feedback About High-noise Activity	Woodfibre LNG Limited will set up and implement means (e.g., an office in Squamish) for people to provide input when experiencing a high-noise activity.	Operation	Construction	
M5.8-1	Erosion Prevention and Sediment Control Plan	Woodfibre LNG Limited will develop and implement an Erosion Prevention and Sediment Control Plan as part of the Construction Environmental Management Plan (CEMP). Existing applicable guidelines will be followed as appropriate to mitigate erosion and sediment transport and include the following: • *Environmental Protection and Management Guide* (OGC 2013) • *Land Development Guidelines for the Protection of Aquatic Habitat* (DFO 1992) • *Develop with Care Environmental Guidelines for Urban and Rural Land Development in British Columbia* (MOE 2014) • *Standards and Best Practices for Instream Works* (MWLAP 2004) The following erosion and sediment control measures will be implemented at the site during the construction and decommissioning phases and included in the Erosion Prevention and Sediment Control Plan (refer to **Section 13.0 Summary of Proposed Environmental and Operation Management Plans and Follow-up Programs**): • Activities within riparian management areas, a 30-m-wide area on either side of both Mill Creek and	Construction Decommissioning	Pre-construction	EAC Condition 21

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
		Woodfibre Creek, will be minimized. Erodible material will not be stockpiled in these areas and no refueling will occur within these areas. • Vegetation cover will be maintained wherever possible. Disturbed areas adjacent to watercourses will be re-vegetated as soon as possible to prevent surface erosion or downstream water quality effects. • Overland flows will be diverted from undisturbed areas away from or around construction areas. • Erosion and sediment control measures, including silt fences, filter fabric, straw bales, gravel filter dikes, sedimentation ponds, perimeter ditches, cut-off swales or other water quality management measures, will be selected, implemented, monitored, maintained, and repaired as required. • Sediment pond(s) will be incorporated as required, and appropriately designed in accordance with current guidelines to meet site conditions and requirements. Sediment ponds will be maintained until construction or decommissioning is completed and the affected areas are sufficiently stabilized and re-vegetated to minimize erosion risk or sediment transport at the site as a result of construction activities. • Construction wastes, overburden, soil, or any other substances potentially deleterious to riparian, aquatic or marine habitat will be stored or disposed of in such a manner as to prevent entry to riparian, aquatic or marine areas. • No erodible materials will be stockpiled within riparian management areas. Soil stockpiles will be diked, sloped, and seeded or appropriately covered to minimize erosion. If temporary stockpiles are constructed then appropriate erosion prevention measures will be installed and regularly maintained until these stockpiles are decommissioned or seeded. Spoil will be managed in accordance with the appropriate Project-specified regulatory approvals or applicable legislation, regulations, and guidelines prior to the completion of construction activities.			

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
		• Erosion and sediment control measures will be maintained and any required changes made promptly to ensure they are working effectively. An inspection and maintenance program will be developed and followed as part of the Erosion Prevention and Sediment Control Plan. Water collected in temporary sediment control structures will be analyzed and its quality determined. If water quality meets acceptable guidelines, it will be discharged into Howe Sound; otherwise it will be treated prior to discharge.			
M5.8-2	Design for Stormwater Management	Woodfibre LNG Limited will include stormwater management in the Project design with the following considerations: • Stormwater that comes into contact with areas that are not subject to LNG facility spills (e.g., roads, material storage areas, roof areas) will be collected in ditches and catch basins. It will then be directed through a stormwater treatment system to remove any oil and sediment prior to discharge into Howe Sound. • Stormwater that comes into contact with the LNG facility or other process areas will be captured in the new lined stormwater retention pond. The water will be tested for compliance with the BC water quality guidelines. If it meets guidelines, stormwater will be discharged directly into Howe Sound; if not, stormwater will be pumped to the water treatment plant prior to being discharged into Howe Sound. • Surface drains and ditches constructed as part of the Project will be graded according to BMPs and vegetated or lined to minimize erosion and increase the retention time of runoff. Particular attention will be given to the construction methodology and design of new or upgrades to access roads to avoid the potential to alter existing drainage patterns by collecting overland drainage and concentrating it at specific locations, which may result in localized erosion.	Operation	Final design	EAC Condition 21

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
M5.9-1	Minimum Instream Flow Releases	Woodfibre LNG Limited will ensure that the minimum instream flow releases (IFRs) will be established by a qualified professional. When required, the water diversions will be interrupted or reduced as required to maintain minimum or higher instream flows.	Construction Operation Decommissioning	Final Design	EAC Condition 5
M5.11-1	Invasive Plant Management Plan	Woodfibre LNG Limited will develop an Invasive Plant Management Plan to mitigate the introduction, transport, and extent expansion of invasive plant species (including noxious weeds) to and from the Project area during construction and operation. The objectives of this plan will be to detect, control (i.e., remove), and monitor invasive plant species in the Project footprint area. Part of this plan will include mapping invasive plant extent and tracking this extent over the life of the Project to record invasive species proliferation. Monitoring will be conducted to make sure that mitigation measures are properly implemented and effective.	Construction Operation	Pre-construction	EAC Condition 10
M5.12-1	Wildlife Management Plan	Woodfibre LNG Limited will develop and implement a Wildlife Management Plan prior to initiation of the construction phase of the project. The Wildlife Management Plan will provide the following information: • details regarding any required pre-construction surveys and wildlife monitoring: ▫ call-playback surveys prior to clearing that specifically focus on western screech-owl at night to ensure the cleared areas are not being used as post-fledgling areas ▫ pre-construction surveys to assess potential western screech-owl nesting habitat in the potential corridors for the gas and water pipeline ROWs, and avoidance of such habitat in the final design for the Project ▫ surveys will also be conducted in areas to be cleared to confirm that natural mineral sites (i.e., mineral water springs) that may be used by band-tailed pigeon are not impacted by the Project	Construction Operation	Pre-construction	EAC Condition 11 EAC Condition 12 Decision Statement Section 4

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
		• Information on how to report and record wildlife conflicts, including wildlife mortality due to vehicles and equipment. A database of wildlife mortality associated with construction and operation of the project should be maintained through the construction and operation phases. Observations of Red and Blue-listed species will be conveyed to the CDC. • limit speed on roadways within the Project area to 30 km/h • measures to identify amphibian crossings (if any) • details regarding posting signage and educating workers to ensure vigilance for amphibians during peak movement periods (i.e., rainy nights in April and September)			
M5.12-2	Retain snags and wildlife trees	Woodfibre LNG Limited will retain wildlife habitat features, including those for avifauna and bats, such as snags and wildlife trees (mature trees are included in M5.9-2) wherever possible and safe to do so. Prior to site clearing, wildlife habitat features to be retained will be demarcated with no-go fencing and signage. Habitat features to be field identified and retained will be included on Project Environmental Management Plan mapping.	Construction	Pre-construction Construction	EAC Condition 5
M5.12-3	Establish and retain vegetative buffers around raptor nests	Woodfibre LNG Limited will establish and retain vegetative buffers around raptor nests to mitigate sensory disturbance in accordance with *Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia* (MOE 2013). These guidelines suggest that a 100-m vegetated buffer be retained around osprey and bald eagle nests and a 200-m vegetated buffer be retained around western screech-owl nests. An additional 100-m no-disturbance buffer for each species nests is recommended during the nesting season.	Construction Operation	Pre-construction	EAC Condition 21
M5.12-5	Light management	Subject to safety and operational requirements, Woodfibre LNG Limited will use blue or green lighting rather than red or white lighting in order to reduce attractiveness to birds.	Construction Operation	Final Design	Decision Statement Section 4

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
M5.12-8	Install nesting structures	Woodfibre LNG Limited will install western screech-owl and barn swallow nesting structures at suitable locations in the LAA once construction is complete to compensate for the removal of (possible) nesting habitat during construction. Artificial nest structures for barn swallows include nesting shelves or nesting cups attached to an appropriate surface.	Operation	Post-construction	
M5.12-9	Design buildings to reduce bird strikes	Woodfibre LNG Limited will design building facilities to reduce the potential for bird strikes and bird mortality. Design features will include minimizing the amount of glass and applying tints or facades where glass is required to provide visual cues.	Construction	Final Design Pre-construction	N/A
M5.13-1	Avoid Clearing during Bat Maternity Season	Woodfibre LNG Limited will avoid clearing when maternity roosts of at-risk bat species are likely to be active. The least risk season for bats in the Project area (i.e., when females are not heavily pregnant, nor when juvenile bats are present and unable to fly) is expected to occur between September 1 and May 15, therefore clearing will be avoided when possible between May 16 and August 31. Pre-clearing maternity roost surveys will be undertaken if the least-risk windows cannot be maintained. Acceptable non-disturbance buffers will be established around active maternity roosts.	Construction	Pre-construction Construction	Decision Statement Section 9
M5.13-2	Minimize the Amount of Ultraviolet Light	Woodfibre LNG Limited will, where possible, use lighting technology that minimizes the amount of ultraviolet light generated, thereby minimizing its attractiveness to insects.	Construction Operation	Final Design	
M5.13-3	Installation of Bat Boxes	Woodfibre LNG Limited will construct and install bat boxes away from potential sources of mortality (e.g., roads) to provide additional roosting habitat for bats.	Operation	Post-construction	Decision Statement Section 9

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
M5.15-1	Follow Instream Works Best Management Practices for Fish	Woodfibre LNG Limited will follow instream works best management practices, including those outlined in M5.8-3 and those outlined below. • **Reduced risk instream work windows** ▫ Project activities and physical works conducted in freshwater fish habit will be undertaken during the reduced risk instream work window unless otherwise approved by MFLNRO. The reduced risk instream work windows for the Lower Mainland (Region 2) are between July 15 and September 15 for salmon, and between August 1 and 31 for trout and Dolly Varden (MOE 2006). • **Avoidance of instream disturbance** ▫ Project activities and physical works pertaining to placement of water supply infrastructure, as well as bridge construction on Mill Creek will avoid, wherever possible, instream operation of equipment and release of debris within the creek. • **Isolation of instream works** The installation of the water supply intake in Mill Creek will require work areas within the creek to be isolated. If isolation of instream work areas will be required, activities will adhere to the provincial Standards and Best Practices for Instream Works (MWLAP 2004). If construction of required intake structures cannot avoid disturbance of instream environments from equipment operation, structure placement, or debris entering the creek, these activities will be isolated to minimize effects to the stream. If construction of the water supply intake cannot avoid the disturbance of instream environments, either directly by equipment operation or structure placement, or indirectly by causing debris to enter the creek, these activities will be isolated to minimize flow effects on bank erosion, will be protected from high flow events, will include the use of clean materials, and will allow for the salvage of fish.	Construction	Pre-construction	Decision Statement Section 3

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
		• **Salvage of fish prior to instream works** Any habitat isolation conducted in instream work areas will require fish salvage prior to the commencement of works. Prior to any fish salvage, fish sampling permits will be required under the provincial *Wildlife Act* (RSBC 1996, c. 488) and the federal *Fisheries Act*. Sampling methods will adhere to fish collection methods and standards (RISC 1997) and general operational BMPs for salvage of fish (MOE 2014c). • **Minimize the duration of activities within watercourses and riparian setbacks** The duration of necessary activities, including both dismantling and constructing structures, which must occur within watercourses and within the 30-m riparian setback, will be minimized to avoid potential fish mortality and changes in fish presence, the quality and quantity of fish habitat, habitat availability, and riparian habitat.			

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
M5.15-2	Develop and Implement a Water Management Plan	Woodfibre LNG Limited will develop a Water Management Plan for Mill Creek, which will afford protection of fish and fish habitat by prescribing the minimum instream flow releases (IFRs). During low flows, water withdrawals from Mill Creek will be reduced to meet IFRs. If streamflows are less than the IFR, water will not be withdrawn from Mill Creek. Instream flow releases specific to the existing flow regime and geomorphology of Mill Creek will be developed in general accordance with *Assessment Methods for Aquatic Habitat and Instream Flow Characteristics in Support of Applications to Dam, Divert, or Extract Water from Streams in British Columbia* (Lewis et al. 2004) and consultation with MFLNRO. The information requirements for determining IFRs include the fish-bearing status of the stream, historic flow records, and any recently collected data. This current and historical information will allow for the establishment of seasonally adjusted instream flow thresholds calculated as percentiles of natural mean daily flows each month. Until such time as the Mill Creek-specific IFRs can be developed, the Project will adhere to IFRs calculated in accordance with the methods outlined in *Development of Instream Flow Thresholds as Guidelines for Reviewing Proposed Water Uses* (Hatfield et al. 2003) Monitoring will be a requirement of the Water Management Plan to confirm that the plan is effective in protecting fish and fish habitat. Effective monitoring will include a combination of compliance monitoring and biotic response monitoring and the definition of program objectives. Design of a monitoring program will consider program objectives, scope of effort, timing, and duration. Typical designs include, though are not limited to, the following: • continuous streamflow monitoring downstream of point of withdrawal • intermittent monitoring of biotic variables (e.g., fish abundance or density) random IFR compliance audits	Construction Operation Decommissioning	Pre-construction	EAC Condition 5

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
M5.17-2	Establish and Maintain Bird Nest Setbacks	Project activities will maintain a minimum 30 m setback distance from active marine bird nests identified in the Project area. Larger setbacks may be established for listed species and will be considered on a species-by-species case.	Construction Operation	Pre-construction	Decision Statement Section 4
M5.17-3	Establish and Maintain Marine Bird Breeding Colony Setbacks	Woodfibre LNG Limited will comply or require its contractors to comply with the recommended 300 m minimum setback from waterbird colonies (see Figure 5.17-2) for Project – related marine vessel traffic, and subject to safety concerns, refrain from blowing horns or whistles and maintain constant engine noise while passing near the colonies (EC 2013a).	Construction Operation	Construction	Decision Statement Section 4
M5.17-5	Minimize the Duration of Construction Activities in Intertidal Zone	Woodfibre LNG Limited will minimize the duration of necessary activities, including both dismantling and construction of structures, that must occur within the intertidal zone to the extent possible to reduce the disturbance of marine birds and marine bird habitat. Where practicable, activities will be scheduled during low tide.	Construction	Construction	EAC Condition 21
M5.17-8	Development of a Marine Bird Management Plan	Woodfibre LNG Limited will develop and implement a Marine Bird Management Plan (MBMP) prior to the initiation of the construction phase of the Project. This MBMP will be part of an overall Wildlife Management Plan document. This plan will include: • Pre-construction surveys within mapped (but not field-verified) marbled murrelet critical nesting habitat to be cleared as part of the Project will be undertaken following appropriate standards developed by the Resource Information Standards Committee for marbled murrelet inventory (MELP 2001). These surveys will determine if marbled murrelets are currently nesting in these areas (if timing of Project construction allows for these surveys to be conducted during nesting season), or if these areas provide suitable nesting habitat (if timing of Project construction prevents surveys of during active nesting activity). • Provision of information and training to all workers (contractors, staff, and employees) on how to report and record marine bird conflicts in the Project area,	Construction Operation	Pre-construction	Decision Statement Section 4

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
		specifically vessel strikes (bird species, location of carcass on vessel, weather conditions) in a database during construction, operation and decommissioning. • Should regular review of the database identify areas of persistent conflict or mortality rates that would affect populations, the Project operations will be reviewed to identify potential mitigation measures. Pre- and post-construction (operation-phase) monitoring of marine birds in the Project area. If the monitoring identifies high levels of marine bird attraction and collision-related mortality associated with the Project on-shore infrastructure, lighting, weather or migration periods, additional mitigation measures will be explored, including: turning off unnecessary lights (exterior and interior), especially during periods of high marine bird migratory flight activity in the area, wider light shut-down periods during migratory periods and inclement weather events (overcast, cloudy and/or hazy and foggy conditions), avoidance of continuous red or flashing red incandescent lights, use of blue jelly-jar LED lights on suspension cables and rectangular blue LED lights on bridge decks (Golder et al. 2010). Survey methods may include stand watches during migratory periods (spring and fall) in an adaptive management approach.			
M7.5-1	External surface finishing	Woodfibre LNG Limited will reduce the level of contrast by finishing new buildings' external surfaces or re-finishing existing buildings' external surfaces and structures as appropriate for required functional utility. The finish will have low glare and natural colours to reduce contrast with the qualities of the surrounding landscape features.	Construction	Construction	EAC Condition 20
M7.5-2	Screening of land-based infrastructure	Woodfibre LNG Limited will provide additional screening of land-based infrastructure not currently screened by existing vegetation through temporary or permanent planting, where possible and safe to do so.	Construction	Construction	EAC Condition 20
M7.5-4	Monitoring and maintenance of natural screening	Woodfibre LNG Limited will monitor and maintain natural screening to ensure minimal visibility of infrastructure and activity in operational areas by establishing vegetation and avoiding surface and root disturbance.	Operation	Construction	EAC Condition 20

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation	EAC Condition Federal Decision Statement
M7.5-5	Re-finishing and maintenance of external surfaces	Woodfibre LNG Limited will preserve the level of contrast for Project infrastructure by re-finishing and maintaining external surfaces as required. As part of the integrity management program, or other maintenance program, WLNG will establish re-finishing and maintenance schedules for site buildings and infrastructure external surfaces.	Operation	Operation	EAC Condition 20
M7.6-1	**Consult with the Tsleil-Waututh Nation on additional mitigation for Aboriginal Interests**	Upon receipt of the completed Tsleil-Waututh Nation Knowledge Study, WLNG will work in consultation with the Tsleil-Waututh Nation to identify technically and economically feasible mitigation measures needed to address potential Aboriginal Rights issues identified in the Tsleil-Waututh Nation Knowledge Study, such as access to traditional marine mammals, vegetation, wildlife, and fishing areas, and additions to various Plans, including marine related plans, to accommodate Tsleil-Waututh Nation interests as well as heritage and culturally significant site issues. Examples of additional mitigation measures to discuss with the Tsleil-Waututh Nation are: • Woodfibre LNG Limited will provide the Tsleil-Waututh Nation with an opportunity to review and comment on the draft Construction Environmental Management Plan, and other management plans that have a potential bearing on identified Tsleil-Waututh Nation Aboriginal Rights, such as the Squamish Harbour Vessel Traffic Plan, and Marine Transport Management Plan. • Woodfibre LNG Limited will work with the Tsleil-Waututh Nation to address issues that they may raise with respect to heritage resources. Woodfibre LNG Limited will provide the Tsleil-Waututh Nation with an opportunity to review and comment on draft Heritage Resources reports, including the Heritage Resources Preliminary Field Reconnaissance Report, the Heritage Resources Impact Assessment Report, and the Chance Find Management Procedures for the Project.	Construction Operation Decommissioning	Pre-construction	EAC Condition 22 Decision Statement Section 7