

## 22.0 SUMMARY OF MITIGATION MEASURES

The mitigation measures presented in the Woodfibre Liquefied Natural Gas Project (Project) Application for an Environmental Assessment Certificate (Application) are summarized below in **Table 22-1**. These measures were developed to avoid, minimize, restore onsite, or offset the potential adverse effects of the Project on environmental, economic, social, heritage and health pillars as discussed in **Part B** of the Application, **Section 11.0 Accidents and Malfunctions** and **Section 12.0 Effects of the Environment on the Project**.

The mitigation measures are organized in the table by Intermediate Component (IC) and Valued Component (VC). Each mitigation measure was given a unique identification number corresponding with the first section of the Application in which it appeared. As the same mitigation measure may apply to more than one IC or VC, the measure is fully described in the first section in which it appears, and thereafter referenced by number and name. Project design measures or other measures that mitigate the potential effects, in addition to the mitigation measures in the table, are summarized in each IC and VC assessment. Project phase refers to the phase during which Project-related effects will be mitigated by the measure. Timing refers to when the mitigation measure will be developed or implemented.

Woodfibre LNG Limited (Proponent or WLNG) will also develop the plans required for permitting by the Oil and Gas Commission (OGC), including an Emergency Response Plan. Woodfibre LNG Limited will implement the Project design, management and contingency measures noted in **Section 11.0 Accidents and Malfunctions**. In addition, the Proponent will prepare and implement the plans presented in **Section 13.0 Summary of Proposed Environmental and Operation Management Plans and Follow-up Programs**, which will incorporate the mitigation measures in **Table 22-1** and monitoring and follow-up programs into Construction, Operation and Decommissioning Environmental Management Plans.

**Table 22-1 Proposed Mitigation Measures**

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>5.2 Atmospheric Environment</b>				
M5.2-1	<b>Dust Control Plan</b>	Woodfibre LNG Limited will prepare and implement a Dust Control Plan for construction, operation and decommissioning activities. The objectives of this plan will be to prevent and control dust emissions. Monitoring will be conducted to make sure that mitigation measures are properly implemented and are effective. Mitigation measures to reduce the emission of fugitive particulate matter (i.e., dust) may include activities such as watering of exposed surfaces, reducing the height of material drops, covering stockpiles, and controlling the speed of onsite off-road vehicles.	Construction Decommissioning	Pre-construction
M5.2-2	<b>Limit Use of Generators</b>	Woodfibre LNG Limited will limit the use of generators to emergency power during operation.	Operation	Operation
<b>5.3 Greenhouse Gas Management</b>				
M5.3-1	<b>Best Management Practices for Greenhouse Gas Emissions</b>	<p>Woodfibre LNG Limited will develop and implement best management practices to reduce GHG emissions. Woodfibre LNG Limited will be compliant with regulations and permitting and associated reporting requirements (see <b>Section 14.0 Compliance Reporting</b>). Best management practices will include the following:</p> <ul style="list-style-type: none"> <li>• reduce emissions from mobile equipment (such as through ongoing vehicle maintenance and reducing the idling time of vehicles)</li> <li>• develop and implement a leak detection and repair program for Project facilities</li> <li>• develop control philosophies to minimize the amount of flared and vented gases and select chemicals which minimize contributions to global warming</li> </ul> <p>These best mitigation approaches will address regulatory developments on both a provincial and federal level through the incorporation of new processes and operations. Annual compliance reports will track the implementation and success of the best management practices. Compliance will be demonstrated through reporting emissions to the BC MOE, according to the regulation outlined in <b>Appendix 5.3-1 Greenhouse Gas Methodology</b>. Leak detection will follow the recommendations of the American Petroleum Institute (2013) and leak repair will follow the engineering design of the Project.</p>	Construction Operation Decommissioning	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>5.4 Atmospheric Sound</b>				
M5.4-1	<b>Limit Hours of Earthmoving Equipment</b>	Woodfibre LNG Limited will conduct earthmoving equipment construction using heavy earthmoving equipment between 0700 hours and 2200 hours to reduce the potential effect of construction sound on nearby dwellings whenever possible.	Construction Decommissioning	Construction Decommissioning
M5.4-2	<b>Advise Nearby Residents of Noisy Activities</b>	Woodfibre LNG Limited will schedule high noise activities to reduce disruption whenever possible.	Construction Decommissioning	Construction Decommissioning
M5.4-3	<b>Establish Muster Points Away from Receptors</b>	Woodfibre LNG Limited will establish heavy equipment muster points at least 500 m from any receptor	Construction Decommissioning	Construction Decommissioning
M5.4-4	<b>Fit Equipment with Mufflers</b>	Woodfibre LNG Limited will fit equipment with standard mufflers or silencers and keep these mufflers and silencers in good working order.	Construction Decommissioning	Construction Decommissioning
M5.4-5	<b>Use Acoustical Screening</b>	Woodfibre LNG Limited will take advantage of acoustical screening from existing onsite barriers to shield dwellings from construction equipment sound.	Construction Decommissioning	Construction Decommissioning
M5.4-6	<b>Schedule Noise Emitting Maintenance During the Day</b>	Woodfibre LNG Limited will schedule high noise emitting maintenance activities during the day whenever possible.	Operation	Operation
M5.4-7	<b>Notify Residents</b>	When appropriate, Woodfibre LNG Limited will notify residents prior to high noise-emitting maintenance activities (if appropriate).	Operation	Operation
M5.4-8	<b>Receive Feedback About High-noise Activity</b>	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

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>5.5 Light</b>				
Project design measures are proposed to mitigate changes to the Light VC. No additional mitigation measures are proposed.				
<b>5.6 Geotechnical and Natural Hazards</b>				
<b>M5.6-1</b>	<b>Road-related Mitigation Measures</b>	Woodfibre LNG Limited will engage qualified registered professionals to design Project roads; such design will include road stability (i.e., road prism, cutslope, fillslope). The Proponent will prepare engineered plans and designs for road and slope remediation or stabilization, if required, and will continue engaging in ongoing communications with contractors responsible for roads.	Construction Decommissioning	Final Design
<b>M5.6-2</b>	<b>Ongoing Communication Regarding Henriette Lake Dam</b>	Henriette Dam was noted to be deficient to resist current earthquake loads (Sandwell 2010), and could possibly be breached and initiate a debris flow. As noted, conditions and studies of Henriette Dam are not included as part of the current assessment. Woodfibre LNG Limited will maintain ongoing communication with personnel responsible for dam safety and monitoring of downslope site conditions.	Construction Operation Decommissioning	Final Design
<b>M5.6-3</b>	<b>Debris Flow-Debris Flood Mitigation Measures</b>	Woodfibre LNG Limited will conduct debris flow and debris flood hazard assessment will be completed prior to construction of the Project, which will include peak discharge and sediment concentration estimates. If determined to be required as part of that study, debris flow mitigation measures such as diversion and catchment structures will be designed by qualified registered professionals, based on detailed site-specific geotechnical and natural hazards investigations.	Operation	Final Design

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.6-4	<p><b>Earthquake-related Mitigation Measures</b></p>	<p>Supplementary geotechnical investigations and analyses will be conducted to delineate the extent and depths of potentially liquefiable fills or soils both onshore and offshore within the Project area.</p> <p><b>Onshore Facilities</b></p> <p>Based on investigations and preliminary analyses undertaken to date, the upper portion of the natural fluvial fan/delta deposits has been identified as potentially liquefiable if subject to the design earthquake event (1 in 2,475-year event) applicable to the Project area. In the event of liquefaction, onshore facilities are at risk of excess lateral ground movements, settlements, and potential slope movements or failures. To mitigate this risk, use of ground-movement treatment measures to densify the potentially liquefiable soils will be used (Knight Piésold 2014). The zone of ground improvement treatment will extend a distance equivalent to 1.3 to 1.5 times the thickness of the liquefiable layer beyond the outer perimeter of the main Project facilities, with a recommended minimum 15-m ground improvement zone extending horizontally beyond the plant limits. The potential for soil liquefaction is less of a concern in the vicinity of the FSO jetty and uploading dock because the layer of weak soil is shallower in those areas than in the vicinity of the LNG facility. Future detailed geotechnical investigations and design by qualified professionals will determine the depth and type of ground improvement mitigation measures, as well as the extent of the ground improvement measures beyond the outer perimeter of the LNG facility and other process components, that are necessary to achieve the Project performance requirements.</p> <p>The LNG facility, critical process piping, and other key LNG infrastructure has all been designed to safely shut down in the event of the maximum earthquake design load of a 1 in 2,475-year earthquake event.</p> <p><b>Shoreline and Offshore Facilities</b></p> <p>Although no similar analyses of the potential for liquefaction along the shoreline and potential effects to offshore facilities are presented in the available reports and documentation, due to the comparable subsurface conditions and characteristics of the fluvial surficial materials within the Project area. The risk of liquefaction and associated slope movements and instability is expected to be comparable. However, the risk is potentially more likely due to the steep slopes along the fan/delta front. Use of large-diameter, rock-socketed monopiles may be considered to provide a fixed contact for the floating storage and offloading unit (FSO). Deep, driven pile foundations have been considered for other offshore structures, while shallow foundations are considered potentially suitable for some onshore structures such as utility and personnel ramp facilities at shoreline locations. The design for the offshore and shoreline structures and facilities will be conducted by qualified registered professionals based on detailed, site-specific geotechnical and natural hazards investigations.</p>	<p>Construction Decommissioning</p>	<p>Final Design</p>

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
		<p><b>Landfill Area</b></p> <p>As described by Knight Piésold (2014), the LNG facility and associated 1 Horizontal to 1 Vertical (1H:1V) cutslope are located directly downslope of the existing landfill, which was developed in several stages, including installation of the initial historic landfill, for which there is limited information. The historic landfill is generally buttressed and partially covered by the more recent Phase 1 and Phase 2 landfills. Based on previous information (Knight Piésold 2014), the Phase 2 landfill is fully lined with a leachate collection system above the liner and an underdrain below, and is supported by a 10-m-high fill berm reported to consist of dense sand and gravel fill, constructed over potentially liquefiable, looser surficial soils extending approximately 2 m below original ground level. Knight Piésold (2014) states that the risk of landfill failure or excessive displacements is expected to be low, provided that the leachate collection system prevents mounding of leachate within the landfill waste above the liner, and the potentially liquefiable surficial soil layer is effectively drained, with confirmation by continued monitoring. The report also recommends that more detailed seismic analyses be carried out based on additional investigations to confirm that the risk of excessive movements or failure meets accepted performance criteria. This study will include determination by a registered professional whether monitoring of groundwater and leachate level conditions associated with the existing landfill upslope of the Project area is required. Mitigation and monitoring measures will be designed and implemented as required.</p> <p>Conceptual design indicates that the risk of cutslope instability or erosion may be reduced to an acceptable level by installation of anchor and mesh support as well as application of erosion control measures and re-vegetation treatment. Use of a flatter cutslope is not considered feasible as it would encroach on the Project facilities (e.g., plant, utility corridor, road).</p> <p>As described above, the risk of cutslope instability or erosion will be reduced to an acceptable level by mitigation measures, including the design and construction of slope stabilization measures, and, if required, landfill improvements under the direction of qualified and experienced professionals. In addition, instrumentation to monitor groundwater and leachate levels within and underlying the landfill will be installed during construction and monitored throughout operation and decommissioning. These designs and improvements to the landfill and cutslope will include contingency plans and methods to detect and prevent the development of any excessive increase in the leachate and groundwater levels, while mitigating the risk of excessive movements, instability, or erosion of either or both the landfill and the cutslope.</p>		

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.6-5	Field review of desktop terrain mapping and terrain stability assessment	Woodfibre LNG Limited will conduct a field review of desktop terrain mapping and a terrain stability assessment to confirm interpretations of surficial materials, bedrock, slopes, and geomorphological processes to be carried out by original map compilers prior to construction.	Construction Decommissioning	Final Design
<b>5.7 Site Contamination</b>				
M5.7-1	Implement COC requirements	As part of the environmental management program, WLNG will implement the mitigation measures specified in the COC.	Construction Operation Decommissioning	Construction
<b>5.8 Surface Water Quality</b>				
M5.8-1	Erosion Prevention and Sediment Control Plan	<p>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:</p> <ul style="list-style-type: none"> <li>• <i>Environmental Protection and Management Guide</i> (OGC 2013)</li> <li>• <i>Land Development Guidelines for the Protection of Aquatic Habitat</i> (DFO 1992)</li> <li>• <i>Develop with Care Environmental Guidelines for Urban and Rural Land Development in British Columbia</i> (MOE 2014)</li> <li>• <i>Standards and Best Practices for Instream Works</i> (MWLAP 2004)</li> </ul> <p>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 <b>Section 13.0 Summary of Proposed Environmental and Operation Management Plans and Follow-up Programs</b>):</p> <ul style="list-style-type: none"> <li>• Activities within riparian management areas, a 30-m-wide area on either side of both Mill Creek and Woodfibre Creek, will be minimized. Erodible material will not be stockpiled in these areas and no refueling will occur within these areas.</li> <li>• 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.</li> <li>• Overland flows will be diverted from undisturbed areas away from or around construction areas.</li> <li>• 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.</li> </ul>	Construction Decommissioning	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
		<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul> <p>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.</p>		

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.8-2	<b>Design for Stormwater Management</b>	<p>Woodfibre LNG Limited will include stormwater management in the Project design with the following considerations:</p> <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ul> <p>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.</p>	Operation	Final design
M5.8-3	<b>Follow Instream Works Best Management Practices</b>	<p>Woodfibre LNG Limited will mitigate effects to freshwater from instream works required during the construction and maintenance of the Mill Creek intake by implementing the following strategies:</p> <ul style="list-style-type: none"> <li>Instream construction activities will be completed in isolation of streamflows (e.g., flow diverted around work area) as much as possible.</li> <li>All fill materials or materials that will contact watercourse waters, including shoreline works or surfacing, will be clean and free of organic material and deleterious substances.</li> <li>Water intakes will be designed and constructed following existing regulation and BMPs, such as <i>Best Management Practices for Installation and Maintenance of Water Line Intakes</i> (MOE 2006).</li> </ul>	Construction	Construction
M5.8-4	<b>Water Quality Monitoring</b>	<p>Woodfibre LNG Limited will retain a qualified Environmental Monitor to oversee the implementation of the selected mitigation measures. The Environmental Monitor will evaluate the performance of mitigation measures (e.g., through water quality sampling) and will have the authority to suspend activities that are causing an unexpected adverse effect, or potentially contravening environmental legislation. The Environmental Monitor will be given the authority to immediately suspend all activities that are resulting, or could imminently result, in the release of sediment or other deleterious substances to the watercourses in the Project area.</p>	Construction Decommissioning	Construction Decommissioning

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.8-5	<b>Develop and Implement a Water Quality Monitoring Program</b>	Woodfibre LNG Limited will develop and implement a water quality monitoring program for Mill Creek and Woodfibre Creek. Information to be included within this program will include sample sites, frequency of sampling, and parameters to be monitored.	Construction Operation	Pre-construction
<b>5.9 Surface Water Quantity</b>				
M5.9-1	<b>Minimum Instream Flow Releases</b>	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
M5.9-2	<b>Minimize Vegetation Clearing</b>	Woodfibre LNG Limited will limit clearing of native vegetation communities to the extent required for construction of Project facilities. Where feasible, temporary construction features, such as laydown areas, will be located on paved or previously disturbed areas to reduce clearing. In addition, areas to be cleared will be delineated to help limit clearing to what is planned. Reducing the clearing area to the minimal amount required to accommodate the Project footprint will reduce the direct loss of vegetation communities and wildlife habitat. Monitoring will be conducted to ensure that mitigation measures are properly implemented and effective.	Construction	Construction
<b>5.10 Marine Water Quality</b>				
M5.8-1	<b>Erosion Prevention and Sediment Control Plan</b>	See description for M5.8-1 above.	Construction Decommissioning	Pre-construction
M5.8-2	<b>Design for Stormwater Management</b>	See description of M5.8-2 above.	Operation	Final Design
M5.10-1	<b>Marine Works Management Plan</b>	Woodfibre LNG Limited will prepare and implement a Marine Works Management Plan to minimize sediment disturbance during construction and prevent discharge or runoff containing high TSS, concrete wash water and fuel from entering the marine environment. The plan will contain (but not be limited to) the following measures: <ul style="list-style-type: none"> <li>All construction operations will be monitored by a qualified Environmental Monitor who will be onsite during the high risk construction and demolition activities to determine whether the works are resulting in any adverse effects on marine environment. Frequency of monitoring will be detailed in a monitoring plan. Any adverse effects will be reported to DFO by WLNG.</li> </ul>	Construction Decommissioning	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
		<ul style="list-style-type: none"> <li>• Marine works will be conducted during the least risk fisheries work window specific by DFO for the region if practical. If the work window cannot be followed, additional mitigation measures including the advice provided by DFO (Measures to Avoid Causing Harm to Fish and Fish Habitat (2013b)) will be implemented. The work window for Howe Sound is currently August 16 - January 31 (DFO 2014).</li> <li>• Work activities will cease and DFO will be contacted, if aggregations of herring (e.g., herring spawn) and salmonids (e.g., smolts) are observed within the work area.</li> <li>• Marine works will be avoided during weather that may increase sediment suspension.</li> <li>• All works will be conducted in a manner to prevent the discharge or introduction, either direct or indirect, of soil, sediment or sediment laden water, turbid water or any other deleterious substance into the marine environment. All discharges from construction activities shall meet BC water quality guidelines (MOE 2009).</li> <li>• Construction materials, excavation wastes, overburden, sediment, or other substances potentially deleterious to marine life shall be disposed of off-site in accordance with regulatory requirements, or placed in such a manner by the contractor, to prevent their entry into the marine environment.</li> <li>• The contractor shall follow <i>Best Management Practices for Pile Driving and Related Operations</i> (BCMPDCA and DFO 2003).</li> <li>• Vessels and other equipment involved in pile driving and construction activities will be positioned in a manner that will prevent damage to the seafloor and shoreline.</li> <li>• Where required, turbidity monitoring will be implemented during all pile drilling/driving activities, to determine that turbidity levels in the marine environment do not exceed established water quality regulatory criteria during Project works.</li> <li>• The following water quality criteria will be applied based on BC water quality guidelines (MOE 2009) with regards to discharge or introduction of sediment or sediment- laden water in the marine environment:                         <ul style="list-style-type: none"> <li>▪ Turbidity:                                 <ul style="list-style-type: none"> <li>▪ change from background of 2 NTU when the background level is less than 8 NTU</li> <li>▪ change from background of 5 NTU when background is 8-50 NTU</li> <li>▪ change from background of 10% when background is more than 50 NTU</li> </ul> </li> </ul> </li> </ul>		

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
		<ul style="list-style-type: none"> <li>▪ TSS:                             <ul style="list-style-type: none"> <li>▪ change from background of 5 mg/L when background is less than 25 mg/L</li> <li>▪ change from background of 10 mg/L when background is 25-100 mg/L</li> <li>▪ change from background of 10% when background is more than 100 mg/L</li> </ul> </li> <li>• If the criteria outlined above is exceeded as a result of Project-related activities, these works or activities will be halted until measures that will result in compliance with the criteria outlined above are put in place.</li> <li>• Where the sediment control criteria cannot be practically met, the work areas and activities contributing to these conditions will be isolated from tidal and flowing waters. This may include use of silt curtains and other silt control measures.</li> <li>• For dredging activities the following mitigation measures will be followed:                             <ul style="list-style-type: none"> <li>▪ Prior to dredging, the perimeter of the dredge area will be identified, so that work occurs within the confines of the project area. Tools such as real-time kinematic positioning controls (e.g., differential GPS) may be used to assist in positioning.</li> <li>▪ Employ sediment containment and water filtering devices on the barge to meet the TSS and turbidity criteria outlined above. This may require containment and treatment of barge dewatering effluent that exceeds the criteria.</li> <li>▪ Water quality monitoring will be implemented during dredging works to verify that the turbidity and TSS criteria are being met and enable management decisions to be made in the event that the performance criteria are not met.</li> <li>▪ The contract specifications will include operational controls to minimize disturbance of substrates (e.g., making additional dredge passes rather than dragging a bucket or beam to level the dredge surface, not stockpiling material underwater, controlling the rate of ascent and descent of the bucket).</li> <li>▪ The dredged material barge will not be overloaded beyond the top of the side rails to minimize loss of dredged material from the barge and to prevent barge listing or instability.</li> <li>▪ The barge will not come to rest on the seafloor (no grounding) (spuds may be used to anchor the barge).</li> </ul> </li> </ul>		

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.10-2	Concrete Works Management Plan	<p>Woodfibre LNG Limited will prepare and implement a Concrete Works Management Plan as part of the CEMP. The following mitigation measures will be included in this plan to mitigate potential effects to the marine environment from concrete works:</p> <ul style="list-style-type: none"> <li>• When pouring concrete, all spills of fresh concrete will be prevented from entering into the marine environment at the site.</li> <li>• If the concrete is being placed with a concrete pump, all hose and pipe connections will be sealed and locked properly so that lines will not leak or uncouple.</li> <li>• All concrete forms will be constructed in a manner which will prevent fresh concrete or cement-laden water from leaking into the surrounding water.</li> <li>• If fresh water is used to cure concrete, the runoff will be monitored for acceptable pH levels. If the pH levels are outside the allowable limits, then the runoff water will be contained and neutralized.</li> <li>• During inclement weather, uncured concrete will be protected or covered in a manner that minimizes the creation of high pH water.</li> <li>• Barriers will be used as appropriate to prevent splashing over forms and into the water.</li> <li>• Wash equipment and tools that have come in contact with concrete in a designated area away from the marine environment and drainages, so that concrete affected water is prevented from entering watercourses (tidal waters, streams, storm drains).</li> <li>• If necessary to pour concrete within the intertidal or subtidal zones (e.g., piling installation), contact between cementitious materials and surrounding seawater will be avoided to the extent possible.</li> <li>• When grinding cured concrete, water pH and TSS levels will be monitored not to exceed allowable limits from the effect of dust and fines. In the event that the levels are outside the acceptable ranges, preventative measures will be introduced. This may include introducing silt curtains to contain the solids and to prevent fish from entering a contaminated area or constructing catch basins to recover the runoff and neutralizing it prior to disposal.</li> <li>• Excess or spilled concrete will be contained, immediately cleaned up and disposed of in an environmentally acceptable manner.</li> </ul>	Construction	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.10-3	Minimize the Effects of Creosote Pile Removal	<p>Woodfibre LNG Limited will prepare and implement creosote pile removal mitigation measures as part of the CEMP, including the following measures:</p> <ul style="list-style-type: none"> <li>• A reasonable attempt will be made to remove the entire creosote-treated pile.</li> <li>• Piles will be removed by a slow, steady pull to minimize disturbance of seafloor habitats and to avoid bringing creosote-contaminated sediments to the surface. If the pile breaks off below the biologically-active zone in the sediment, it may not be advisable to dredge the remainder out, depending on the sensitivity of the habitat at the site.</li> <li>• Used/decommissioned piles will be disposed of on land in an appropriate waste management facility (Hutton and Samis 2000).</li> <li>• Work will follow procedures outlined in DFO's <i>Guidelines to Protect Fish and Fish Habitat from Treated Wood Used in Aquatic Environments in the Pacific Region</i> (Hutton and Samis 2000).</li> <li>• A sediment containment system (e.g., silt curtains) will be installed as appropriate during piling removal to prevent the dispersion of suspended sediments.</li> <li>• Creosote piling removal will be conducted during the least-risk fisheries work window specified by DFO for the region, unless a self-assessment determines that the work will not cause serious harm to fish or their habitat.</li> </ul>	Construction	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.10-4	Waste Management Plan	<p>Woodfibre LNG Limited will develop and implement a Waste Management Plan for hazardous and non-hazardous waste to ensure that waste generation is minimized and that waste is properly stored and disposed of. The plan will contain (but is not limited to) the following measures:</p> <ul style="list-style-type: none"> <li>• Hazardous Wastes:                             <ul style="list-style-type: none"> <li>▪ The <i>Hazardous Waste Regulation</i> (Government of BC 1988) will be followed under the <i>Environmental Management Act</i> for containment, storage and handling, disposal, and transportation of substances identified as hazardous waste.</li> <li>▪ Where activities involve the handling, storage, and removal of hazardous waste, the following records will be maintained:                                     <ul style="list-style-type: none"> <li>▪ inventories of types and quantities of hazardous waste generated, stored, or removed</li> <li>▪ manifests identifying hazardous waste haulers and disposal destinations</li> <li>▪ disposal certification documents.</li> </ul> </li> </ul> </li> <li>• Non-Hazardous Wastes:                             <ul style="list-style-type: none"> <li>▪ Solid waste materials that are not acceptable under the existing landfill permit will be transported offsite by barge for disposal to an appropriate designated disposal or recycling facility.</li> <li>▪ Whenever possible, the materials used in construction will be reused and recycled. Recyclable materials will be separated and transported off site.</li> <li>▪ Clearly labelled garbage bins with lids and recycling containers will be made available for food waste and recyclables.</li> <li>▪ Food waste will be stored in wildlife-proof bins.</li> </ul> </li> </ul>	Construction Operation	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>5.11 Vegetation Communities</b>				
M5.2-1	Dust Control Plan	See description of M5.2-1 above.	Construction Decommissioning	Pre-construction
M5.9-2	Minimize Vegetation Clearing	See description of M5.9-2 above.	Construction	Construction
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
M5.11-2	Minimize Clearing of Sensitive and Important Ecosystems	Woodfibre LNG Limited will, where possible, design the Project to avoid the riparian area along Mill Creek (outside of the Green Zone) and the mature forest adjacent to the Creek.	Construction	Construction
M5.11-3	Pre-construction Rare Plant Surveys and Salvage	Rare plant surveys will be conducted in areas to be disturbed by the Project (i.e., the footprint) to identify the locations of any listed plant species that may be affected by clearing activities. Surveys will be conducted in the spring to coincide with flowering and maximize the detectability of rare plants. Any listed plant species that are identified within the Project footprint will be salvaged and replanted in appropriate microsites elsewhere in the LAA.	Construction	Pre-construction
<b>5.12 Avifauna</b>				
M5.9-2	Minimize Vegetation Clearing	See description of M5.9-2 above.	Construction	Construction
M5.11-2	Minimize Clearing of Sensitive and Important Ecosystems	See description of M5.11-2 above.	Construction	Construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.12-1	<b>Wildlife Management Plan</b>	<p>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:</p> <ul style="list-style-type: none"> <li>• details regarding any required pre-construction surveys and wildlife monitoring: <ul style="list-style-type: none"> <li>▪ 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</li> <li>▪ 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</li> <li>▪ 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</li> </ul> </li> <li>• 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.</li> <li>• limit speed on roadways within the Project area to 30 km/h</li> <li>• measures to identify amphibian crossings (if any)</li> <li>• details regarding posting signage and educating workers to ensure vigilance for amphibians during peak movement periods (i.e., rainy nights in April and September)</li> </ul>	Construction Operation	Pre-construction
M5.12-2	<b>Retain Snags and Wildlife Trees</b>	<p>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.</p>	Construction	Pre-construction Construction
M5.12-3	<b>Establish and Retain Vegetative Buffers around Raptor Nests</b>	<p>Woodfibre LNG Limited will establish and retain vegetative buffers around raptor nests to mitigate sensory disturbance in accordance with <i>Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia</i> (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.</p>	Construction Operation	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.12-4	<b>Avoid Clearing during Nesting Season</b>	<p>Where possible, Woodfibre LNG Limited will avoid vegetation clearing during the nesting season for bald eagles, osprey and western screech-owl in accordance with MOE (2013). The least risk periods for development outlined in MOE's Develop with Care 2014 guidelines (MOE 2014) are identified as follows:</p> <ul style="list-style-type: none"> <li>• bald eagle - September 1 to December 31</li> <li>• osprey - September 15 to March 31</li> <li>• other raptors - October 1 to February 28</li> </ul> <p>Woodfibre LNG Limited will avoid clearing during nesting season for passerines in accordance with least risk development windows to passerines (September 1 to February 28) provided in MOE (2014). Pre-clearing bird nest surveys will be undertaken if the aforementioned least risk windows cannot be maintained. Appropriate, species-specific setback buffers will be established and maintained around any confirmed or suspected active nests that are detected.</p>	Construction	Construction
M5.12-5	<b>Light Management</b>	<p>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.</p>	Construction Operation	Final Design
M5.12-6	<b>Blasting Management Plan</b>	<p>Woodfibre LNG Limited will develop and implement a blasting management plan as part of the CEMP to mitigate effects of blasting to freshwater and marine aquatic life and marine birds. Monitoring of effects should be incorporated into the plan so that corrective mitigation measures can be undertaken if necessary. Blasting activities will conform to the <i>Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters</i> (Wright and Hopky 1998).</p> <p>Where feasible, underwater blasting will be scheduled to occur during periods when the number of birds in the area is lowest (likely the summer), with a maximum of one underwater blast per day, or at intervals of several hours (Cooper 1982). In addition, noises or blasts (e.g., "thunderflashes") to scare birds away from the immediate vicinity of the blast site will be emitted immediately prior to detonation (Cooper 1982; Demarchi and Bentley 2004).</p>	Construction	Pre-construction
M5.12-7	<b>Reduce Electrocutation Potential</b>	<p>Woodfibre LNG Limited will design powerlines and conductor layout to reduce potential bird strikes. The new powerlines will be small extension to the Project area with short spans of lines between poles and are expected to be visible to birds. If larger spans of line are installed, conductors will be placed far apart to avoid electrocution, and powerlines will be marked to enhance visibility for avian VCs.</p>	Operation	Final Design Construction
M5.12-8	<b>Install Nesting Structures</b>	<p>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.</p>	Operation	Post-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.12-9	<b>Design Buildings to Reduce Bird Strikes</b>	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
M5.12-10	<b>Work with BC Hydro and FortisBC to minimize effects to wildlife</b>	Woodfibre LNG Limited will meet with BC Hydro (i.e., Woodfibre Substation project) and FortisBC (i.e., Eagle Mountain – Woodfibre Gas Pipeline Project) to identify further measures to minimize potential adverse cumulative effects on wildlife.	Construction Operation	Final Design
<b>5.13 At-risk Bat Species</b>				
M5.9-2	<b>Minimize Vegetation Clearing</b>	See description of M5.9-2 above.	Construction	Construction
M5.11-2	<b>Minimize Clearing in Sensitive and Important Ecosystems</b>	See description of M5.11-2 above	Construction	Construction
M5.12-1	<b>Develop a Wildlife Management Plan</b>	See description of M5.12-1 above.	Construction Operation	Pre-construction
M5.12-2	<b>Retain Snags and Wildlife Trees</b>	See description of M5.12-2 above.	Construction	Pre-construction Construction
M5.13-1	<b>Avoid Clearing during Bat Maternity Season</b>	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
M5.13-2	<b>Minimize the Amount of Ultraviolet Light</b>	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	<b>Installation of Bat Boxes</b>	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

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.12-10	Work with BC Hydro and FortisBC to minimize effects to wildlife	See description of M5.12-10 above.	Construction Operation	Final Design
<b>5.14 Amphibians</b>				
M5.8-1	Erosion Prevention and Sediment Control Plan	See description of M5.8-1 above.	Construction Operation	Pre-construction
M5.8-2	Design for Stormwater Management	See description of M5.8-2 above.	Construction	Final Design
M5.8-5	Develop and Implement a Water Quality Monitoring Program	See description of M5.8-5 above.	Construction Operation	Pre-construction
M5.9-2	Minimize Vegetation Clearing	See description of M5.9-2 above.	Construction	Construction
M5.11-2	Minimize Clearing in Sensitive and Important Ecosystems	See description of M5.11-2 above.	Construction	Construction
M5.12-1	Develop a Wildlife Management Plan	See description of M5.12-1 above.	Construction Operation	Pre-construction
M5.14-1	Avoid Falling Trees into Watercourses	Where safe to do so, WLNG will avoid falling trees into the watercourse where clearing is necessary adjacent to a watercourse (e.g., Mill Creek).	Construction	Construction
M5.14-2	Identify Sensitive Habitat	Prior to initiation of the construction phase of the Project, WLNG will identify important habitat to be retained by including it in construction plans and by field-identified with no-go fencing.	Construction	Pre-construction
M5.14-3	Salvage and Replace Coarse Woody Debris	Woodfibre LNG Limited will salvage coarse woody debris that has been removed in upland areas to facilitate Project construction and will relocate it along linear features and within the Green Zone upon completion of the construction phase.	Construction	Construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.14-4	<b>Develop an Environmental Protection Plan for Works in and about Mill Creek</b>	Woodfibre LNG Limited will develop and implement an Environmental Protection Plan specific to works required in and around Mill Creek. The Plan will be developed prior to the initiation of instream works. This plan will require coastal tailed frog salvage for instream construction.	Construction	Pre-construction
M5.15-2	<b>Water Management Plan</b>	See description of M5.15-2 below.	Construction Operation Decommissioning	Pre-construction
<b>5.15 Freshwater Fish and Fish Habitat</b>				
M5.2-1	<b>Dust Control Plan</b>	See description of M5.2-1 above.	Construction Decommissioning	Pre-construction
M5.8-3	<b>Follow Instream Works Best Management Practices</b>	See description of M5.8-3 above.	Construction	Construction
M5.9-2	<b>Minimize Vegetation Clearing</b>	See description of M5.9-2 above.	Construction	Construction
M5.12-6	<b>Blasting Management Plan</b>	See description of M5.12-6 above.	Construction	Pre-construction
M5.15-1	<b>Follow Instream Works Best Management Practices for Fish</b>	<p>Woodfibre LNG Limited will follow instream works best management practices, including those outlined in M5.8-3 and those outlined below.</p> <ul style="list-style-type: none"> <li> <b>Reduced risk instream work windows</b>                      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).                 </li> <li> <b>Avoidance of instream disturbance</b>                      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.                 </li> </ul>	Construction	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
		<ul style="list-style-type: none"> <li>• <b>Isolation of instream works</b>                      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.</li> <li>• <b>Salvage of fish prior to instream works</b>                      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 <i>Wildlife Act</i> (RSBC 1996, c. 488) and the federal <i>Fisheries Act</i>. Sampling methods will adhere to fish collection methods and standards (RISC 1997) and general operational BMPs for salvage of fish (MOE 2014c).</li> <li>• <b>Minimize the duration of activities within watercourses and riparian setbacks</b>                      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.</li> </ul>		

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.15-2	<b>Water Management Plan</b>	<p>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.</p> <p>Instream flow releases specific to the existing flow regime and geomorphology of Mill Creek will be developed in general accordance with <i>Assessment Methods for Aquatic Habitat and Instream Flow Characteristics in Support of Applications to Dam, Divert, or Extract Water from Streams in British Columbia</i> (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 <i>Development of Instream Flow Thresholds as Guidelines for Reviewing Proposed Water Uses</i> (Hatfield et al. 2003)</p> <p>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:</p> <ul style="list-style-type: none"> <li>• continuous streamflow monitoring downstream of point of withdrawal</li> <li>• intermittent monitoring of biotic variables (e.g., fish abundance or density)</li> <li>• random IFR compliance audits</li> </ul>	<p>Construction                      Operation                      Decommissioning</p>	<p>Pre-construction</p>

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>5.16 Marine Benthic Habitat</b>				
M5.10-1	Marine Works Management Plan	See description of M5.10-1 above.	Construction	Pre-construction
M5.10-3	Minimize the Effects of Creosote Pile Removal	See description of M5.10-3 above.	Construction	Pre-construction
M5.16-1	Minimize Marine Shading	<p>Woodfibre LNG Limited will employ the following measures to minimize shading associated with the installation of marine structures:</p> <ul style="list-style-type: none"> <li>Where possible, ramps and gangways used to access floating facilities will be installed at an elevation of at least 2 m above the highest high water mark to allow ambient light to reach the seafloor.</li> <li>Where possible, docks, ramps and gangways will be surfaced with aluminum grating (or other light permeable material), allowing ambient light to reach the benthic communities below.</li> </ul>	Operation	Construction
M5.16-2	Ballast Water Management Plan	<p>Woodfibre LNG Limited will comply or require its contractors to comply with all legislated shipping requirements, including those related to the management of ballast water:</p> <ul style="list-style-type: none"> <li><i>Ballast Water Control and Management Regulations</i> (Government of Canada 2011) under the <i>Canada Shipping Act</i>, RSC 1985, c.S-9.</li> <li>International Maritime Organization Resolution A. 868(20): <i>Guidelines for the Control and Management of Ships Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens</i>, in particular section 7.1 (IMO 2004)</li> <li>Model Ballast Water Management Plan developed by the International Chamber of Shipping and the International Association of Independent Tanker Owners (IMO 2004)</li> <li>Regulation B-1 of the International Maritime Organization's <i>Regulations for the Control and Management of Ships' Ballast Water and Sediments</i> (IMO 2004)</li> <li>Part B of the Annex to Resolution MEPC.127 (53), <i>Guidelines for Ballast Water Management and Development of Ballast Water Management Plans</i> (IMO 2004)</li> </ul>	Operation	Operation

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>5.17 Marine Birds</b>				
M5.8-1	<b>Erosion Prevention and Sediment Control Plan</b>	See description of M5.8-1 above.	Construction Decommissioning	Pre-construction
M5.8-2	<b>Design for Stormwater Management</b>	See description of M5.8-2 above.	Construction	Final Design
M5.11-1	<b>Invasive Plant Management Plan</b>	See description of M5.11-1 above.	Construction Operation	Pre-construction
M5.12-6	<b>Blasting Management Plan</b>	See description of M5.12-6 above.	Construction	Pre-construction
M5.17-1	<b>Avoid Clearing During Marine Bird Breeding Season</b>	<p>Woodfibre LNG Limited will follow guidelines for restricted activity periods to protect nesting marine birds to comply with the federal <i>Migratory Birds Convention Act</i> and the provincial <i>Wildlife Act</i>. The site is located within the A1 bird nesting zone in Canada, which has a regional nesting period of March 19 to August 17 (EC 2014b); however, the breeding season for colonial waterbirds extends from March into September (EC 2013a). Based on the locations of recorded colonial waterbird nesting habitat, colonial waterbirds are unlikely to be affected by clearing activities associated with the Project; therefore, the A1 bird nesting zone period (March 19 to August 17) will be followed and the clearing activities will be avoided during the nesting season where feasible.</p> <p>When clearing is required during the nesting season, pre-clearing surveys for nesting birds will be conducted and appropriate, species-specific setback buffers will be established and maintained around any confirmed or suspected active nests to reduce potential mortality. This mitigation measure is predicted to be effective in reducing potential marine bird mortality.</p>	Construction	Pre-construction
M5.17-2	<b>Establish and Maintain Bird Nest Setbacks</b>	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
M5.17-3	<b>Establish and Maintain Marine Bird Breeding Colony Setbacks</b>	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

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.17-4	<b>Implement Marine Vessel Speed Restrictions</b>	During inbound travel, LNG carriers will be moving at a maximum speed of 8 to 10 knots at the south end of Passage Island (entrance to Howe Sound and the RAA) until they reach the immediate vicinity surrounding the Project area (LAA) where speeds will be reduced to 6 knots. To the extent practical, all other Project vessels will limit their speed while travelling within the RAA.	Construction Operation	Construction
M5.17-5	<b>Minimize the Duration of Activities in Intertidal Zone</b>	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
M5.17-6	<b>Underwater Noise Management Plan</b>	<p>Woodfibre LNG Limited will prepare and implement an Underwater Noise Management Plan as a component of the Marine Works Management Plan (M5.10-1) to mitigate potential mortality and behavioural changes to birds, fish and marine mammals. The plan will reference DFO's <i>BMP for Pile Driving and Related Operations</i> (BCMPDCA and DFO 2003), and will contain the following measures:</p> <p>Pile Driving and Related Activities:</p> <ul style="list-style-type: none"> <li>• Multiple underwater noise generating activities will be minimized when practicable (e.g., avoid multiple pile driving activities at the same time). Where multiple underwater noise generating activities are planned, they will be sequenced to minimize construction duration.</li> <li>• Works in the marine environment will be conducted during the least risk fisheries work window specified by DFO for the region unless otherwise agreed upon by DFO. The prescribed work window for Howe Sound is August 16 - January 31 (DFO 2014b).</li> <li>• Where possible, pile driving activities will avoid impacting hard substrates to prevent disturbance to fish habitat.</li> <li>• The use of vibrational pile driving will be used where practical and feasible as impact pile driving is associated with louder sound pressure levels underwater. The use of vibro-hammers for pile installation minimizes the effects on fish by decreasing the anticipated noise levels.</li> <li>• A ramp up or soft start technique will be used. Where equipment allows, power will be built up slowly from a low energy start-up to give adequate time for marine wildlife to leave the vicinity before exposure to the maximum sound pressure level. There will be a soft start every time pile driving is resumed following an interval of no pile driving.</li> </ul>	Construction	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
		<ul style="list-style-type: none"> <li>• Underwater noise from pile driving activities will be monitored in accordance with the following:                             <ul style="list-style-type: none"> <li>▪ Sound will not exceed 30 kPa at a distance of 1 m to 2 m from pilings; or</li> <li>▪ If the sound exceeds 30 kPa at a distance of 1 m to 2 m from pilings, measures will be taken to reduce either the intensity of the sound generated or the level of sound propagation through the water column. The appropriate measures will be chosen based on practicality to the Project and effectiveness and may include:                                     <ul style="list-style-type: none"> <li>▪ silt curtains around pile driving activities</li> <li>▪ bubble curtains around pile driving activities</li> <li>▪ a vibratory hammer in place of an impact hammer for pile driving</li> </ul> </li> </ul> </li> <li>• Prior to pile driving, the perimeter of the pile driving area will be identified, so that work occurs within the confines of the pile driving area.</li> </ul> <p>Monitoring:</p> <ul style="list-style-type: none"> <li>• The Environmental Monitor will be responsible for monitoring underwater noise and potential effects to wildlife, and implementing corrective mitigation measures if necessary (e.g., establishing safety zones in the event underwater noise levels exceed injury thresholds (180 and 190dB re 1 µPa)).</li> </ul>		
M5.17-7	<b>Reduce Moored Vessel Underwater Noise</b>	To the extent possible, vessel engines and propellers will be shut down while moored at the FSO to reduce unnecessary underwater noise during LNG transfer operations during construction and operation.	Operation	Operation

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.17-8	<b>Development of a Marine Bird Management Plan</b>	<p>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:</p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• 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, specifically vessel strikes (bird species, location of carcass on vessel, weather conditions) in a database during construction, operation and decommissioning.</li> <li>• 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.</li> <li>• 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.</li> </ul>	Construction Operation	Pre-construction
M5.17-9	<b>Coordinate with BURNCO to share information from marine bird monitoring studies</b>	Woodfibre LNG Limited will coordinate with BURNCO to mutually share results of marine bird monitoring studies to contribute to the knowledge base for marine bird interactions.	Construction Operation	Construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>5.18 Forage Fish and Other Fish (Marine)</b>				
M5.8-1	<b>Erosion Prevention and Sediment Control Plan</b>	See description of M5.8-1 above.	Construction Decommissioning	Pre-construction
M5.8-2	<b>Design for Stormwater Management</b>	See description of M5.8-2 above.	Operation	Final Design
M5.10-1	<b>Marine Works Management Plan</b>	See description for M5.10-1 above.	Construction Decommissioning	Pre-construction
M5.10-2	<b>Concrete Works Management Plan</b>	See description for M5.10-2 above.	Construction	Pre-construction
M5.10-3	<b>Minimize the Effects of Creosote Pile Removal</b>	See description for M5.10-3 above.	Construction	Pre-construction
M5.10-4	<b>Waste Management Plan</b>	See description for M5.10-4 above.	Construction Operation	Pre-construction
M5.16-1	<b>Minimize Marine Shading</b>	See description for M5.16-2 above.	Operation	Construction
M5.16-2	<b>Ballast Water Management Plan</b>	See description of M5.16-3 above.	Operation	Operation
M5.17-6	<b>Underwater Noise Management Plan</b>	See description for M5.17-6 above.	Construction Operation Decommissioning	Pre-construction
<b>5.19 Marine Mammals</b>				
M5.17-6	<b>Underwater Noise Management Plan</b>	See description of M5.17-6 above.	Construction Operation Decommissioning	Pre-construction
M5.19-1	<b>Avoidance of pile driving on hard substrates</b>	In addition to the mitigation measures described in M5.17-6, WLNG will prevent pile driving activities from impacting hard substrates, where possible. During impact pile-driving activities, a qualified specialist marine mammal observer will monitor for marine mammals and will communicate presence or absence to the contractor.	Construction	Construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M5.19-2	<b>Marine Mammal Management Plan</b>	<p>Woodfibre LNG Limited will produce a Marine Mammal Management Plan for the Project. This plan will include vessel speed reductions and avoidance of marine mammals:</p> <ul style="list-style-type: none"> <li>• LNG carrier and other deep-sea vessel speeds will be kept at a maximum of 8 to 10 knots when operating in the LAA.</li> <li>• All Project vessels will follow established shipping lanes/navigational routes typically used in the area.</li> <li>• All Project vessels will maintain a constant course and constant speed, to the extent practical, when operating in the RAA.</li> <li>• Under no circumstances, other than in the case of an emergency, will vessels approach within 100 m of any marine mammal.</li> <li>• If marine mammals approach within 100 m of a vessel, the vessel will reduce its speed and, if possible, cautiously move away from the animal. If it is not possible for a vessel to move away from or detour around a stationary marine mammal or group of marine mammals, the vessel will reduce its speed and wait until the animal(s) moves at least 100 m from the vessel prior to resuming speed.</li> <li>• During impact pile driving activities, a qualified specialist marine mammal observer will monitor for marine mammals and will communicate presence/absence to the contractor.</li> </ul>	Construction Operation	Pre-construction
M5.19-3	<b>Planning for Future Marine Traffic</b>	Woodfibre LNG Limited will undertake additional passage planning concerning the interaction of future traffic in studies as part of the Technical Review Process under TERMPOL Code of Recommended Standards for the safety and Prevention of Pollution for Marine Transportation Systems and Related Assessment Procedures.	Operation	Final Design
<b>6.2 Labour Market</b>				
No mitigation measures are proposed for the labour market VC.				

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>6.3 Sustainable Economy</b>				
M6.3-1	<b>Squamish Harbour Vessel Traffic Plan</b>	Woodfibre LNG Limited will develop and implement strategies, best management practices, and guidelines to avoid and minimize Project-related disruption of marine-based recreational activities in the Squamish Harbour area during construction and operation. In developing this plan, WLNG will consult with key marine user groups (e.g., Squamish Terminals, yacht clubs, kiteboard clubs, and kayaking operators) to identify the routes of all Project-associated marine traffic (e.g., ferries and water taxis) and discuss strategies to manage the interaction of Project vessel traffic with recreational and tourism areas during the high season months. Woodfibre LNG Limited's use of the Darrell Bay terminal for the worker ferry is part of this plan as it minimizes interaction with recreationists and tourists who are using the marine waters of Squamish Harbour and the head of Howe Sound. This traffic plan will include a procedure for marine stakeholders to consult with WLNG regarding special events such as yacht races, regattas, and marine-based festivals to ensure that additional passage planning and scheduling can be reviewed.	Construction Operation	Pre-construction
<b>7.2 Infrastructure and Community Services</b>				
M7.2-1	<b>Local Information Packages and Web Pages</b>	Woodfibre LNG Limited will prepare and provide non-local construction and operations workers with information packages on rental housing and temporary accommodation options in Greater Vancouver and the Squamish area and information on local services they may require in these communities. Woodfibre LNG Limited will also make this information available on web pages that can only be accessed by Project workers. The web pages would include links to appropriate resources.	Construction Operation	Pre-construction
M7.2-2	<b>Housing and Accommodation Advisor</b>	For the construction period and the initial stage of operations, WLNG will require its EPCM contractor(s) to contract with a person or a firm that will canvass and identify housing and temporary accommodation units and make incoming workers aware of this potential accommodation, and generally act as a one-window housing resource for the Project's non-local workers and as a liaison with housing and accommodation providers in the LAA. During construction, when feasible, this person will also pre-book hotel and motel spaces within reasonable commuting distance of the Project during periods when a higher number of short-term temporary accommodation units are required.	Construction Operation	Pre-construction
M7.2-3	<b>Decommissioning Plan - Employment</b>	As part of the decommissioning plan (see <b>Section 13.0 Summary of Proposed Environmental and Operation Management Plans and Follow-Up Programs</b> ) WLNG will include information regarding the timing for the transition of operational activities to decommissioning and closure and associated decommissioning employment opportunities. The plan will include communication strategies to keep employees informed of decommissioning plans and timelines.	Decommissioning	Pre-decommissioning

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M7.2-4	<b>Traffic Management Plan</b>	The Proponent will research and prepare a Traffic Management Plan that will provide guidance on how all Project-related traffic is managed in and around Squamish during each phase of the Project. This plan will include driving routes and parking options for the project's ferry location and for material and equipment laydown areas in Squamish. The plan may include potential options for reducing the number of private vehicles commuting from Metro Vancouver along the Sea-to-Sky Highway 99 each day, including car-pooling initiatives and/or a commuter bus service from designated areas. WLNG will consult with District of Squamish in preparing and finalizing the traffic management plan.	Construction Operation	Pre-construction
M7.2-5	<b>Emergency Response Plan (Construction)</b>	Prior to commencing construction, WLNG will develop and implement an Emergency Response Plan for the construction phase of the project. The Emergency Response Plan will be developed with input from local, regional and provincial emergency response authorities, such as Squamish Fire Department, the Squamish RCMP, Vancouver Coastal Health and BC Ambulance Service. The Emergency Response Plan will be communicated to emergency response authorities and service providers.	Construction	Pre-construction
M7.2-6	<b>Emergency Response Plan (Decommissioning)</b>	Prior to commencing the Project decommissioning phase, WLNG will develop and implement an Emergency Response Plan for the decommissioning phase of the Project, taking into account specific decommissioning activities. As the project is situated in a remote location without road access, it will be necessary for the Emergency Response Plan to take this factor into account. Like the construction emergency response plan and the operations Safety Loss and Management Program, the decommissioning Emergency Response Plan will be developed with input from local, regional and provincial emergency response authorities.	Decommissioning	Pre-decommissioning
M7.2-7	<b>Implement TERMPOL Recommendations</b>	Woodfibre LNG Limited will continue to participate in Transport Canada's voluntary shipping and navigational risk assessment TERMPOL review process. TERMPOL studies will be agreed to by Transport Canada, and will include a systematic assessment of safety and risk management in the joint use of the waterway. Any recommendations from the TERMPOL Review Committee will be integrated into the Project design and operating procedures, including but not limited to those related to navigation, passage planning, traffic management, suitability of the terminal location, orientation, and operation.	Construction	Final Design

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>7.3 Marine Transport</b>				
<b>M5.19-3</b>	<b>Planning for future marine traffic</b>	See description of M5.19-3 above.	Operation	Final Design
<b>M6.3-1</b>	<b>Squamish Harbour Vessel Traffic Plan</b>	See description of M6.3-1 above.	Construction Operation	Pre-construction
<b>M7.2-7</b>	<b>Implement TERMPOL Recommendations</b>	Woodfibre LNG Limited will continue to participate in Transport Canada's voluntary shipping and navigational risk assessment TERMPOL review process. TERMPOL studies will be agreed to by Transport Canada, and will include a systematic assessment of safety and risk management in the joint use of the waterway. Any recommendations from the TERMPOL Review Committee will be integrated into the Project design and operating procedures, including but not limited to those related to navigation, passage planning, traffic management, suitability of the terminal location, orientation, and operation.	Construction Operation Decommissioning	Final Design
<b>M7.3-1</b>	<b>Marine Transport Management Plan</b>	Woodfibre LNG Limited will prepare and implement a marine transport management plan prior to construction activities or as outlined through TERMPOL. This plan will outline measures to ensure all vessel traffic is aware of Project activities. The plan will also provide details of the communication channels to be used and the Project-related safety procedures to be followed.	Construction Operation	Pre-construction
<b>M7.3-2</b>	<b>Use Navigational Aids and Lights</b>	Woodfibre LNG Limited will install aids and navigational lights based on recommendations following the <i>NPA</i> review process.	Construction Operation	Construction
<b>M7.3-3</b>	<b>Notices to Mariners and Notices to Shipping</b>	Woodfibre LNG Limited will notify the relevant authorities, including the CCG, so that Notices to Mariners and Notices to Shipping can be issued.	Construction Operation	Pre-construction
<b>M7.3-4</b>	<b>Update navigational charts and nautical publications</b>	Woodfibre LNG Limited will ensure CHS navigational charts and other appropriate nautical publications are updated to show the terminal and other marine features, where appropriate.	Construction Operation	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M7.3-5	<b>Compliance with maritime regulations and legislation</b>	Woodfibre LNG Limited will conduct all Project shipping and transportation of passengers in accordance with the requirements of the <i>Canada Shipping Act</i> , in compliance with the CCG and PPA. Maritime legislation and other requirements are outlined in <b>Section 7.3.1.1.2</b> . In addition, shipping activities will also comply with all other applicable national and international safety regulations that have not been listed, such as requirements established by the International Maritime Organization. Where applicable, consideration will also be given to best practice criteria for the safe operation of LNG vessels presented by the Society of International Gas Tanker and Terminal Operators, and the World Association for Waterborne Transport Infrastructure.	Construction Operation	Construction
M7.3-6	<b>Consult with BC Ferries and Squamish Terminals</b>	Woodfibre LNG Limited commits to further consult with BC Ferries and Squamish Terminals regarding potential interference, vessel routes, and current operating practices.	Construction Operation	Pre-construction
M7.3-7	<b>BC Coast Pilots</b>	Woodfibre LNG Limited commits to having two BC Coast Pilots on board LNG carriers at all times, throughout the passage in Howe Sound or as recommended through studies as part of TERMPOL. BC Coast Pilots will be transported to site and will board the LNG carrier for outbound transit at the Woodfibre LNG terminal. Inbound LNG carriers are expected to pick up BC coast pilots outside Victoria at the existing pilot station or in Burrard Inlet.	Operation	Operation
M7.3-8	<b>Use of tugboats in Howe Sound</b>	Woodfibre LNG Limited expects that LNG carrier passage in Howe Sound will be assisted by a minimum of three tugs, which will also assist in alerting and ensuring recreational users are aware of the approaching vessel. The final number and specification of tugs to be used will be determined through TERMPOL.	Operation	Operation
M7.3-9	<b>Berthing of LNG carriers</b>	During berthing, WLNG will ensure that LNG carriers will turn and align with tugboat assistance in a designated turning area within the LAA; the basin is located adjacent to the berth. Once aligned, tugboats will assist the LNG carrier with berthing.. Final berthing procedures and provisions will be determined through TERMPOL.	Operation	Operation
M7.3-10	<b>Limits to transit in poor weather</b>	Woodfibre LNG Limited will ensure that any transits in poor weather will be at the approval of BC Coast Pilots. Limits on weather and conditions, including wind speeds, waves, and traffic will be placed following studies conducted as part of TERMPOL and through consultation with PPA.	Operation	Operation
M7.3-11	<b>Communication of LNG carrier with CCG MCTS</b>	Woodfibre LNG Limited will ensure that LNG carriers will request clearance from CCG MCTS prior to entering, moving within, and departing Howe Sound. MCTS will communicate and monitor movements along the entire shipping route.	Operation	Operation

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
M7.3-12	<b>Monitoring of LNG carrier with radar and AIS</b>	Woodfibre LNG Limited personnel will monitor LNG carrier passage in the marine operations center using radar and AIS.	Operation	Operation
M7.3-13	<b>Ferry schedule posting</b>	During operation, WLNG will publish the daily worker ferry schedule times.	Operation	Operation
M7.3-14	<b>Consultation with recreational stakeholder groups in Howe Sound</b>	Woodfibre LNG Limited commits to further consultation with recreational stakeholder groups in Howe Sound to identify areas of concerns and where practicable, to identify additional mitigation that can be implemented to reduce effects.	Construction Operation	Pre-construction
M7.3-15	<b>Ship-handling safety features and emergency signaling</b>	Woodfibre LNG Limited will ensure that Project LNG carriers will have safety equipment to facilitate ship handling and LNG cargo system handling. The ship-handling safety features include, vessel radar and positioning systems that enabling the crew to monitor the ship's position, traffic, and identified hazards around the ship. A global maritime distress system automatically transmits signals if there is an onboard emergency requiring external assistance.	Operation	Operation
M7.3-16	<b>Approach velocity meters on LNG carriers</b>	Woodfibre LNG Limited will ensure that LNG carriers use approach velocity meters when berthing to ensure that the prescribed impact velocity for the berth fenders will not be exceeded.	Operation	Operation
M7.3-17	<b>Automatic mooring line monitoring and emergency shutdowns</b>	Woodfibre LNG Limited will ensure that automatic mooring line monitoring is used as it will provide individual line loads to help maintain the security of the mooring arrangement while alongside moorings. When connected to the onshore system, the instrument systems and the shore-ship LNG transfer system will function as one system, allowing emergency shutdowns of the entire system, either from the vessel or from the shore.	Operation	Operation

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>7.4 Land and Resource Use</b>				
M6.3-1	<b>Squamish Harbour Vessel Traffic Plan</b>	See description of M6.3-1 above.	Construction Operation	Pre-construction
M7.4-1	<b>Access Management Plan</b>	Woodfibre LNG Limited will develop and implement an Access Management Plan to address recreational backcountry opportunities while ensuring the safety and security of the public and of WLNG workers and facilities. As part of this plan, WLNG will identify potential opportunities to provide access to recreationists to Crown land areas beyond the Project site. In addition, WLNG will discuss access through the Project site to the surrounding Crown lands with the party holding the guide outfitter tenure in the area. A key consideration for WLNG allowing access through the Project site to the guide outfitter will be the maintenance of the safety of its workers and facilities.	Construction Operation	Pre-construction
M7.4-2	<b>Collaborate with Matthews Southwest and Bethel Lands Corporation and District of Squamish to minimize displacement of recreation activity</b>	As discussed, WLNG will develop a Squamish Harbour Vessel Traffic Plan (M6.3-1) to identify strategies to minimize effects to marine-based recreational activities. Its development will incorporate consultations with Squamish Harbour users. To help avoid cumulative effects, as a component of the Squamish Harbour Vessel Traffic Plan, WLNG will also work with Matthews Southwest and Bethel Lands Corporation and District of Squamish to minimize displacement of recreation activity by Project-associated ferry and water taxi traffic that travels to the Project site.	Construction Operation	Pre-construction
<b>7.5 Visual Quality</b>				
M7.5-1	<b>External Surface Finishing</b>	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
M7.5-2	<b>Screening of land-based infrastructure</b>	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
M7.5-3	<b>Initiation of planting programs</b>	Woodfibre LNG Limited will initiate decommissioning and maintenance planting programs during the construction phase, recognizing that results will not be realised until the operation or decommissioning phases of the Project.	Construction Decommissioning	Construction
M7.5-4	<b>Monitor and maintain natural screening</b>	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

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>M7.5-5</b>	<b>Re-finish and maintain external surfaces</b>	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
<b>M7.5-6</b>	<b>Re-vegetate and treat disturbed areas</b>	Woodfibre LNG Limited will re-vegetate or treat exposed slopes throughout the operation phase (where possible) to reduce contrast and ensure blending with the existing landform. This mitigation can include planting ground covers and colour treatment. WLNG will promote successful establishment of vegetation screening and minimize visibility of infrastructure and activity in operational areas.	Operation Decommissioning	Operation
<b>M7.5-7</b>	<b>Re-contour disturbed areas</b>	Woodfibre LNG Limited will re-contour disturbed areas not required for the future operation or maintenance of the Project area to approximate natural slopes and reduce form contrast between disturbed and natural environments. As part of the Decommissioning Environmental Management Plan, WLNG will prepare and implement an Earth Works and Grading Plan, with drainage and planting plans, to guide re-shaping and re-vegetation of disturbed slopes.	Decommissioning	Pre-decommissioning
<b>M7.5-8</b>	<b>Coordination with FortisBC and BC Hydro</b>	Woodfibre LNG Limited will consult with BC Hydro and FortisBC to determine construction areas and operation design options so that additional mitigation measures can be identified to avoid and minimize potential cumulative effects on visual quality from both development projects.	Construction Operation	Final Design

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>7.6 Current Use of Lands and Resources for Traditional Purposes</b>				
Mitigation measures in Section 7.6 are the same measures identified for the VCs linked to this VC.				
M7.6-1	<b>Consult with the Tsleil-Waututh Nation on additional mitigation for Aboriginal Interests</b>	<p>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:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Woodfibre LNG Limited will work with the Tsleil-Waututh Nation to address issues that they may raise with respect to heritage resources.</li> </ul> <p>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.</p>	Construction Operation Decommissioning	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>8.2 Heritage Resources</b>				
M8.2-1	<b>Avoid disturbance of heritage sites</b>	Woodfibre LNG Limited will avoid effects to heritage resources, if present, through partial Project redesign or relocation. This will result in minimal effect to the heritage site and is the preferred option from a cultural resource management perspective. It can also be the least expensive option from a construction or operation perspective. A site investigation may be required to define the heritage site limits.	Construction Decommissioning	Final Design
M8.2-2	<b>Employ non-intrusive systematic data techniques</b>	Woodfibre LNG Limited will employ non-intrusive systematic data recovery techniques. This may include the documentation of heritage resources, if present, such as a canoe run or fish trap, historic structure or a heritage wreck; detailed recording of culturally modified trees, or surface collection of palaeontological material; activities which may or may not require a Section 14 HCA permit, in addition to a Section 12 HCA permit prior to site alteration.	Construction Operation Decommissioning	Construction
M8.2-3	<b>Employ systematic data recovery (archaeological salvage or emergency excavation)</b>	Woodfibre LNG Limited will employ systematic data recovery (archaeological salvage or emergency excavation), if necessary. In addition to a Section 12 HCA permit prior to site alteration, this option will likely require a Section 14 HCA permit, and can delay construction or operation by up to several weeks and additionally involve extensive artifact analysis. Consequently, salvage or emergency excavation is not a preferred option.	Construction Operation Decommissioning	Construction
M8.2-4	<b>Monitor for undetected heritage resources</b>	In the event that no newly identified heritage resources are identified within the LAA, it remains possible that yet undetected heritage resources could still be encountered once ground-disturbing activities begin. This mitigation option may require an HCA Site Alteration permit from the Archaeology Branch if a registerable or new archaeological site that has not been previously identified is discovered. Woodfibre LNG Limited will continue monitoring where site-specific Project effects cannot be predicted or evaluated before construction or operation, especially near the margins of a heritage site, or in cases where deeply buried deposits are expected that cannot be accessed without the assistance of heavy machinery. Monitoring may also be appropriate where systematic data recovery has been undertaken, but where significant heritage deposits (potentially archaeological or palaeontological) remain.	Construction Decommissioning	Construction
M8.2-5	<b>Develop Heritage Resource Chance Find Management Procedures</b>	To provide a cost-effective method of managing heritage resources throughout the life of the Project, WLNG will develop Heritage Resource Chance Find Management Procedures that would provide direction to the Proponent and its contractors if unforeseen heritage resources are encountered.	Construction Operation Decommissioning	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>9.2.1 Public Health - Community Health and Well-being</b>				
M9.2-1	<b>Healthy Living Strategy</b>	Woodfibre LNG Limited will implement a healthy living strategy to guide policies, programs, and services that support the workforce. The strategy will include mechanisms to support work-life balance, local procurement, community health and safety, and support employee physical and mental health.	Construction Operation	Pre-construction
M9.2-2	<b>Substance Abuse Policy</b>	Woodfibre LNG Limited will establish and enforce a substance abuse policy applicable to all personnel working at the Project site.	Construction Operation	Pre-construction
M9.2-3	<b>Addictions Training</b>	Woodfibre LNG Limited will provide supervisors and managers with training to identify and offer support to workers who may be struggling with addiction. Managers will also be provided with the appropriate contacts within the broader community who can offer professional support where needed.	Construction Operation	Construction
M9.2-4	<b>Life Skills Workshops</b>	Woodfibre LNG Limited will host life skills and health workshops on themes such as workplace health, drugs and alcohol abuse, and money management. Programs would be optional to employees.	Construction Operation	Construction
M9.2-5	<b>Provide Counselling</b>	Where required, WLNG will provide access to worker or family counselling (e.g., addiction counselling).	Construction Operation	Construction
M9.2-6	<b>Prepare for Decommissioning</b>	Woodfibre LNG Limited will prepare workers to transition to new employment opportunities at decommissioning, provide programs to assist in résumé and cover letter writing and other skills as workers pursue alternate employment.	Decommissioning	Pre-decommissioning
M9.2-7	<b>Shift Schedule</b>	Woodfibre LNG Limited will consult with representatives of labour and Squamish and Whistler area community organizations about shift schedules to gather information about preferred shift scheduling options for workers in the construction and operation phases in order to manage potential effects on worker and family well-being.	Construction Operation	Construction
M9.2-8	<b>Employee Buses</b>	During Project construction and operation, WLNG will consider use of employee buses and vans from designated locations in Metro Vancouver and Squamish to decrease the number of cars on the road at shift change, and to limit the number of tired drivers on the road following a 10 or 12-hour shift	Construction Operation	Construction
M9.2-9	<b>Contractor Requirements</b>	Woodfibre LNG Limited will require transportation contractors to have proven safety records and experience and to comply with applicable regulatory requirements relating to shifts and driving hours.	Construction Operation	Construction
<b>9.2.2 Human Health Risk Assessment</b>				
No mitigation measures are proposed for the Human Health Risk Assessment section as potential interactions between Project-related activities and human health are not specifically identified.				

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>11.0 Accidents and Malfunctions</b>				
M5.2-1	<b>Dust Management Plan</b>	See description of M5.2-1 above.	Construction Decommissioning	Pre-construction
M5.8-1	<b>Erosion Prevention and Sediment Control Plan</b>	See description of M5.8-1 above.	Construction Decommissioning	Pre-construction
M5.8-2	<b>Design for Stormwater Management</b>	See description of M5.8-2 above.	Operation	Final Design
M5.8-3	<b>Follow Instream Works Best Management Practices</b>	See description of M5.8-3 above.	Construction	Construction
M5.10-2	<b>Concrete Works Management Plan</b>	See description for M5.10-2 above.	Construction	Pre-construction
M5.12-6	<b>Blasting Management Plan</b>	See description of M5.12-6 above.	Construction	Pre-construction
M5.15-1	<b>Follow Instream Works Best Management Practices for Fish</b>	See description of M5.15-1 above.	Construction	Pre-construction
M11-1	<b>Re-vegetate disturbed areas</b>	In the event of a spill, vegetation and soil may be removed to facilitate cleanup. Any removed vegetation will be replaced after cleanup to encourage re-establishment of natural vegetation communities.	Construction Operation Decommissioning	Construction
M11-2	<b>Development of Spill Contingency and Cleanup Measures Plan for Marine Birds</b>	This plan will be developed in keeping with the province of BC's <i>Marine Oil Spill Prevention and Preparedness Strategy</i> (MOE, 1991) and will include the EPA suggestions (US EPA 2014).	Construction Operation Decommissioning	Pre-construction
M11-3	<b>Develop Heritage Site-specific Clean-up Plan</b>	If the spill occurs over or into ground where a palaeontological, archeological, or historical site exists or where potential for a paleontological site has been identified but not assessed, a professional palaeontologist, archaeologist, historic archaeologist or built-heritage specialist respectively will be engaged to participate in the non-emergency development of the EMP specific to the spill event.	Construction Operation Decommissioning	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>12.0 Effects of the Environment on the Project</b>				
M5.6-2	Ongoing Communication Regarding Henriette Lake Dam	See description of M5.6-2 above.	Construction Operation Decommissioning	Final Design
M5.6-3	Debris Flow and Debris Flood Mitigation Measures	See description of M5.6-3 above.	Operation	Final Design
M5.6-4	Earthquake-related Mitigation Measures	See description of M5.6-4 above.	Construction Decommissioning	Final Design
M5.6-5	Field review of desktop terrain mapping and terrain stability assessment	See description of M5.6-5 above.	Construction Decommissioning	Final Design
M5.15-2	Water Management Plan	See description of M5.15-2 above.	Construction Operation Decommissioning	Pre-construction
M5.17-4	Implement Marine Vessel Speed Restrictions	See description of M5.17-4 above.	Construction Operation	Construction
M6.3-1	Squamish Harbour Vessel Traffic Plan	See description of M6.3-1 above.	Construction Operation	Pre-construction
M7.2-5	Emergency Response Plan (Construction)	See description of M7.2-5 above.	Construction	Pre-construction
M12-1	Fuel Hazard Assessment	Woodfibre LNG Limited will conduct a fuel hazard assessment based on the Guide to Fuel Hazard Assessment and Abatement in British Columbia (Wildfire Management Branch 2012) pursuant to the <i>Wildfire Act</i> .	Construction Operation Decommissioning	Pre-construction

Mitigation Number	Mitigation Name	Proposed Mitigation	Project Phase	Timing of Implementation
<b>17.0 Aboriginal Interests</b>				
M7.6-1	<b>Consult with the Tseil-Waututh Nation on additional mitigation for Aboriginal Interests</b>	See description of M7.6-1 above.	Construction Operation Decommissioning	Pre-construction