

**FINAL TERMS OF REFERENCE FOR THE PREPARATION OF AN  
ENVIRONMENTAL ASSESSMENT REPORT**

**FOR:**

The Goldboro LNG Project  
Pieridae Energy (Canada) Limited

**PURSUANT TO:**

The Nova Scotia *Environment Act*



**May 7, 2013**

## Table of Contents

1.0 BACKGROUND .....	4
1.1 Purpose of the Terms of Reference .....	4
1.2 Proposed Project.....	4
1.3 Environmental Assessment Requirements.....	4
1.4 Information for the Environmental Assessment Process.....	5
2.0 PREPARATION AND PRESENTATION OF THE EA REPORT .....	5
3.0 PROJECT DESCRIPTION.....	6
3.1 The Proponent.....	7
3.2 Project Location.....	7
3.3 Project Design .....	8
3.4 Construction .....	8
3.5 Project Operation .....	9
3.6 Decommissioning and Reclamation .....	9
4.0 REGULATORY ENVIRONMENT .....	9
5.0 NEED FOR AND PURPOSE OF THE PROJECT .....	9
6.0 A DESCRIPTION OF ALTERNATIVES TO THE PROJECT .....	10
7.0 OTHER METHODS FOR CARRYING OUT THE PROJECT .....	10
8.0 ASSESSMENT METHODOLOGY .....	10
9.0 EXISTING ENVIRONMENT.....	11
9.1 Geophysical Environment .....	11
9.1.1 Topography, Geomorphology and Geology.....	11
9.1.2 Geology .....	11
9.1.3 Soils.....	12
9.2 Water Resources.....	12
9.2.1 Groundwater.....	12
9.2.2 Surface Water.....	12
9.2.3 Wetlands.....	12
9.3 Atmospheric Resources .....	13
9.3.1 Climate.....	13
9.3.2 Air Quality .....	13
9.3.3 Ambient Noise and Light Levels .....	13

9.4 Flora and Fauna .....	13
9.4.1 Terrestrial Environment .....	14
9.4.2 Freshwater Aquatic and Marine Environment.....	14
9.5 Agriculture, Aquaculture and Forestry Resources.....	15
9.5.1 Agriculture.....	15
9.5.2 Fishery, Aquaculture and Marine Harvesting.....	15
9.5.3 Forestry Resources .....	15
9.6 Socio-Economic Conditions .....	15
9.7 Existing and Planned Land Uses .....	15
9.8 Archaeological Resources.....	16
10.0 ADVERSE EFFECTS AND ENVIRONMENTAL EFFECTS ASSESSMENT .....	16
10.1 Geophysical Environment .....	16
10.2 Water Resources.....	17
10.3 Atmospheric Resources .....	17
10.4 Flora and Fauna .....	18
10.4.1 Terrestrial Environment .....	18
10.4.2 Freshwater Aquatic and Marine Environment.....	18
10.5 Agriculture, Aquaculture and Forestry Resources.....	18
10.5.1 Agriculture.....	18
10.5.2 Fisheries, Aquaculture and Marine Harvesting.....	18
10.5.3 Forestry.....	19
10.6 Socio-Economic .....	19
10.7 Existing and Planned Land Uses .....	19
10.8 Archaeological Resources.....	20
11.0 PROPOSED MITIGATION.....	20
11.1 Geophysical Environment .....	20
11.2 Water Resources.....	21
11.2.1 Surface Water Quality and Quantity .....	21
11.2.2 Groundwater Quality and Quantity .....	21
11.2.3 Wetland Resources .....	21
11.3 Atmospheric Resources .....	21
11.4 Flora and Fauna .....	22
11.4.1 Terrestrial Environment .....	22
11.4.2 Freshwater Aquatic and Marine Environment.....	22

11.5 Agriculture, Aquaculture and Forestry Resources.....	22
11.6 Socio-Economic .....	22
11.7 Existing and Planned Land Uses .....	23
11.8 Archaeological Resources.....	23
12.0 RESIDUAL ADVERSE EFFECTS AND ENVIRONMENTAL EFFECTS.....	23
13.0 EVALUATION OF THE ADVANTAGES AND DISADVANTAGES TO THE ENVIRONMENT.....	23
14.0 PROPOSED COMPLIANCE AND EFFECTS MONITORING PROGRAMS.....	23
14.1 Geophysical Environment .....	24
14.2 Water Resources.....	24
14.3 Atmospheric Resources .....	24
14.4 Other Monitoring Plans.....	24
15.0 CONSULTATION PROGRAM .....	25
15.1 Public Consultation.....	25
16.0 ASSESSMENT SUMMARY AND CONCLUSION.....	26

## **1.0 BACKGROUND**

### **1.1 Purpose of the Terms of Reference**

The purpose of this document is to identify for Pieridae Energy (Canada) Limited (the Proponent) the information requirements for the preparation of an Environmental Assessment (EA) Report. The EA Report will be used to meet the requirements of a provincial Class II Undertaking.

Pieridae Energy (Canada) Limited must include all the information requested within the Terms of Reference as a minimum, in accordance with the Environmental Assessment Regulations pursuant to Part IV of the *Environment Act*. The Terms of Reference include Valued Ecosystem Components (VECs) which must be adequately addressed in the EA Report. While the Terms of Reference provide a framework for preparing a complete EA Report, it is the responsibility of the Proponent to provide sufficient data and analysis on any potential environmental effects to permit a proper evaluation by governments, the public and Mi'kmaq of Nova Scotia.

### **1.2 Proposed Project**

Pieridae Energy (Canada) Limited proposes to construct a liquefied natural gas (LNG) liquefaction plant and marine terminal in Goldboro, Guysborough County, Nova Scotia. The Goldboro LNG Project (the Project), as proposed by the Proponent, comprises of an onshore natural gas liquefaction plant, a marine terminal for loading carriers with LNG product, and a wharf for mooring associated support vessels and unloading materials during construction. The marine terminal will be designed to accommodate LNG carriers ranging in size from 145,000 m<sup>3</sup> to 263,000 m<sup>3</sup>. It is envisaged that there will be between 7 and 13 carriers per month docking at the facility for loading purposes. On-site storage will entail three LNG tanks. The plant will also include a waste water treatment facility and a 180 MW power plant to support the LNG facility and support services.

### **1.3 Environmental Assessment Requirements**

#### Nova Scotia EA Requirements

The Project is a Class II Undertaking pursuant to Schedule A of the Environmental Assessment Regulations made under Section 49 of the *Environment Act* given that it includes an on-site power generation that has a daily fuel input rating of more than 31,000 GJ derived from natural gas. Since the Project will be assessed as a Class II Undertaking, the Proponent is required to prepare an EA Report. The Environmental Assessment Regulations require that the proposed Terms of Reference for the EA Report be prepared by the Environmental Assessment Administrator (Administrator) and made available for public review. Public comments on the Draft Terms of Reference were accepted from February 27 - March 29, 2013.

## Government of Canada's EA Requirements

Given the similarities between the Keltic Project and the Goldboro LNG Project, the approval history, and the Goldboro LNG assessment process under provincial legislation, the federal Canadian Environmental Assessment Agency has determined that no federal environmental assessment is required under the new (2012) *Canadian Environmental Assessment Act*.

### **1.4 Information for the Environmental Assessment Process**

Copies of the EA Registration Document and the Final Terms of Reference for the EA Report may be examined at the following locations:

- Municipality of the District of Guysborough, 33 Pleasant Street, Guysborough, NS;
- Sherbrooke Library, 11 Main Street, Sherbrooke, NS;
- James and Mary Rhynold, 15048 Hwy 316, Stormont, NS;
- Ecology Action Centre, 2705 Fern Lane, Halifax, NS;
- Nova Scotia Environment, 155 Main Street, Suite 205, Antigonish, NS; and
- Nova Scotia Environment Library, 5th Floor, 5151 Terminal Road, Halifax, NS.

All information pertaining to this environmental assessment review will be posted to the EA website as it becomes available:

<http://www.gov.ns.ca/nse/ea>

## **2.0 PREPARATION AND PRESENTATION OF THE EA REPORT**

This section shall introduce the reader to the EA Report and include the purpose for the document within the context of Part IV of the Nova Scotia *Environment Act* and Environmental Assessment Regulations.

Pursuant to the Nova Scotia Environmental Assessment Regulations, the EA Report must include, but not be limited to, the following information:

- a description of the proposed undertaking;
- the reason for the undertaking;
- other methods of carrying out the undertaking;
- a description of alternatives to the undertaking;
- a description of the environment that might reasonably be affected by the undertaking; the environmental effects of the undertaking;
- the environmental effects of the undertaking, including identifying any effects on species at risk, species of conservation concern and their habitats;
- an evaluation of advantages and disadvantages to the environment of the undertaking; measures that may be taken to prevent, mitigate or remedy negative environmental effects and maximize the positive environmental effects on the environment;
- a discussion of adverse effects or significant environmental effects which cannot or will not be avoided or mitigated through the application of environmental control technology;
- a program to monitor environmental effects produced by the undertaking during its

- construction, operation and abandonment phases; and
- a program of public information to explain the undertaking.

The order in which information is presented is at the discretion of the Proponent; however, a concordance table will be required to indicate where the information can be found. The Proponent may provide additional information to assist the Environmental Assessment Panel (EA Panel) in making their recommendation to the Minister and assist the Minister in making the decision for the Project.

Since the EA Report is intended for public review, the information should be presented in non-technical language wherever possible and appropriate, including a non-technical executive summary. The Proponent will be required to submit an electronic copy of the EA Report in accordance with the EA Branch Bulletin on Requirements for Submitting Electronic Copies of Environmental Assessment (EA) Documents for publication on the Department's website.

### **3.0 PROJECT DESCRIPTION**

This section of the EA Report shall describe each component of the Project as it is planned through its full life cycle, including site preparation, construction, commissioning, operation, maintenance, and decommissioning of:

- LNG loading terminal – including the jetty trestle and buildings, piping, cabling and access road, jetty heads, LNG loading berths, marginal wharf and causeway, tug berths, and refuelling of tug boats;
- Natural Gas Liquefaction Plant, including inlet facilities and feed gas compression, gas treatment facilities, natural gas liquefaction train, near Atmospheric LNG storage and boil off gas compression, refrigerant storage, flare stacks, raw water extraction and storage, plant utilities, waste water and storm water management, administration and control buildings, and truck loading facility;
- 180 MW Power Plant;
- Pipeline tie-in;
- Wastewater Treatment Facility used to treat and discharge plant water;
- Shipping, including vessel types and sizes, frequency of shipping and planned routes;
- Service water and drinking water systems;
- Administration and service buildings;
- Sanitary wastewater system;
- Red Head access road; and

- Associated infrastructure including PLC based control system, fire and gas system, emergency shutdown system, security systems and CCTV, control building(s), substation(s), field auxiliary rooms, fire station, fire pump building(s), rotating equipment shelters, construction work camp, air and nitrogen generation plant, and additional infrastructure as may be required to support safe construction and operation of the facility.

### **3.1 The Proponent**

This section shall outline the Proponent's corporate commitment to sustainable development and environmental protection goals and principles including pertinent corporate policies, programs, plans, strategies, protocols, guidelines, codes, and environmental management systems (EMS).

Provide summary information on the nature of the management structure and organizational accountability for designing, constructing, operating and modifying the Project; implementing environmental mitigation measures and environmental monitoring; and managing potential adverse environmental effects.

Provide details on relevant corporate experience (the Proponent and related companies) with similar large-scale operations in Canada and in other countries with similar regulatory and social policy regimes. Describe experience in building and operating other LNG facilities, power generation plants, highways and other related infrastructure (including marine terminals). Provide a record of the environmental performance and capability of the Proponent in conducting this type of Project. Indicate the environmental record of key sub-contractors.

### **3.2 Project Location**

The EA Report must provide a concise description of the geographical setting in which the Project is to be constructed/operated. Describe how the Project site was chosen, including a discussion of the specific environmental considerations used in site selection of all Project components, and the advantages of the proposed site. Describe the Project's compatibility with existing local and regional land-use policies and plans, and opportunities to integrate Project planning into regional scale development efforts. Discuss compatibility of the Project location in relation to people and their community and traditional activities and land uses by the Mi'kmaq of Nova Scotia.

Describe the ultimate boundaries of the Project in a regional context including existing and proposed land uses and infrastructure such as road networks, highway realignment, railways, power lines, pipelines, proximity to permanent and seasonal residences, individual and community water supplies, wetlands, water bodies, streams, ecologically sensitive areas, and archaeological sites. Include mapping at an appropriate scale.

Provide details on ownership of property within the Project footprint including lands owned by the Proponent, the Crown, or private lands. Provide details of existing agreements to develop the Project on lands not owned by the Proponent. Provide detailed plans for the required



acquisition or use of private lands and Crown Lands, and discuss any contingencies should these lands not be available for Project development.

Provide a list and map of communities in the region, including Mi'kmaq communities, potentially affected by the Project and indicate the distance between those communities and the specific Project components as appropriate. Identify proposed local shipping routes for importing and exporting products.

### **3.3 Project Design**

This section shall describe the design plans and appropriate design standards for all components of this Project, including the LNG terminal and natural gas liquefaction plant, the 180 MW power plant, the marginal wharf and causeway, and the wastewater treatment facility. All associated infrastructure including pipelines, fuel storage structures, water storage or impoundment structures, water treatment equipment and structures, new or upgrades to water and/or sewage lines, power transmission lines, and any other infrastructure, must be detailed. Also discuss environmental controls planned for the Project and how environmental protection, conservation, best management practices (BMPs), and best available technology have been considered in the design.

This section shall also provide potential design variations and implications (including advantages or disadvantages to the environment) of those variations. Any assumptions which underlie the details of the Project design shall be described. Where specific codes of practice, guidelines and policies apply to items to be addressed, those documents shall be cited.

### **3.4 Construction**

This section shall include a description of the following:

- Identify and describe by location, all physical works and activities carried out during the construction phase, including but not limited to: clearing and grubbing; blasting; site access and roadways; marine construction methods; road construction methods; dangerous goods storage areas; watercourse crossings or diversions; utilities; and description of equipment used for construction activities, both terrestrial and marine.
- Proposed construction schedules, including days of the week, times of the day, seasonal schedules and anticipated commencement and completion dates.
- Describe the criteria for the selection of candidate sites for the disposal of excess/waste excavated rock and overburden, including those for acid producing bedrock.
- Identify, by Project component, all construction methods, standards, codes of practice, policies and guidelines that will be used during construction. Identify environmental BMPs that will be utilized during construction.

### **3.5 Project Operation**

Describe the operation of all Project components, including the LNG terminal and natural gas liquefaction plant, 180 MW power plant, marginal wharf and causeway, wastewater treatment facility, and supporting infrastructure to all components.

The description of the operation shall include:

- Equipment description and specifications, including appropriate diagrams and flow charts for LNG terminal and natural gas liquefaction plant, power plant and infrastructure components. Details (including characteristics and toxicities) and quantities of all products produced, stored, and imported to and exported from the facility (including by-products and chemical intermediaries);
- Routine and maintenance operations for all Project components;
- Water balance and energy balance including specification and volumes of plant fuels and outputs, maintenance operations, and contingency plans; and
- Environmental controls and BMPs, including pollution prevention techniques in addition to traditional treatment and disposal practices.

### **3.6 Decommissioning and Reclamation**

Describe the proposed plans for decommissioning the facility, including all infrastructure and reclamation of any impacted site. The EA Report shall also discuss the post-decommissioning land use options of the property.

## **4.0 REGULATORY ENVIRONMENT**

Describe the existing regulatory environment (Federal, Provincial and Municipal) including all permitting, licensing and regulatory requirements that apply to all phases of the Project and associated infrastructure. Provide a schedule indicating anticipated dates for required regulatory approvals.

Describe applicable guidelines and standards that would apply to the Project. Those applicable standards or guidelines shall also be referenced in the appropriate sections of the EA Report and linked to environmental protection objectives.

## **5.0 NEED FOR AND PURPOSE OF THE PROJECT**

The need for and purpose of should be established from the perspective of the Proponent. The Project is being designed to meet specific objectives and these objectives should be discussed. If the objectives of the Project are related to or contribute to a larger private or public sector policy, program or plan, this information should be included.

## **6.0 A DESCRIPTION OF ALTERNATIVES TO THE PROJECT**

The EA Report must include an analysis of alternative means of carrying out the Project; describing functionally different ways to meet the Project need and achieve the Project purpose.

## **7.0 OTHER METHODS FOR CARRYING OUT THE PROJECT**

The EA Report shall discuss other methods for meeting the need for the Project, including but not limited to, alternatives to LNG as an energy source, and shipment of LNG by rail or road rather than ship. This section shall also discuss alternate locations for the Project.

The rationale for rejecting other described methods of carrying out the Project must be provided, including a discussion of how environmental sustainability and impact avoidance criteria were applied.

## **8.0 ASSESSMENT METHODOLOGY**

This section shall include the study strategy, methodology and boundaries used for preparing the EA Report. The following must be clearly defined:

- The temporal boundaries (i.e., duration of specific Project activities and potential impacts) for construction and operation through to decommissioning and post-decommissioning;
- The study boundaries or Project area and all space that will be potentially impacted, by the Project as proposed, or subject to subsequent modifications, and the methodology used to identify the study boundaries; and
- The Valued Ecosystem Components (VECs) within the study boundaries and the methodology used to identify the VECs. The methodology used for VEC identification shall include input from members of the public, government departments and agencies, other experts, and other interested parties, as well as direct engagement with the Mi'kmaq of Nova Scotia.

Where appropriate, the EA Report shall identify environmental protection objectives (including those contained in applicable legislation or guidelines) associated with each VEC;

- Strategy for investigating the interactions between the Project and each VEC and how that strategy was used to coordinate the individual studies undertaken; and
- Method for predicting and evaluating Project impacts upon the environment; determining necessary avoidance, mitigation, remediation and/or compensation (in this order of consideration); and determining the significance of any residual impacts.

The following sections outline specific concerns and requirements related to the existing environment, adverse effects and environmental effects assessment, proposed mitigation,

residual environmental impacts, proposed compliance and effects monitoring and the public information program that are to be addressed in the EA Report for the proposed Project.

## **9.0 EXISTING ENVIRONMENT**

The EA Report should provide a baseline description of the environment in the vicinity of the Project and all other areas that could be impacted by the Project. This description must include the components of the existing environment and environmental processes, their interrelations and interactions, as well as variability in these components, processes and interactions over time scales appropriate to the effects assessment. The Proponent's description of the existing environment shall be in sufficient detail to permit the identification, assessment and evaluation of the significance of potentially adverse environmental effects that may be caused by the Project.

The EA Report shall clearly indicate baseline data/information which is not available or where existing data cannot accurately represent environmental conditions in the Project area. If the background data have been extrapolated or otherwise manipulated to depict environmental conditions in the Project area, modeling methods and equations shall be described and shall include calculations of margins of error.

VEC Assessment boundary (spatial potential to be affected by the Project and temporal construction/operation and decommissioning)

For the EA Report, the spatial boundaries must include the Project footprint and relevant receiving environments such as airsheds and watersheds. Temporal boundaries must address applicable guidelines, standards and regulatory requirements and include Project construction, operation, decommissioning and post-decommissioning.

The components of the environment to be discussed shall include identified VECs and those indicated within Sections 9.1 – 9.8.

### **9.1 Geophysical Environment**

#### **9.1.1 Topography, Geomorphology and Geology**

Topographical maps should be provided locating the Project in both regional and local contexts. The EA Report shall describe the physical geography of the Project area including post-glaciated landforms, coastal features, and marine features.

#### **9.1.2 Geology**

The EA Report should include a description of bedrock geology and surficial geology. Geological properties of all Project sites which may influence stability, occupational health and safety, rehabilitation programs, or the quality of waste water leaving any area disturbed by the Project should be described. The EA Report must consider the potential for Acid Rock Drainage/Metal Leaching (ARD/ML) where new bedrock may be exposed and/or excavated.

This section should also consider any mineral resources that may be impacted by the Project.

### 9.1.3 Soils

A soil survey of the areas to be disturbed by the Project should be conducted at a suitable scale, with particular reference to the physical and chemical properties of the materials that influence erosion potential, storm water run-off quality, rehabilitation, and agricultural productivity of the land.

The marine component of the Project should also include a discussion pertaining to surficial sediment characteristics and mobility under present and future environmental conditions.

## 9.2 Water Resources

The EA Report must include quality and quantity of groundwater and surface water resources potentially affected by the Project.

### 9.2.1 Groundwater

Provide a description of the regional and local hydrogeology of the study area, including a discussion of both groundwater quantity and quality. The direction of groundwater flow at the site should be discussed and potential receptors of groundwater should be identified. Also discuss groundwater use in the area, including both current and likely potential future uses.

Discuss the approximate location of existing water wells in the vicinity (within a 1 km radius) of all Project components. Show approximate well locations on a map.

### 9.2.2 Surface Water

Provide a general hydrologic, hydraulic and water quality description of all surface water bodies in the vicinity, including upstream and downstream to all Project components. Existing uses, withdrawal capacities, and users of the watercourses shall be identified, including use by the Mi'kmaq of Nova Scotia.

### 9.2.3 Wetlands

The EA Report must identify the location, size and class of any wetland within the predicted zone of influence and conduct a wetland evaluation. The true ecosystem value of each wetland shall be examined through on-site investigations using comprehensive valuation methodology that assesses component, functional and attribute values.

The EA Report must determine whether any wetlands within the predicted zone of influence are wetlands of special significance, as defined by the Nova Scotia Wetland Conservation Policy. Wetlands of special significance will not usually be granted approval for alteration.

Field surveys and investigations required to complete wetland shall be completed in a manner that adheres to the Nova Scotia Wetland Conservation Policy.

### **9.3 Atmospheric Resources**

Atmospheric resources will include ambient air quality, the acoustic environment, greenhouse gas emissions, and impacts on climate.

#### **9.3.1 Climate**

The EA Report must include a discussion of the regional climate conditions and meteorology in the vicinity of the Project area. This section should include climate norms, extreme conditions as well as trends in these conditions, if available.

In addition to historical climate data, the climate sub-section of the existing environment should include a summary of climate change projections for the Project area where available.

#### **9.3.2 Air Quality**

For the study area, provide a review of baseline ambient air quality and meteorological data, including annual and seasonal climatic conditions for the region.

Provide a description of existing ambient air quality conditions for the study area, with particular attention to ambient and peak levels of nitrogen oxides ( $\text{NO}_x$ ), sulfur oxides ( $\text{SO}_x$ ), carbon monoxide (CO), ozone ( $\text{O}_3$ ), particulate matter (total suspended particulate (TSP),  $\text{PM}_{2.5}$  and  $\text{PM}_{10}$ ), and volatile organic compounds (VOCs) levels. Discuss the influence of local and regional emission sources and the influence of climate and weather conditions. The data should be used for the development of an appropriate model(s) for the study area to be provided in the EA Report. Also describe any potentially sensitive receptors and/or locations.

#### **9.3.3 Ambient Noise and Light Levels**

The EA Report must describe the existing ambient acoustical environment at the Project site (including the marine environment), and in any other areas where Project activities could be expected to have an environmental effect. Provide the spatial boundaries of existing noise and vibration levels, as well as locations of recording stations and length of record for any acoustic or vibration data presented. Consider the effects of different meteorological conditions on noise propagation. Provide information on any existing relevant standards, guidelines or objectives with respect to noise and vibration levels.

Describe existing ambient light levels at the Project site and at any other areas where Project activities could have an environmental effect on light levels. Describe night-time illumination levels during different weather conditions and seasons.

### **9.4 Flora and Fauna**

Identify the following types of flora, fauna, and habitat. Appropriate field surveys agreed to by the Nova Scotia Department of Natural Resources (DNR) – Wildlife Division, shall be conducted

as part of the evaluation. Surveys should be described by results, methodology, and spatial and temporal boundaries.

#### 9.4.1 Terrestrial Environment

Identify typical species of flora, sensitive flora, flora species-at-risk, and potential habitat for flora species-at-risk in the study area. Identify areas of old growth forest. Current information shall be obtained from the DNR – Wildlife Division; the Atlantic Canada Conservation Data Center; Environment Canada; the Nova Scotia Museum of Natural History, and local naturalists and relevant interest groups. Field surveys and investigations required to supplement the available data shall be completed in a manner that is acceptable to the DNR – Wildlife Division. Available data, survey results, and detailed mitigation measures that demonstrate a special emphasis on avoidance of impacts shall be included in the EA Report.

Identify any existing or planned wildlife management areas, ecological reserves or wilderness areas as well as managed wetlands and significant wildlife habitat. Identify and delineate on a map 'roadless areas' and discuss their potential value to Nova Scotia's protected areas network. Include areas with high wildlife concentrations, wildlife corridors or habitats rare/unique to Nova Scotia.

Identify typical species of fauna (including invertebrate species), sensitive fauna, fauna species-at-risk, and potential habitat for fauna species-at-risk in the study area. Current information shall be obtained from the DNR – Wildlife Division; the Atlantic Canada Conservation Data Center; Environment Canada; Nova Scotia Communities, Culture and Heritage; the latest Committee on the Status of Endangered Wildlife in Canada (COSEWIC) list; the Atlas of Breeding Birds of the Maritime Provinces; and local naturalists and relevant interest groups. Field surveys and investigations required to supplement the available data shall be completed by professional biologists in a manner that is acceptable to the DNR – Wildlife Division and Canadian Wildlife Service. When surveys are necessary to supplement the available data and adequately describe the use of the area by migratory birds during different times of the year (breeding season, migration, winter), emphasis will be placed on determining whether any bird species-at-risk, colonial nesting species, species particularly vulnerable to habitat fragmentation, etcetera, occur or breed in or near the study area.

#### 9.4.2 Freshwater Aquatic and Marine Environment

The EA Report must include a description of any freshwater fish or fish habitat that exists in any identified watercourse or any other receiving watercourse that may be impacted by the development. The description of these species and habitat should identify any species-at-risk and ecologically sensitive or critical habitat and migratory routes of fish.

Describe the relative distribution and abundance of valued fish resource components within the predicted zone of influence. Fish species, age, health, and diversity shall be described.

A description of any seasonal variation in the location, abundance and activities of aquatic species should be included. Describe and identify key habitat features, such as spawning, rearing, nursery, feeding, migration and overwintering areas, as they occur within the Project area. Also describe the criteria utilized for determining the zone of influence this Project has on the fish habitat.

Describe the marine habitat and species of fish, including pelagic and demersal finfish, shellfish, crustaceans, and marine mammals, likely to be present within the surrounding marine environment. The description of these species and habitats should identify any species-at-risk and ecologically sensitive or critical habitat and migratory routes of fish and marine mammals.

## **9.5 Agriculture, Aquaculture and Forestry Resources**

### **9.5.1 Agriculture**

Identify and describe agricultural resources in the study area. Identify agricultural operations in the study area and describe crop types, growing seasons and growing methods.

### **9.5.2 Fishery, Aquaculture and Marine Harvesting**

Describe all commercial, recreational and Aboriginal fisheries (including food social ceremonial (FSC) as well as commercial), aquaculture, and harvesting (e.g., marine plants, shellfish) in the study area. Describe the commercial and recreational species, caught, grown or harvested, and their economic importance. Identify fishing, aquaculture and harvesting locations, the amount caught, and methods used.

### **9.5.3 Forestry Resources**

Identify and describe forestry activities in the study area.

## **9.6 Socio-Economic Conditions**

Describe the current socio-economic conditions of the area, including population demographics and economic conditions (including Aboriginal Peoples). Provide details of employment rates and trends at the municipal and regional level. The spatial boundaries of this analysis should include areas within which employees of the Project are expected to reside. Identify key industries in the region (both land-based and marine-based), and describe their contribution to the local and regional economies. Provide details of residential and commercial property values. Describe any local and regional economic development goals and objectives identified through community consultation, or existing economic development plans and strategies.

## **9.7 Existing and Planned Land Uses**

Describe the patterns of current and planned land use and settlement in the study area including residential, industrial, agricultural, parks, and protected areas. Provide details of areas under existing mineral exploration licenses as well as areas licensed for pulpwood harvesting. Identify locations of abandoned mine workings, mine tailings and waste rock disposal areas, as well as contaminated sites. This section shall include map(s) to illustrate land uses and provide distances to significant settlements.

The EA Report must also identify lands and resources of special social, cultural or spiritual



value to the Mi'kmaq of Nova Scotia, with particular emphasis on any current use of land for traditional purposes. A Mi'kmaq Ecological Knowledge Study (MEKS) should be used to identify land and resource use that have and/or continue to be pursued by the Mi'kmaq of Nova Scotia. Prior to undertaking a MEKS, the Proponent is encouraged to contact the Kwilmu'kw Mawklusuaqn Negotiation Office (Mi'kmaq Rights Initiative or KMKNO) to discuss established MEKS protocol.

### **9.8 Archaeological Resources**

Identify any areas containing features of historical, paleontological, cultural or archaeological importance in a manner acceptable to the Nova Scotia Communities, Culture and Heritage. Describe the nature of the features located in those areas. Particular attention shall be given to Mi'kmaq of Nova Scotia archaeological sites and burial sites. All heritage research permits acquired, and engagement with the Mi'kmaq of Nova Scotia during this analysis should be identified in the document.

### **10.0 ADVERSE EFFECTS AND ENVIRONMENTAL EFFECTS ASSESSMENT**

The EA Report shall describe the effects of the Project on the environment during all phases of the Project (construction, operation, and decommissioning and reclamation), including any environmental change on health, socio-economic conditions, archaeology, and the current use of land for traditional purposes by the Mi'kmaq of Nova Scotia. The EA Report shall identify and describe the accidents and/or malfunctions that may occur during all phases of the Project and assess the effects on VECs. The EA Report must also describe the cumulative effects of Project activities.

The effects assessment shall also consider impacts of the environment (including weather and climate) on the Project, including a discussion of how potential climate change will impact all components of the Project.

### **10.1 Geophysical Environment**

Potential effects of the Project on the geophysical environment that must be discussed in the EA Report include:

- potential for induced slope failures and accelerated erosion events and the potential effects on downslope infrastructure, biophysical environments and land use values;
- change in surface water quality as a result of increased erosion and sedimentation;
- acidic water run-off from bedrock disturbed during Project construction; and
- effects of landfall structures on coastal processes.

The EA Report must also discuss the potential cumulative and residual effects of the Project on the geophysical environment and the significance of these effects.

## 10.2 Water Resources

In conducting the effects assessment on water resources, the EA report must identify and evaluate:

- changes in surface and groundwater quality as a result of effluent discharges from the Project site;
- potential effects on groundwater quality and quantity and associated impacts to users of groundwater;
- potential effects to surface water quality on fish and fish habitat, community water supplies (protected and unprotected), and recreational and agricultural users;
- potential direct and indirect impacts to wetlands and how Project development will adhere to the Nova Scotia Wetland Conservation Policy; and
- potential cumulative and residual effects of the Project on water resources and the significance of these effects including ecosystem integrity and changes in hydrology to areas immediately adjacent to the Project area.

Where wetland avoidance is not possible, the EA Report must discuss compensation measures to ensure no net loss of wetland area and function.

The Canadian Council for Ministers of the Environment (CCME) Water Quality Guidelines with background water quality results shall be used to ensure the protection of relevant water uses (aquatic life, recreational use, agricultural use, and drinking water supply) and shall be used as the basis for evaluating the significance of the predicted impacts.

## 10.3 Atmospheric Resources

In considering the potential effects on air quality, the EA Report must describe the sources, types and estimated quantities of air emissions (including fugitive emissions and flaring) under routine conditions and in the case of malfunctions and accidental events on a seasonal and annual basis. The impact of stack emissions from natural gas and other fuels must be discussed, including but not limited to, impacts of NO<sub>x</sub>, SO<sub>x</sub>, CO, O<sub>3</sub>, TSP, PM<sub>2.5</sub> and PM<sub>10</sub>, and VOCs. Describe and quantify the sources, types, estimated quantities, and impacts of transportation related (highway and marine) air emissions on ambient levels and receptors under Projected routine operating conditions. Discuss the potential for micro-climate modifications in the vicinity of the Project, including the impacts of increased water vapour in the study area.

The description shall include appropriate models based on known or measured atmospheric conditions throughout the year.

The EA Report must include the predicted GHG emissions and provide an inventory of GHG emissions from all Project components, including carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), sulfur hexafluoride (SF<sub>6</sub>) and conversion of these emissions to an equivalent amount of CO<sub>2</sub>. Also include an inventory of the precursors or tropospheric ozone (CO, NO<sub>x</sub>, and VOCs).

Where possible, the EA Report shall include a comparison of the above information with estimates of total GHG contributions from Nova Scotia, and from similar facilities in Canada. The EA Report must also include a discussion of measures that have been considered and/or

are proposed to reduce air emissions and reduce or offset GHG emissions.

Obtain current information from Nova Scotia Environment – Climate Change Directorate regarding requirements to satisfy provincial and federal commitments to addressing climate change. This information and how the Proponent plans to meet these requirements shall be provided in the EA Report.

While considering the effects on air quality, the EA Report must discuss the potential impacts of predicted increases in noise and light levels during all phases of the Project, on surrounding residential, commercial, recreational and institutional areas, and marine and terrestrial habitats.

## **10.4 Flora and Fauna**

### **10.4.1 Terrestrial Environment**

The EA Report must identify and evaluate the potential effects on flora and fauna and avifauna species/communities during all phases of the Project. The EA Report must include a full account of impacts on species at risk or of concern, significant habitats and protected areas or areas of potential value to Nova Scotia's protected areas network that may be potentially disturbed, altered or removed. The effects assessment must also consider the potential for effects to flora and fauna associated with landscape fragmentation and sensory disturbances.

### **10.4.2 Freshwater Aquatic and Marine Environment**

The EA Report must evaluate the potential effects on aquatic environments, including fish and fish habitat.

While considering the effects that the Project may have on freshwater and marine species, the EA Report must include a full account species at risk or of concern and significant habitats. This section must include activities that may affect avifauna in the aquatic environments. The EA Report must also consider potential effects to marine species from blasting, dredging and other marine construction, as well as vessel traffic and terminal operation. Where impacts to fish habitat cannot be avoided or mitigated, the EA Report must discuss compensation measures to ensure impacts are offset.

The EA Report should include a summary of the potential effects on flora/fauna known to be important to the Mi'kmaq of Nova Scotia.

## **10.5 Agriculture, Aquaculture and Forestry Resources**

### **10.5.1 Agriculture**

The EA Report must include an effects assessment of the Project on existing and future agriculture activity within the study area.

### **10.5.2 Fisheries, Aquaculture and Marine Harvesting**

The EA Report must assess the impacts on commercial/recreational fishing, aquaculture or

other marine harvesting which may be impacted by the proposed Project. The effects assessment should consider changes in commercial/recreational fishing, aquaculture or other marine harvesting species, including contamination of species consumed by people as a result of increased erosion, sedimentation and from effluent discharges from the Project, displacement, mortality or loss and/or alteration of habitat. The EA Report must also discuss navigation restrictions and loss of traditional fishing areas of the Mi'kmaq of Nova Scotia.

### 10.5.3 Forestry

The EA Report must include a discussion on the potential effects on any forestry resources within the Project area.

## 10.6 Socio-Economic

The socio-economic effects assessment must include:

- the potential impacts of the Project on economic conditions, populations and employment;
- the potential impacts of the proposed Project on residential property values and property demand during all phases of the Project (including temporary accommodation required during construction);
- the effect of the proposed Project on present and future commercial, residential, institutional, recreational and resource land uses within the study area, including impacts to areas under mineral exploration licenses or forestry licenses;
- the potential impact on recreational opportunities, including the effects on aesthetics from areas surrounding the Project area. This analysis should be supported by visual impact assessments from both the land and water; and
- the potential impact on the current use of land and resources for traditional purposes and any Aboriginal specific land claims within the study area.

While considering the effects on economic conditions and employment, the EA Report should include a discussion on expenditures and the anticipated direct and indirect employment positions that will be created during all phases of the Project.

## 10.7 Existing and Planned Land Uses

The EA Report must consider the effects that may restrict the ability of people to use and enjoy adjacent lands and marine area presently, and in the future.

The EA Report shall include a description of the potential impacts from existing or planned land uses in the study area. This shall include a discussion of Project interactions with any rural planning initiatives, parks, protected areas, contaminated sites, former mine workings, and mine disposal areas.

Potential effects on traditional and current recreational and commercial use by the Mi'kmaq of Nova Scotia must be identified and evaluated.

The EA Report must discuss the anticipated changes in traffic density and patterns during all phases of the Project including the effects on transportation during, and following realignment of Highway 316.

While assessing the effects on navigation and navigable waters, the EA Report must consider navigation patterns of all waters that may be impacted by the Project. Potential effects on traditional and current recreational and commercial use must be identified and evaluated.

### **10.8 Archaeological Resources**

The EA Report must evaluate the potential effects of any changes in the environment as a result of Project activities on physical and cultural resources, structures and/or sites of historic, archaeological, or paleontological significance. Of particular importance, the EA Report must assess development in proximity to the MacMillan Mine Site, Dung Cove Site, Giffin's Mill Site and South Maitland Lead Site.

In conducting the effects assessment on archaeological resources, it is recommended that the Proponent consult with Nova Scotia Department of Communities, Culture and Heritage and with the Archaeology Research Division of KMKNO.

### **11.0 PROPOSED MITIGATION**

The EA Report shall describe all measures that have, or will be, taken to avoid or mitigate negative impacts, and maximize the positive environmental effects of the Project (as described in Section 9.0, Adverse Effects and Environmental Effects Assessment). Mitigation includes the elimination, reduction or control of the adverse effects or the significant environmental effects of the Project, and may include restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.

Describe proposed compensation that will be provided when environmental damage is unavoidable or cannot be adequately mitigated by any other means.

In considering mitigation measures to be employed, the EA Report must describe any legislation, regulations, guidelines, policies, BMPs, and specifications that will be adhered to during construction and operation of the facility that will lead to mitigation of environmental impacts.

### **11.1 Geophysical Environment**

Describe alternatives to disrupting net acid producing bedrock. When no practical alternative to exposing acid producing bedrock exists, mitigation plans shall be developed for minimizing the impacts on the aquatic environment. Discuss commitments to provide contingency and remediation plans for watercourses that have been degraded due to the disturbance of net acid producing bedrock or tills.

If contaminated soils are to be disturbed, discuss methods to minimize adverse impacts.

## **11.2 Water Resources**

### **11.2.1 Surface Water Quality and Quantity**

The EA Report must describe all mitigation measures that will be used in construction, operation and decommissioning phases of the Project to reduce impacts to surface water resources, including but not limited to erosion and run-off control features and storm drainage management.

Discuss all mitigation measures planned to prevent the release of hazardous substances, including fuel oil, into local surface waters.

Discuss commitments to provide contingency and remediation plans for any impact to surface water resources, including decrease of water quality or quantity.

### **11.2.2 Groundwater Quality and Quantity**

Describe actions that will be taken to moderate any negative impacts on groundwater quality and quantity.

Describe measures to be employed in the event of accidental dewatering of any domestic water supply wells through construction activity, including compensation for loss or degradation of domestic water supplies. Describe mitigation measures planned to prevent contamination of groundwater from the accidental release of a hazardous substance (including fuel oil).

Discuss commitments to provide contingency and remediation plans for any contamination of groundwater resources, including decrease of water quality.

### **11.2.3 Wetland Resources**

Discuss avoidance of wetland de-watering and mitigation measures to maintain ecological and hydrological integrity of any wetlands in the area. Where avoidance is not possible, provide details of proposed compensations plans.

## **11.3 Atmospheric Resources**

The EA Report must describe measures to avoid, minimize or otherwise mitigate effects on biological receptors during all phases of the Project (vegetation, fish, wildlife, and human health).

Specifically, the EA Report must describe measures that will be taken to control emissions including but not limited to NO<sub>x</sub>, SO<sub>x</sub>, CO, TSP, PM<sub>2.5</sub> and PM<sub>10</sub>, and VOCs. Describe any GHG mitigation plans.

The EA Report must describe all measures that will be taken to mitigate any potential increase in noise and light levels during construction and operation.

## **11.4 Flora and Fauna**

### **11.4.1 Terrestrial Environment**

Discuss measures that will be taken to minimize the impacts of the Project construction and operation on flora species. Include any landscaping plans for preservation of existing vegetation.

Describe the measures that will be taken to minimize the impacts of the Project construction and operation on terrestrial fauna and avifauna. Include any plans for preservation of existing habitat and compensation for loss or degradation of terrestrial habitat (i.e. habitat rehabilitation/replacement).

Describe the measures that will be taken to minimize the introduction of non-native species to the area.

Discuss commitments to provide contingency and remediation plans for drainage to terrestrial habitat as a result of accidental events.

### **11.4.2 Freshwater Aquatic and Marine Environment**

Discuss measures that will be taken to minimize the impacts of the Project construction and operation on marine and freshwater aquatic species, avifauna and their habitats. Include any plans for preservation of existing habitat and compensation for loss or degradation of aquatic habitat.

Describe the measures that will be taken to minimize the introduction of non-native species to the area.

Discuss commitments to provide contingency and remediation plans for drainage to aquatic habitat as a result of accidental events.

## **11.5 Agriculture, Aquaculture and Forestry Resources**

Discuss measures that will be taken to minimize the impacts of the Project on agriculture, fishing, aquaculture, marine harvesting, and forestry.

## **11.6 Socio-Economic**

Describe actions that will be taken to mitigate adverse impacts on private and commercial property, existing industry and businesses, planned land use, recreation and other human activities, including traditional activities and land uses by the Mi'kmaq of Nova Scotia.

Provide a dispute resolution policy for addressing Project related complaints and concerns that may be received throughout construction, operation, decommissioning and reclamation, and post-decommissioning.

### **11.7 Existing and Planned Land Uses**

Describe the measures planned to minimize the potential impacts of the Project on existing and planned land uses. Careful attention shall be given to mitigating impacts resulting from the Project's interaction with existing contaminated sites, mine waste/tailings sites, and other former mine related works.

Discuss the mitigation measures planned to address anticipated impacts from any predicted changes in traffic speed, traffic routes, marine navigation, exclusion zones and density in adjacent residential and commercial areas.

### **11.8 Archaeological Resources**

Describe mitigation measures to preserve, protect, or recover any resources of cultural or archaeological value that are identified in the study area.

### **12.0 RESIDUAL ADVERSE EFFECTS AND ENVIRONMENTAL EFFECTS**

This section of EA Report shall list and contain a detailed discussion and evaluation of the residual impacts for each VEC, including the criteria for determining significance. Residual impacts are those adverse effects or significant environmental effects which cannot or will not be avoided or mitigated through the application of environmental control technologies or other acceptable means. Those impacts that can be mitigated or avoided shall be clearly distinguished from those impacts that will not be mitigated or avoided.

These impacts become important in the evaluation of a proposed Project as they represent the environmental cost of the Project.

### **13.0 EVALUATION OF THE ADVANTAGES AND DISADVANTAGES TO THE ENVIRONMENT**

This section shall present an overall evaluation of the advantages and disadvantages to the environment, including the VECs, during the construction, operation and decommissioning phases of the Project. The evaluation of the disadvantages shall include an examination and justification of each disadvantage.

### **14.0 PROPOSED COMPLIANCE AND EFFECTS MONITORING PROGRAMS**

The EA Report shall include a framework upon which compliance and effects monitoring will be based throughout the life of the proposed Project, including decommissioning and post-decommissioning activities. Monitoring programs must be designed to determine the effectiveness of the implemented mitigation measures. The EA Report shall describe the compliance reporting methods to be used, including reporting frequency, duration, methods, format, and receiving agencies.

Recognizing that the effectiveness of compliance and effects monitoring depends on a



workforce that can identify and address potential impacts during construction and operation of the facility, the framework shall include procedures for providing training and orientation to on site employees during construction and operation of the facility.

The description of the compliance and effects monitoring program shall also include any procedures/plans for addressing potential exceedances of environmental protection standards, guidelines or approvals.

The discussion of compliance monitoring shall include, but not be limited to Sections 14.1 – 14.4.

#### **14.1 Geophysical Environment**

Describe plans and procedures for assessing ARD potential and associated monitoring in the event of disturbance or exposure.

#### **14.2 Water Resources**

Discuss any surface water monitoring plans for the construction, operation and decommissioning phases of the Project, including both water quality and quantity aspects.

Discuss plans for periodic monitoring of water quality and quantity of springs (if used as a water supply), and any wells (if blasting operations are proposed). Discuss any groundwater monitoring plans for the construction and operational phases of the Project.

Discuss plans for a survey of structures if blasting is planned, to include wells, building foundations, etcetera, which may experience damage or impact due to seismic vibrations or air concussion.

#### **14.3 Atmospheric Resources**

Describe plans and procedures for air quality emissions and compliance testing and monitoring, especially for NO<sub>x</sub>, SO<sub>x</sub>, CO, TSP, PM<sub>2.5</sub> and PM<sub>10</sub>, and VOCs, during operation. Identify the methods that will be used to determine the monitoring locations. Describe plans to provide real-time air monitoring data to NSE.

Describe plans for GHG monitoring, reduction targets and reduction plans.

Discuss the plans for monitoring baseline, construction and operational noise levels at the site, and at any residential or commercial areas near the Project.

#### **14.4 Other Monitoring Plans**

Include any other monitoring plan which may include an Environmental Protection Plan (EPP) or other guidelines, polices or plans, proposed for the construction, operation and decommissioning of the Project.

## 15.0 CONSULTATION PROGRAM

A Notice of Project Registration was published in the Guysborough Journal, Chronicle Herald, and Royal Gazette on February 27, 2013 and posted on the Nova Scotia Environment internet site ([www.gov.ns.ca/nse/ea/Projects.asp](http://www.gov.ns.ca/nse/ea/Projects.asp)). Information pertaining to this EA will be available on this site.

The Class II EA process for the Project includes the following opportunities to participate (specifically government departments/agencies, the general public and Mi'kmaq of Nova Scotia will be invited to provide comments):

- the Project Description and Draft Terms of Reference; and
- the Environmental Assessment Report.

### 15.1 Public Consultation

For any consultation undertaken with the general public, the EA Report must describe ongoing and proposed consultation and information sessions.

The EA Report must describe all steps taken by the Proponent to identify the concerns of the public about the adverse effects or environmental effects of the Project. It shall provide a summary of all concerns expressed by the public and all steps taken by the Proponent to address these concerns. Moreover, the EA Report must describe any outstanding concerns.

The EA Report will also provide details of efforts made to distribute Project information and provide a description of the information and materials distributed to inform the general public.

### 15.2 Consultation with the Mi'kmaq of Nova Scotia

To assist the provincial Government in their consultation process with the Mi'kmaq of Nova Scotia, the EA Report must describe all steps taken by the Proponent to identify the concerns of Mi'kmaq of Nova Scotia about the adverse effects or environmental effects of the Project. It shall provide a summary of all concerns expressed by the Mi'kmaq of Nova Scotia and all steps taken by the Proponent to address these concerns. Moreover, the EA Report must describe any outstanding concerns.

During the EA process, Nova Scotia Environment will serve as the provincial Crown consultation coordinator.

The EA Report will also provide details of efforts made to distribute Project information and provide a description of the information and materials distributed to inform the Mi'kmaq of Nova Scotia.

In parallel to Proponent engagement with the Mi'kmaq of Nova Scotia, the Government of Nova Scotia will undertake consultation directly with the Mi'kmaq of Nova Scotia pursuant to the

Mi'kmaq-Nova Scotia-Canada Consultation Process (2010).

The Proponent is encouraged to engage the Mi'kmaq of Nova Scotia as referenced in the Nova Scotia Office of Aboriginal Affairs' *Proponent's Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia* (2011).

Include any plans for ongoing community consultation or formation of a community liaison committee (CLC) during construction, operation and decommissioning.

## **16.0 ASSESSMENT SUMMARY AND CONCLUSION**

This section of the EA Report shall summarize the overall findings of the EA with emphasis on the main environmental issues identified and predict the significance of adverse environmental effects of the Project.