

## 24 ENVIRONMENTAL MANAGEMENT PLANS

### 24.1 Introduction

The following is a summary of environmental and operational management plans that will be developed for works that will be undertaken by Pacific NorthWest LNG Limited Partnership (PNW LNG) (or its contractors) during the construction and operations phases of the Project. It is expected that the contractors completing work on the Project may be required to develop their own site-specific management or environmental work plans but will refer to the following plans as part of their environmental management plans (EMPs). These EMPs are to be used in combination with site-specific environmental work plans. In the unlikely event that works cannot be undertaken in a manner that provides appropriate environmental management through their application, the EMPs will be updated with the appropriate information.

A separate EMP may be required for the decommissioning phase of the Project.

### 24.2 Scope of Environmental Management Plans

EMPs outline the environmental protection measures to be implemented on the project site to eliminate or reduce environmental effects. These procedures include performance-based environmental requirements in accordance with regulatory approvals, best management practices (BMPs), and engineering specifications.

Each management plan will include the written procedures, specifications, and controls that provide direction towards construction and operations activities, and:

- Comply with all of the project-specific environmental obligations and assurances, including, without limitation, those set forth in the EIS/Application
- Identify roles and responsibilities of the environmental management team
- Identify monitoring and reporting requirements
- Comply with the EMP framework, including detailed construction and operations EMPs
- Are expanded and updated throughout the term of the contract to reflect changes in scheduling, site conditions, and weather-dependant contingency measures.

The management plans will guide the development of environmental work plans for construction activities and any required site-specific management plans, and will provide effective environmental protection during the construction and operations phases of the Project.

#### 24.2.1 Plan Applicability

The EMPs apply to any person, subcontractor, or organization involved with the Project. The project team consists of all parties engaged by PWN LNG to execute the project work for the design, construction, operation, and maintenance of the Project as defined in a contractor agreement.

## **24.2.2 Regulatory Context**

Development of the EMP is based on information presented throughout this EIS/Application, applicable legislation or regulations, and any relevant standards or guidelines.

The legislative and BMP documents listed below will guide the development and implementation of relevant EMP component plans:

- *Canadian Environmental Protection Act* (Environment Canada)
- *Transportation of Dangerous Goods Act* (Transport Canada)
- *Fisheries Act* (Fisheries and Oceans Canada; DFO)
- Land Development Guidelines for the Protection of Aquatic Habitat (DFO)
- Canadian Standards Association (CSA) Z731-03, Emergency Preparedness and Response
- *Environmental Management Act*, Hazardous Waste Regulation: provides requirements for authorized containment, storage/handling, disposal and transportation of substances identified as hazardous waste
- *Environmental Management Act*, Spill Reporting Regulation: identifies and outlines the reporting requirements when a spill occurs
- Wildlife Act
- Species at Risk Act
- *Migratory Birds Convention Act*
- Migratory Birds Regulations
- *BC Oil and Gas Activities Act*
- *Canada Marine Act*
- *Hazardous Products Act*
- *Weed Control Act*
- *Clean Energy Act*
- Disposal at Sea Regulations
- Port Authorities Operations Regulations
- Canadian Aviation Regulations
- Vessel Pollution and Dangerous Chemicals Regulations
- Habitat Conservation and Protection Guidelines
- Canadian Council of Ministers of the Environment Guidelines
- International Convention for the Prevention of Pollution from Ships (MARPOL)
- Policy for the Management of Fish Habitat
- Federal Policy on Wetland Conservation
- Fisheries Protection Policy Statement, 2013
- Archaeological Heritage Policy Framework

- Canadian Ambient Air Quality Standards (effective 2015)
- PETRONAS Technical Standards
- Operational Statement for Mitigation of Seismic Sound in the Marine Environment.

### **24.3 List of Environmental Management Plans**

The Project involves several environmentally sensitive activities that require unique considerations and may require site-specific or discipline-specific EMPs. These EMPs detail the relevant BMPs, mitigation measures, monitoring requirements, and reporting. These stand-alone plans will be developed prior to the start of construction works and during the course of the Project when construction works requiring more detailed environmental planning are identified and will be subject to the review procedure. The following EMPs will be developed for the Project:

- Air Quality and Greenhouse Gas Management Plan
- Noise, Vibration, and Ambient Light Management Plan
- Emergency Response Plan
- Transportation Management Plan
- Marine and Freshwater Resources Management Plan
- Vegetation Management Plan
- Waste Management Plan
- Blasting Management Plan
- Pile Driving Management Plan
- Dredging Management Plan
- Archaeological and Heritage Resources Management Plan
- Environmental Monitoring Management Plan
- Accommodation Plan.

### **24.4 Objectives of Environmental Management Plans**

EMPs will be implemented to make sure that project development is undertaken in an environmentally responsible manner. The objectives of the EMPs include:

- Protect valued components and socio-economic features in the project development area (PDA) during construction
- Provide strategies to show compliance with the conditions of environmental permits and approvals from regulatory agencies designed to protect valued components
- Reduce or remove any environmental liabilities of the Project.

Included in the EMPs are practical and technically feasible BMPs that will be implemented to facilitate compliance with federal and provincial legislation and regulations.

### **24.4.1 Air Quality and Greenhouse Gas Management Plan**

The Air Quality and Greenhouse Gas Management Plan will describe BMPs and mitigation measures to mitigate potential effects on air quality and greenhouse gas emissions from project activities. The plan will outline requirements for reporting and monitoring, and the personnel needed to implement these actions. Additional mitigation measures will be put in place in the designated project area so that air quality meets regulatory requirements (see Section 6). Mitigation measures are primarily focused on:

- Incorporating the best achievable technology into project design to reduce air emissions
- Requiring thermal oxidizers
- Monitoring air quality during construction and operations
- Developing a gas leak detection program.

Any monitoring requirements defined by the British Columbia Ministry of the Environment and British Columbia Oil and Gas Commission as a permit condition will be included in the Air Quality and Greenhouse Gas Management Plan.

### **24.4.2 Noise, Vibration, and Ambient Light Management Plan**

The Noise, Vibration, and Ambient Light Management Plan will be developed to reduce noise and light effects on the surrounding environment. Noise, vibration, and light will result from blasting, pile driving, and general facility operations. Mitigation measures will be implemented to reduce effects on local communities and wildlife.

Noise and vibration will be reduced by implementing best practice strategies from regulatory directives and international guidelines. These mitigation measures will require short- and long-term monitoring, with regular reporting to address noise complaints or compliance issues. Mitigation strategies will include specific instructions to reduce and muffle noise caused by machinery during construction and operations. Equipment that emits noise and vibrations will be calibrated to perform using manufacturer specifications, and construction will occur during predetermined daytime hours. Nighttime activities will be limited to lower noise activities.

Lighting may be required throughout the day, depending on daytime ambient light levels, and at night during construction and operations of the Project and this may affect wildlife habitat, behaviour, and movement. Directional lighting and motion-activated security lighting will be implemented to reduce light pollution and effects on local residents during construction. During operations, facility luminaries will be selected to reduce wasted light, allow for light level control, and actively turn off lights when not required. These guidelines will be designed following the goals provided in the Canada Green Building Council Leadership in Energy and Environmental Design (LEED) guidelines.

### **24.4.3 Emergency Response Plan**

The Emergency Response Plan (ERP) will detail BMPs and measures for preparing and dealing with project-related spills and emergencies, including accidents or malfunctions (see Section 22), to reduce risks to and effects on the environment, the community, and workers and people onsite. Emergency contacts, emergency procedures, and a comprehensive reporting program will be detailed in this plan. Clear identification of the procedures and materials used for containment, clean-

up, disposal, and communications will also be included. Material Safety Data Sheets (MSDS) for all materials kept onsite will describe toxic exposure effects and proper medical treatment procedures. The site supervisor will be responsible for making this accessible to all individuals onsite.

The ERP will specifically address several types of incidents that could occur during construction and operations, including:

- Security related incidents
- Accidents or malfunctions (see Section 22), including:
  - Emergency flaring and emergency liquefied natural gas (LNG) facility shutdown
  - Explosion or fire
  - Fuel or hazardous material spill at the storage or loading facilities (from mobile equipment and storage vessels)
  - LNG release at the storage or loading facilities
  - Marine vessel collision (vessel striking another fixed vessel or object), grounding, or collision (two moving vessels).
- Extreme weather events (see Section 23.1).

The ERP will contain succinct information on response strategies, associated resources, and potential escalation hazards for project-specific incident scenarios and will be used by emergency responders to rapidly establish control and successfully deal with an incident.

The ERP will include information on correctly identifying an environmental emergency that could occur as a result of project activities causing harm to the environment or danger to human life or health. The following information will be provided:

- A description of the measures used to prevent, prepare for, respond to, and recover from an environmental emergency
- An emergency response organization structure and a description of the roles and responsibilities of individuals responsible for implementing the ERP
- A description of training requirements
- An inventory of the emergency response equipment included in the ERP and the corresponding storage locations
- Internal and external notification, communication, and activation procedures to notify members of the public who could be adversely affected.

#### **24.4.4 Transportation Management Plan**

The Transportation Management Plan will detail mitigation measures required to reduce effects of traffic and pressure on transportation infrastructure, which include the following:

- Outline preferred ground transportation corridors
- Provide policies for the movement of dangerous goods and of heavy, oversized and regular loads; convoys will be prohibited

- Outline policies and procedures for the use of the Prince Rupert Airport and the Northwest Regional Airport Terrace-Kitimat for project-related activities
- Provide policies for the movement of workers to and from construction sites and airports; where possible workers will be transported by bus or crew-cab truck
- Require PNW LNG to engage in frequent communication between BC Ministry of Transportation and Infrastructure, Royal Canadian Mounted Police, Prince Rupert Port Authority, and the council members of Port Edward and Prince Rupert to address potential concerns and changes in demand of infrastructure and services.

#### **24.4.5 Marine and Freshwater Resource Management Plan**

The Marine and Freshwater Resource Management Plan will detail regulations, permits, BMPs, and mitigation measures required to reduce effects on marine and freshwater environments. The plan will describe water quality standards to be adhered to and provide site-specific mitigation measures to prevent erosion or the mobilization of soils and sediment. A 30 m vegetation riparian buffer will be retained around the perimeter of Lelu Island to reduce the risks of erosion and sedimentation to the marine environment.

Marine environmental monitoring will focus on total suspended solids (TSS)/turbidity, and water quality monitoring will be conducted during dredging and at other selected construction sites. Specific areas to be managed and monitored will be identified in the Marine and Freshwater Resource Management Plan. Contractors will be provided with regulations and guidance on allowable limits for turbidity and other substances, and compliance will be required during all phases of the Project.

The Marine and Freshwater Resource Management Plan will also outline information on freshwater quality standards to be adhered to, monitoring requirements, and site-specific responsibilities. Mitigation measures that will be outlined in the Marine and Freshwater Resource Management Plan include:

- Requirements for topsoil stripping and storage
- Erosion and sediment control methods and their implementation
- Guidelines to control concrete wash water and leachate, as well as their storage and disposal methods
- Fish salvage from watercourses determined to have fish present and habitat compensation for freshwater fish habitat loss.

#### **24.4.6 Vegetation Management Plan**

The Vegetation Management Plan (VMP) identifies management practices to make sure the prevention, detection, monitoring, and control of invasive species is conducted within the project area. The VMP describes requirements for reporting during advanced site preparation activities and applicable / relevant standards used to determine the effectiveness of the BMPs. BMPs aim to reduce disturbance, protect existing native plants, reduce invasive seed transfer, and control invasive plants.

Ecological communities of management concern located adjacent to construction limits and wetlands outside the PDA will be clearly marked to alert workers and restrict access to these features for protection. The use of herbicides will be restricted near such communities. Mitigation measures to protect, or reduce disturbance to the sensitive areas will be implemented during construction and operations phases of the Project. These measures may include, but are not be limited to, exclusion fencing, seed and plant salvage, and/or replanting. Training and education about sensitive areas and locations will be provided to all parties working on site.

Environmental management BMPs for soil management will be included in the vegetation management plan and implemented during construction of the Project, including mitigation of the impacts of sedimentation, erosion, and drainage to vegetation within construction areas. Information on correctly delineating work boundaries, salvaging soil, handling wet soils, handling previously disturbed soils and general site clean-up practices will be provided. The Project intends to maintain and restore baseline hydrological regimes, which will serve to reduce potential indirect impacts to ecological communities around the perimeter of the PDA during and post construction.

#### **24.4.7 Waste Management Plan**

The Waste Management Plan will detail the responsibilities of PNW LNG and its contractors when dealing with both hazardous and non-hazardous waste.

##### **24.4.7.1 Hazardous Waste**

Hazardous waste management procedures will be detailed in the Waste Management Plan for dealing with the potential discovery of hazardous materials and the transport of hazardous materials to and from the project site. Hazardous materials in BC are regulated under the *Environmental Management Act* and include hazardous waste as defined by the Hazardous Waste Regulation. A variety of potentially hazardous materials will be used and stored onsite during the Project, including propane, acetylene, form oil, paints, epoxies, antifreeze, batteries, hydraulic fluid, cleaners and solvents, and concrete additives and agents.

Provisions of site-specific hazardous materials management procedures will include, but are not limited to:

- An inventory of hazardous materials that will be used onsite
- MSDS for all hazardous materials in use or stored onsite
- Location of hazardous materials storage areas
- Spill prevention and response plans
- An inventory and location of spill equipment stored onsite
- A list of personnel trained to handle hazardous materials.

Hazardous wastes produced during construction and operations may include:

- Solvents or hydrocarbons from contaminated wastewater and surface runoff
- Trace mercury removed during the natural gas treatment process
- Waste catalyst and adsorbents

- Waste lubricating oils
- Spent solvents
- Medical wastes
- Biological sludge
- Minor miscellaneous wastes, such as used cartridge filters, batteries, and scrap metal.

Any hazardous wastes recovered from a spill, either on land or in the marine environment, will be disposed offsite at an approved disposal facility.

#### **24.4.7.2 Non-hazardous Waste**

Non-hazardous waste management procedures will be developed for disposing of non-hazardous waste generated during construction, operations, and decommissioning. The Waste Management Plan will outline procedures for non-hazardous waste minimization, recycling, and disposal. Waste recycling and disposal will be conducted in accordance with regulatory requirements.

Materials disposal associated with construction activities on Lelu Island will include vegetation and peat clearing, as well as overburden material. In general, trees on Lelu Island will be felled and taken by local enterprises and removed from site to the extent practical, with remaining wood material chipped onsite. Culturally modified trees (CMTs) that require removal will be offered to local First Nations for traditional use. Other organic matter, including peat, will be managed on Lelu Island, where it will be stockpiled onsite to allow for beneficial use once it is drained. To reduce waste, sand and gravels onsite will be salvaged and used as fill where possible, and any remaining overburden will also be disposed of offsite in accordance with regulatory requirements.

Stormwater management will be designed to effectively manage runoff and grey water. Sewage effluent and other oily effluent (contaminated stormwater) will be transported to the District of Port Edward wastewater treatment facility. Solid wastes from construction and operational activities on Lelu Island will be removed and recycled, or disposed of at approved disposal sites in compliance with any regulatory requirements.

Dredged marine sediment will be used as fill on Lelu Island, where practical. Remaining material will be disposed of at an ocean disposal site approved by Environment Canada. Beneficial reuse of sediment will also be undertaken where appropriate opportunities are identified.

#### **24.4.8 Blasting Management Plan**

The Blasting Management Plan will outline management measures for both terrestrial and underwater blasting. This will include methods to reduce the risk of mortality and injury to fish and other marine life. The plan will be based on DFO's blasting guidelines and will include a 500 m safety radius and adherence to least-risk timing windows (November 30 to February 15) prior to any blasting activities. Dungeness crabs will be relocated prior to blasting activities, and marine mammal observers will monitor predetermined safety zones (approximately 800 m) for marine mammal presence. Observers will be given authority to shut down operations that pose a hazard or danger to marine mammals to adhere to DFO's Blasting Guidelines (Wright and Hopky 1998). Additional regulatory permit information, safety and exclusions zones, and contacts for blasting will be detailed in the plan.

#### **24.4.9 Pile Driving Management Plan**

The Pile Driving Management Plan will outline methods to reduce effects on marine life during pile driving activities. The plan will adhere to BMPs developed by the BC Marine and Pile Driving Contractors Association and DFO, where possible. The use of bubble curtains will be implemented; this is a well-known sound-attenuation strategy.

#### **24.4.10 Dredging Management Plan**

The Dredging Management Plan will detail guidelines for dredging during project construction. Information on correctly removing contaminated marine soils for land disposal will be provided, and if required, alternative assessment methods for determining appropriate disposal methods for contaminated materials will also be detailed.

#### **24.4.11 Archaeological and Heritage Resources Management Plan**

The Archaeological and Heritage Resources Management Plan will describe BMPs and mitigation measures to manage archaeological resources during project construction and operations. An archaeological monitor will be present during the removal of archaeologically significant CMTs and will collect stem round samples for dating to determine the antiquity of modification and inform records of cultural activity. The archaeological monitor will also determine directives on the transport and curation of removed CMTs and samples. A Chance Find Protocol will be developed to provide guidance to the archeological monitor and workers involved in the clearing and removal of vegetation during construction.

Information on how to recognize new sites or human remains will also be included in the Archaeological and Heritage Resources Management Plan, as well as the procedure for this situation and who should be consulted when new discoveries are made. In general, construction work in the vicinity of a new archaeological find will cease until an archaeological monitor has assessed and undertaken the appropriate course of action to protect or mitigate project effects on the archaeological find.

#### **24.4.12 Environmental Monitoring Management Plan**

During project construction, the Environmental Monitoring Management Plan will detail the procedures and practices to comply with all regulatory requirements and guide the implementation of self-imposed environmental commitments to protect the environment. The Environmental Monitoring Management Plan will outline the approach for monitoring surface water quality, marine water quality, effluent emissions, and incidental wildlife observations.

Marine water quality monitoring will focus on TSS/turbidity and will be conducted during dredging and at other selected construction sites. Specific areas to be managed and monitored will be identified in the Marine and Freshwater Resource Management Plan and will also outline freshwater quality monitoring to be undertaken on Lelu Island.

Effects on vegetation will be monitored throughout project construction. Monitoring will focus on ecologically sensitive areas.

Marine mammal observers will monitor marine mammal presence in a 1.0 km zone around impact pile-driving. Observers will be given authority to shut down operations that pose a hazard or danger

to marine mammals to adhere to DFO's Blasting Guidelines. Monitoring will also be conducted for marine bird mortality and fish habitat, and for wetland habitat compensation projects to assess the success of compensation activities.

Air quality monitoring will be conducted as required by regulatory agencies to monitor any increases in air contaminant concentrations.

#### **24.4.13 Accommodation Plan**

An accommodation plan will be implemented to require PNW LNG to engage in frequent communication with city and district planners in Port Edward and Prince Rupert as a means of responding to potential community grievances and changes in demand for housing infrastructure.

The plan will:

- Provide housing policies for non-local temporary workers of whom are not housed in the construction camp on Lelu Island; policies will outline preferred accommodations and require workers be housed in both Port Edward and Prince Rupert when not in housed in the construction camp to lower the demand in a single community.
- Outline camp management policies and practices.

### **24.5 References**

Wright, D.L. and G.E. Hopky. 1998. *Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters*. Canadian Technical Report of Fisheries and Aquatic Sciences,. (No. 2107). Minister of Public Works and Government Services Canada. Winnipeg, MB. 39 pp.