SNC·LAVALIN

SECTION 5

EFFECTS ASSESSMENT METHODOLOGY

Bear Head LNG

A subsidiary company of Liquefied Natural Gas Limited

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5 Effects Assessment Methodology

5.1 Overview and Approach

The environmental assessment methodology has been developed to meet the requirements of the assessment regulations of the Nova Scotia *Environment Act.* The approach also reflects the technical and professional competency of the study team and their ability to address specific issues in a rigorous and pragmatic manner. In general, the approach has been designed to produce an environmental assessment document that:

- Focuses on issues of greatest concern whether these have been identified by the study team, by the public or by the regulators;
- Clearly addresses regulatory requirements; and
- Integrates engineering design and mitigative measures into a framework that will enable, as the engineering proceeds, the preparation of a comprehensive EMP for the Project.

Figure 5.1 depicts the key steps in the assessment process.

The preparation of the Project description and the environmental and socio- economic baseline are the two fundamental building blocks necessary for the environmental analysis. The former is derived from the work undertaken by the Proponent and their engineering team. The latter is derived from the review and compilation of pertinent secondary data sources, the execution of necessary field programs and selected modelling. The integrity of these building blocks is critical to the credibility of the subsequent analysis; the preparation of the two, however, is often iterative. This allows the environmental assessment to be used as a planning tool and to influence Project design.

As indicated in Section 1.8, an environmental assessment was completed for a comparable project and was approved federally pursuant to the then *Canadian Environmental Assessment Act* and provincially pursuant to the *Environment Act.* Subsequent authorizations and permits enabled construction of the Bear Head LNG import facility to start. When the latter project was put on hold in 2007, the authorizations and permits were maintained as active. Table 1.4 and Appendix A detail the current status of the permits and authorizations pertaining to the Bear Head LNG facility as it is currently defined. CEAA no longer applies and through discussions with the pertinent regulatory agencies, it has been determined that the changes that have been made to the Project would best be addressed through a modified Class I registration pursuant to the Nova Scotia *Environment Act.*

5.2 Steps in the Assessment Process

The steps in the environmental assessment process are identified in Figure 5-1. Chapter 2 provides the Project Description. Chapter 3 provides an account of the consultation undertaken. Chapter 4 provides the environmental and socio-economic baseline. The following sections explain the subsequent stages of the process: issue scoping and the definition of Valued Ecosystem Components (VECs)[1] and socio-economic issues; analysis, mitigation and residual environmental effects; and the other factors that must be taken into account, namely cumulative effects and the effects of the environmental on the project.

5.2.1 Scoping: Definition of VECs and Socio-Economic Issues

It is impractical, if not impossible, for an assessment to address all of the potential environmental effects that might be directly or indirectly associated with a proposed undertaking. An important part of the assessment process, therefore, is to identify those matters upon which the assessment may be focused to ensure a meaningful and effective evaluation. This process is often referred to as scoping: an activity designed to identify the components of the biophysical and socio-economic environment that may be impacted by the Project and for which there is public and/or professional concern (Sadar, 1994). This section references the steps that were taken to focus this assessment and to identify the VECs and socio-economic issues.

To compile the environmental and socio-economic baseline, the study team relied on the extensive data base and analysis that had been done for the earlier and approved environmental assessment; on the team's collective knowledge and experience; input and opinions expressed through the consultation program; pertinent research and field work and the results of new modelling on specific topics. This has generated a substantial data base and enabled the identification of those matters that warrant evaluation. The analysis examines the potential effects of each Project phase, i.e., construction, operation and decommissioning, as well as malfunctions and accidents, on the VECs and socio-economic issues identified. There have also been a number of local meetings, and meetings with environmental regulatory staff at the provincial and federal levels. Chapter 3 provides an account of the consultation undertaken.

This evaluative process has involved internal team discussions to ensure that the requisite interdisciplinary rigour brought focus to the assessment. These discussions have included the participation of the specialists contracted to execute specific field programs and the engineers involved in the prefeasibility studies associated with the siting of the facility and the access roads. The informed professional judgement of this team, particularly those who have executed the various field programs, and the local

[1] VECs represent "key" or "indicator" species, communities, species groups or ecosystems, as well as specific media, e.g., water or air, that may transport environmental effects. Social, cultural or economic factors, or issues, may also be affected by the proposed works and are identified as such.

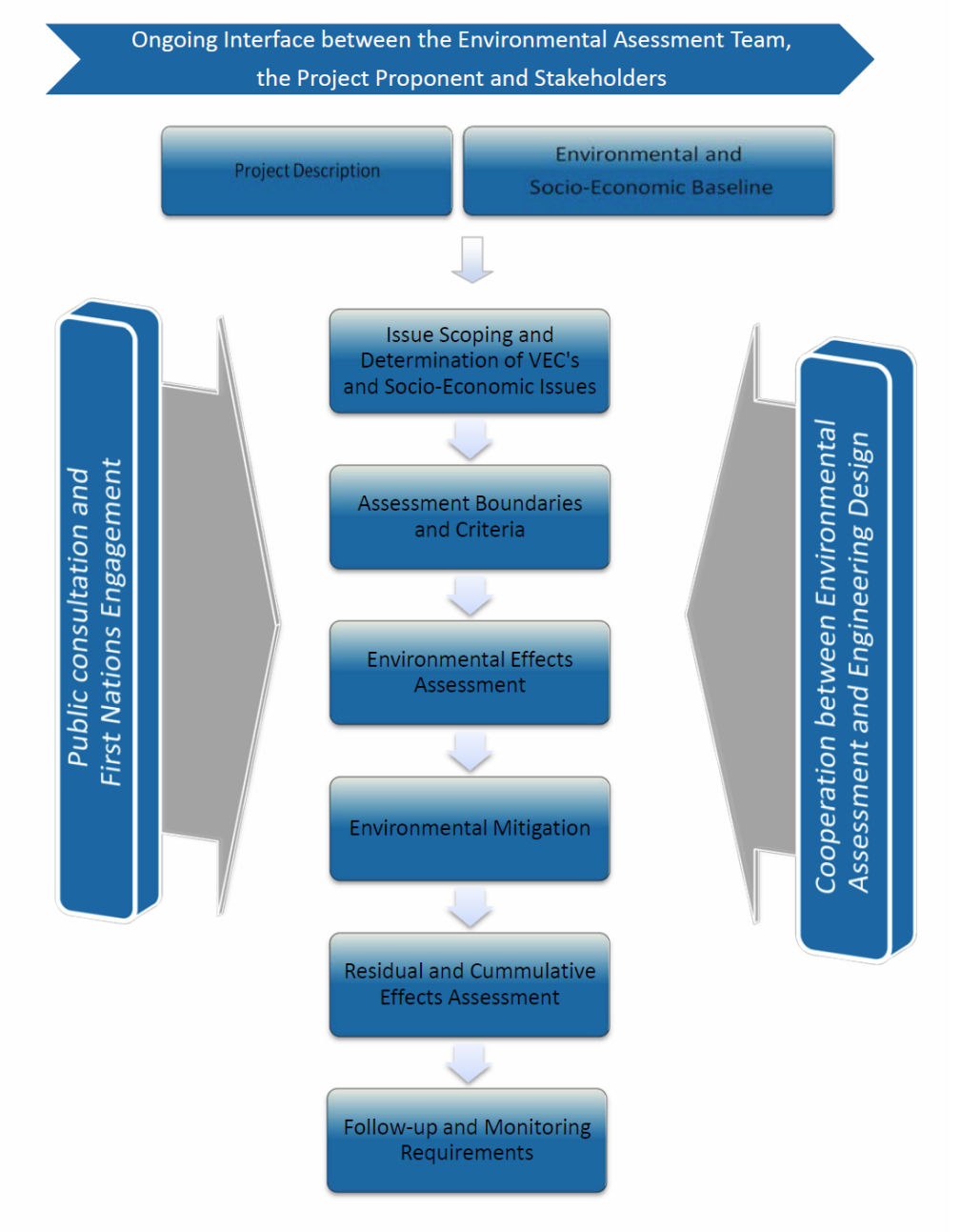

Figure 5-1: The Environmental Assessment Process

knowledge that the proponent team brought to the process, were important inputs to the determination of the VECs and socio-economic issues identified. It is these factors that are subject to evaluation in Chapter 6.

Once the scope of the Project was determined and the phases of the Project defined, it is possible to identify those facets that may cause consequences for the receiving environment. This is accomplished by identifying the linkages, or pathways, between the Project and the receiving environment. That is, those components and activities that will be carried out on the site during Project construction, operation and eventual decommissioning that may have the potential to interact with the physical, ecological and/or socio-economic environment. Such pathways will include, but will not be limited to, effluents and emissions, including noise and dust, and expenditures on labour, services and equipment. The VECs and socio-economic issues are identified in Table 5.1.

As detailed in Section 1.8, many of the necessary permits and authorizations, including those pertaining to the construction of the marine terminal, are in place. The marine data base has been updated (Section 4.4) and two marine VECs identified, i.e., marine habitat and marine life. Since these VECs are not the primary focus of this regulatory submission, an explanatory introduction is provided in Section 6.3, two matrices are provided (Tables 6-24 and 6-25), but no accompanying explanatory text. The potential consequences of the projects successful development and operation on surrounding communities are substantial, and six socio economic issues have been identified. These are discussed individually in Section 6.4. Rather than individual issue matrices, Table 6-27 provides a comprehensive account of the socio economic impacts.

Table 5-1: Potential VECs and Socio-economic Issues

Physical Components	*Ecological Components*	*Socio-economic Issues*
Groundwater	Terrestrial Habitat including Wetlands	Key Settlements, Land Use, community Services and Infrastructure
Surface Water	Terrestrial Fauna	Economic Development
Climate	Freshwater Fish and Fish Habitat	Marine Navigation
Air quality	Species at Risk	Fisheries, Aquaculture and Marine Harvesting
Acoustic Environment	Marine Habitat	First Nations Land and Resource Use
	Marine Life	Archaeology

Table 5-2 substantiates the VEC selection process, defines the selected VECs and the socio-economic issues that will be subject to evaluation.

Table 5-2: Valued Environmental Components (VECs) Selection Process

Environmental Component	Scoping Considerations	Selected VEC	VEC Definition and Scope
Groundwater	Groundwater resources are important in both ecological function and the hydrologic cycle. With regards to human health, it is a source of drinking water and can act as a pathway for contaminant transport. Water quality is regulated by the Province of Nova Scotia under the *Environment Act*	♦ Groundwater	The VEC will consider potential Project-related effects to groundwater, originating from the percolation of precipitation or surface water
Surface Water	Surface water provides habitat for a wide range of species affected by its quality. With regards to human health, surface water can provide drinking water and can contribute to contaminant transport	♦ Surface Water	The VEC will consider potential Project-related effects to freshwater bodies on the Project site
Climate and Climate Change	Climate describes weather patterns and their variations. Changes in climate can impact wildlife, vegetation and human health. Climate change can cause an increase in the frequency and severity of storms, sea level rise, coastal erosion, and many other impacts felt by us	♦ Climate	The VEC will consider Project-related GHG emissions and their effects on local, regional and global climate
Air Quality	The link between air quality and human health has become better understood in recent years. Air emissions have the potential to impact human and ecological health, safety and aesthetics. Air quality is regulated by the Province of Nova Scotia under the *Environment Act*	♦ Air Quality	The VEC will consider potential Project-related effects on ambient air quality.

Environmental Component	Scoping Considerations	Selected VEC	VEC Definition and Scope
Acoustic Environment	The Project will cause increases in noise levels. Noise can cause annoyance to people, resulting in negative health effects, and can adversely affect birds and other wildlife. Noise is governed by Nova Scotia Environment noise criteria and local municipal by-laws	♦ Acoustic Environment	The VEC will consider potential Project-related effects on ambient noise levels
Wetlands	The Project site provides a number of habitats, including wetlands, of value to wildlife. A number of wetlands were originally identified on the Project site, some of which were impacted by previous Project development. These Project impacts were mitigated through agreed-upon wetland compensation, which has already been completed	♦ Terrestrial Habitat	The VEC will consider additional Project-related effects on wetlands, beyond those previously addressed through wetland compensation for completed site development
Forested Communities	Forests are habitat for various life forms and provide stability to soils and sediments. They are of aesthetic, cultural economical and recreational importance to the Mi'kmaq and Point Tupper community	♦ Terrestrial Habitat	The VEC will consider potential Project-related effects to forested communities
Birds	Potential adverse effects to both migratory and non-migratory birds (in particular those at risk) must be avoided. It is important to protect species diversity. The federal *Migratory Birds Convention Act* and *Species at Risk Act,* and Nova Scotia *Endangered Species Act* and *Wildlife Act* apply	♦ Terrestrial Fauna ♦ Marine Life	These VECs will consider potential Project-related effects on birds (and their habitat) potentially feeding, breeding, moving, and/or migrating through the Project area
Mammals	It is important to protect mammals and their habitat. Species at risk are protected under the federal *Species at Risk Act* and *Fisheries Act*, and the Nova Scotia *Endangered Species Act*	♦ Terrestrial Fauna ♦ Marine Life	The VEC will consider potential Project-related effects on marine and terrestrial mammals potentially feeding, breeding, over-wintering, moving, and/or migrating through the Project area
Reptiles and Amphibians	Reptile and amphibian populations tend to be concentrated in small areas and are often associated with wetlands. Protection of species diversity is important. The *Species at Risk Act*, Nova Scotia *Endangered Species Act* and Nova Scotia *Wildlife Act* apply	♦ Terrestrial Fauna	The VEC will consider potential Project-related effects on reptile and amphibian populations that use the site for feeding, breeding, moving and migrating through
Plants and vegetation	It is important to protect species biodiversity and unique or uncommon habitats. Species at risk are protected under the *Species at Risk Act* and the Nova Scotia *Endangered Species Act*	♦ Terrestrial Habitat ♦ Species at Risk	The VEC will consider potential Project-related effects on plants and vegetation species

Environmental Component	Scoping Considerations	Selected VEC	VEC Definition and Scope
Freshwater fish and fish habitat	Impacts to freshwater fish species and their habitat, and resources important to the Mi'Kmaq and Point Tupper community for commercial or recreational fishing will be considered. The federal *Fisheries Act* and Nova Scotia *Endangered Species Act* apply	♦ Freshwater Fish and Fish Habitat	The VEC will consider potential Project-related effects on freshwater fish and fish habitat contained within or affected by runoff from the Project area
Species at Risk	Species at risk need to be identified and impacts avoided. The *Migratory Birds Convention Act, Species at Risk Act,* Nova Scotia *Endangered Species Act,* and *Wildlife Act* apply	♦ Species at Risk	The Species at Risk VEC will consider potential Project-related effects on species at risk
Marine Sediments	Marine sediment quality affects ecological function of benthic communities, and contributes to fish habitat, protected under the federal *Fisheries Act*	♦ Marine Habitat	The VEC will consider potential Project-related effects on marine sediments
Marine Water Quality	Marine waters provide habitat for a wide range of species impacted by its quality. With regards to human health marine water is often used for recreational activities such as swimming, boating and fishing. The pollution prevention provisions of the federal *Fisheries Act* regulate the deposition of deleterious substances into water frequented by fish	♦ Marine Habitat	The VEC will consider potential Project-related effects on marine water quality
Marine Life	Marine species and their habitat, and resources important to the Mi'kmaq and Point Tupper community for recreation and commercial or recreational fishing will be considered. The federal *Fisheries Act* and Nova Scotia *Endangered Species Act* apply	♦ Marine Life	The VEC will consider potential Project-related effects on marine life
Mi'kmaq use of Lands and Resources	It is important to consider current use by First Nations of lands and resources for traditional social, cultural, or spiritual purposes. Federal and provincial governments are required to consider Aboriginal interests and how projects may affect First Nations	♦ First Nations Land and Resource Use	Potential Project-related effects on First Nations' current use of lands and resources for traditional social, cultural and spiritual purposes
Archaeological and Heritage Resources	The 2004 EA identified that the site has low potential for archaeological resources in the Project area. There is, however, a possibility, no matter how unlikely that something could be found. It is also a topic of interest to the Mi'kmaq	♦ Archaeology	Spatial boundary limited to Project footprint
Economic Development	Economic development is a fundamental determinant of socio-economic health. It is important to predict and determine the expected Project-related effects on the economy	♦ Economic Development	The VEC will consider potential Project-related economic effects

Environmental Component	Scoping Considerations	Selected VEC	VEC Definition and Scope
Community Services and Infrastructure	Consideration of local community services (fire, law enforcement and medical) and supporting infrastructure (roadways, water supply) and their capability to accommodate increases in service requirements related to the Project	♦ Key settlements land use, community services and Infrastructure	The VEC will consider potential Project-related effects on local emergency response and support services
Marine Transport	Marine traffic will increase as a result of Project operations. It is important to consider marine transportation from the standpoint of safety, the environment and the economy. Issues related to marine navigation are regulated and administered under the federal *Navigation Protection Act* and *Marine Transportation Security Act*, the International Ship and Port Facility Security (ISPS) Code, and the TERMPOL review process	♦ Marine Navigation	The VEC will consider potential Project-related effects on marine traffic (recreational boating, shipping, commercial and passenger) in the Strait of Canso and Chedabucto Bay, as well as the coastal waters off Nova Scotia
Commercial Fishing and Aquaculture	Fishing and aquaculture are important to the economy of Cape Breton, as well as Nova Scotia. Fishing as a livelihood and as a recreational activity is also valued culturally, and is of importance to First Nations. These activities are regulated by the federal *Fisheries Act*, and the Nova Scotia *Fisheries and Coastal Resources Act*	♦ Fisheries and Aquaculture	The VEC will consider potential effects on commercial, recreational and Aboriginal fisheries and aquaculture industries in Nova Scotia
Land Use	It is important to consider the current land use, land use plans and zoning designations	♦ Key Settlements, Land Use, Community Services and Infrastructure	The Project is compatible with the land use designation of the site, but its development and operation will have impacts on the surrounding communities
Public Health and Safety	Public health and safety is of the utmost importance. Main concerns relate to a potential accidental release of LNG and/or explosion	♦ Key Settlements, Lane Use, Community Services and Infrastructure ♦ Air Quality	The VECs will consider potential Project-related effects on public health and safety Potential effects on emergency and health services are assessed in the Community Services VEC, and effects on other environmental components are assessed in the Malfunctions and Accidental Events section. The Risk Assessment (Appendix B) addresses these concerns

A Project-related effect on a VEC is only possible if there is potential interaction between a Project activity and the VEC. Once VECs have been defined, the next step in the assessment process is to determine potential interactions between Project activities and the identified VECs. Tables 5-3 to 5-5 outline the potential Project interactions with VECs. A VEC-Project activity interaction does not necessarily equate to a Project-related effect on the VEC; rather, it indicates that further analysis is warranted through the effects assessment. The purpose of the assessment is to discuss and evaluate the specific nature and extent of these interactions.

5.2.2 Defining Boundaries and Thresholds

The assessment of a given VEC is bounded spatially, temporally, technically and by certain administrative perspectives.

Spatial boundaries outline the physical limit within which Project interactions with VECs will be considered. They are specific to the VEC being considered; some will be limited to the Project footprint while others will encompass a greater area. These boundaries will be defined for each VEC.

Temporal boundaries include the construction, operation and decommissioning phases of the Project.

Technical boundaries reference any technical limitations associated with the assessment of a VEC or issue. This could be due to limitations in the data, e.g., the availability or extent of data on a VEC, which could compromise the assessment. Any technical boundaries are noted in the evaluation.

Administrative boundaries include the relevant administrative and legislative processes governing the Project. Administrative boundaries are defined for each VEC.

Table 5-3: Project Interactions with Valued Environmental Components (VECs) During Construction and Commissioning

Activity	Sub Component	Biophysical Components											Socioeconomic Components					
		Groundwater	Surface Water	Climate	Air Quality	Acoustic Environment	Terrestrial Habitat	Terrestrial Fauna	Freshwater Fish and Fish Habitat	Species at Risk	Marine Habitat	Marine Life	Key Settlements, Land Use and Community Services and Infrastructure	Economic Development	Marine Navigation	Fisheries, Aquaculture and Marine Harvesting	Archaeology and Heritage Resources	First Nations and Resource Land Use
Construction and Commissioning	Clearing, grubbing, and grading (majority of which is complete)	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓			✓	✓
	Construction and installation of equipment, infrastructure buildings and piping.			✓	✓	✓	✓	✓	✓	✓				✓			✓	✓
	Onsite assembly of the liquefaction modules and construction of the LNG storage tanks.			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓
	Construction of marine terminal facilities.			✓	✓	✓					✓	✓		✓	✓	✓		
	Commissioning (cleaning and drying of equipment, leak checking and hydro testing, function testing of instrumentation, controls and interlocks and verification of software functionality).			✓	✓	✓					✓	✓						

Table 5-4: Project Interactions with Valued Environmental Components (VECs) During Operations

Activity	Sub Component	Biophysical Components											Socioeconomic Components					
		Groundwater	Surface Water	Climate	Air Quality	Acoustic Environment	Terrestrial Habitat	Terrestrial Fauna	Freshwater Fish and Fish Habitat	Species at Risk	Marine Habitat	Marine Life	Key Settlements, Land Use and Community Services and Infrastructure	Economic Development	Marine Navigation	Fisheries, Aquaculture and Marine Harvesting	Archaeology and Heritage Resources	First Nations and Resource Land Use
Operations	Operation of LNG liquefaction trains, supporting infrastructure and LNG storage.			✓	✓	✓	✓	✓	✓	✓				✓			✓	✓
	Routine operation of marine terminal for the loading and unloading of LNG.			✓	✓	✓				✓	✓	✓		✓				✓
	Marine traffic related to operation of the marine terminal.			✓	✓	✓				✓	✓	✓	✓	✓	✓	✓		✓
	Wastewater treatment system.	✓	✓	✓	✓				✓		✓	✓				✓		
	Storm water management system.	✓	✓						✓		✓	✓				✓		

Table 5-5: Project Interactions with Valued Environmental Components (VECs) During Malfunctions, Accidental Events, and Decommissioning

Activity	Sub Component	Biophysical Components											Socioeconomic Components					
		Groundwater	Surface Water	Climate	Air Quality	Acoustic Environment	Terrestrial Habitat	Terrestrial Fauna	Freshwater Fish and Fish Habitat	Species at Risk	Marine Habitat	Marine Life	Key Settlements, Land Use and Community Services and Infrastructure	Economic Development	Marine Navigation	Fisheries, Aquaculture and Marine Harvesting	Archaeology and Heritage Resources	First Nations and Resource Land Use
Malfunctions and Accidental Events	Sedimentation or erosion, particularly during construction.	✓	✓				✓	✓	✓	✓	✓	✓				✓		
	Spills or accidents	✓	✓				✓	✓	✓	✓	✓	✓				✓		
	Accidental release of LNG, fires or explosions.			✓	✓	✓	✓	✓	✓	✓	✓	✓						
	Marine vessel spill or accident			✓	✓	✓				✓	✓	✓			✓	✓		
Decommissioning	Effects expected to be similar to construction. Impacts to be determined with development of a decommissioning plan.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

5.2.3 Analysis, Mitigation and Evaluation

The definition of "environment" in the *NS Environment Act* is as follows:

> 'Environment" means the components of the earth and includes
>
> (i) air, land and water;
>
> (ii) the layers of the atmosphere;
>
> (iii) organic and inorganic matter and living organisms;
>
> (iv) the interacting systems that include components referred to in sub clauses (i) to (iii); and
>
> (v) for the purpose of Part IV, the socio-economic, environmental health, cultural and other items referred to in the definition of environmental effect."

In the provincial legislation "environmental effect" means in respect of an undertaking

a) any change, whether positive or negative, that the undertaking may cause in the environment, including any effect on socio-economic conditions, environmental health, physical and cultural heritage or on any structure, site or thing including those of historical, archaeological, paleontological or architectural significance, and

b) any change to the undertaking that may be caused by the environment, whether that change occurs inside or outside the Province.

The effects evaluation for each VEC and socio-economic issue is conducted by Project phase, i.e., construction, operation, and decommissioning, as well as malfunctions and accidents. For each phase, the study team selects those Project activities that may result in a positive or negative effect on the VEC or socio-economic issue. To determine if there are adverse effects, the study team took the following factors into account:

- Negative effects on the health of the biota;
- Loss of rare and endangered species;
- Loss of critical and/or productive habitat;
- Discharge of persistent and/or toxic chemicals;
- Reductions in the capacity of renewable resources to meet the needs of present and future generations, including those lands and resources used by aboriginal peoples; and
- Interference with the use and enjoyment of property.

Many, if not all, potential adverse effects, can be avoided through the application of good engineering and construction practices, careful timing of activities and adherence to appropriate environmental

management techniques. The assessment will include a description of mitigation and control measures to be employed to minimize Project-related adverse environmental effects. Mitigation measures will be proposed and incorporated into the Project design. Where a positive effect is predicted, methods to augment the effect will be considered.

5.2.4 Residual Effects Prediction

Residual environmental effects are those that remain following the application of mitigation and control measures. A number of factors, or 'rating criteria,' are considered in evaluating residual effects; these include: magnitude, geographic extent, duration and frequency, reversibility and ecological and socioeconomic context. Where available, environmental standards, guidelines or objectives are used as quantitative evaluation criteria, e.g., air quality guidelines.

The following steps are applied to predict residual environmental effects:

- Determine whether environmental effects are adverse. This effects evaluation is conducted per VEC by Project phase. In addition to the rating criteria noted above, a number of factors, including regulatory standards, scientific knowledge and professional judgment, assist in the determination.
- Environmental effects are significant. Definitions as to what constitutes a *significant*, *not-significant* or *positive effect* are provided per VEC. The significance of residual effects is determined through applying the rating criteria identified above; and
- Determine whether a significant residual adverse environmental effect is likely to occur: the probability of occurrence and scientific uncertainty is also considered for any significant adverse environmental effect.

The environmental effects assessment for each VEC will be summarized in a matrix that will outline project interactions with the environment, potential effects, mitigation measures and residual effect significance. The analysis identifies and evaluates the interactions between Project activities and the VEC or socio-economic issue and determines the significance of any residual adverse environmental effects, i.e., effects that may persist after all mitigation strategies have been implemented. Not all consequences of Project development and operation on the identified VECs and socio-economic issues are adverse; beneficial or positive outcomes associated with project development and operation are also identified.

5.2.5 Monitoring and Follow Up

The assessment considers the need for follow-up studies, particularly monitoring programs. Requirements for follow-up and monitoring for a given VEC consider a number of factors including: sensitivity of the VEC to Project activities; public, stakeholder and Aboriginal concerns; regulatory

requirements; and the level of confidence associated with the residual effects rating.

5.3 Cumulative Effects

A consideration in any environmental assessment process is how the proposed Project may interact with past, present or likely, i.e., approved, future projects or activities within the defined spatial and temporal timeframes identified. This sets the Project in its broader ecological and regional development context. Cumulative environmental effects are those effects likely to result from a project in combination with other projects or activities that have been or will be carried out.

Scoping for cumulative environmental effects involves selecting VECs; defining cumulative spatial and temporal boundaries; and identifying certain or reasonably foreseeable projects or activities that could potentially result in cumulative effects with the Project. The following criteria were taken into account when considering inclusion of other projects and activities in the cumulative assessment:

- The project being proposed has a measurable environmental effect;
- The environmental effect is likely to interact cumulatively with the environmental effects from other projects or activities;
- The other projects and activities are not hypothetical, i.e., a degree of certainty has been reached that they will be carried out; and
- There is some probability that the cumulative environmental effect will occur.

5.3.1 Identifying Projects/Activities

The cumulative assessment focuses on effects of future projects and activities in the Project area. The latter were identified based on the knowledge of the study team and through discussions with regulators and local stakeholders. These projects and activities considered to be 'certain' or 'reasonably foreseeable' are:

- Infrastructure tie-ins and corridors to service the Project electrical, gas and water;
- Maher Melford Terminal;
- H-Energy Natural Gas Liquefaction Terminal;
- Goldboro LNG Project; and
- Establishment of Provincial, National and Global GHG Emissions.

The following provides an overview of each of the above with an assessment of the potential for each to overlap spatially and temporally with the Bear Head LNG Project.

Project Infrastructure Tie-ins and Rights-of-Way

It is anticipated that a lateral pipeline will be developed to transport feed gas to the Bear Head LNG facility from Goldboro. The pipeline will be buried in a trench in overland areas, bottom laid across the Strait of Canso and built to technical and environmental management standards approved for existing pipeline systems in the region. The location and routing of the pipeline is currently not known, though it is assumed to follow existing rights-of-way to the Point Tupper area where it will cross the Strait of Canso parallel to an existing gas pipeline. The feed gas pipeline will be evaluated under a separate assessment in coordination with the pipeline development proponent.

In addition to the pipeline right-of-way, it is likely that a new electrical power transmission line and right-of-way will be needed. Water requirements and supplies are still being determined, and it is possible that a new right-of-way will also be required for this utility. Whether the utility is electrical, gas or water, the potential environmental effects of these tie-ins are associated primarily with the physical footprint of the rights-of-way. These are being grouped together for the purposes of the cumulative assessment, based on the similarity of the associated environmental effects.

Maher Melford Terminal

Maher Melford Terminal proposes to develop a 315-acre privately-owned container terminal and intermodal rail facility in Middle Melford, NS, to be located on a 14,000 acre industrial reserve on the Strait of Canso. The proposed project location is across the Strait of Canso from the Bear Head LNG Project site. The terminal is specifically designed as a high volume intermodal container transfer facility, where containers would be moved between vessels and rail. The Maher Melford Terminal is proposed to have an initial capacity exceeding 1.5 million twenty foot equivalent units.

The Melford International Terminal received federal and provincial environmental assessment approval in 2008, but construction has not yet been initiated. There has been considerable uncertainty associated with the development timeline. If the project proceeds, there would likely be some temporal overlap with the Bear Head LNG Project, possibly between the construction phases and certainly between the operation phases. It is probable that the two projects would result in similar types of environmental effects. Given the physical proximity of the two project sites and the planned use of marine transportation, the effects are likely to have some overlapping spatial boundaries.

H-Energy LNG Project

H-Energy has signed an option on two 300 acre parcels of land on the shore in Middle Melford, NS, where they are also proposing to construct and operate an LNG export terminal; the proposed location is almost directly across the Strait of Canso from the Bear Head LNG Project site. The company has completed an LNG terminal concept study and is currently working on pre-FEED, technology selection and environmental permitting. According to their project development plan, H-Energy aims to have one 4.5 mtpa liquefaction train operational in 2020, adding second and third 4.5 mtpa trains in 2022 and 2024 respectively. Should the H-Energy LNG Project proceed according to its project development plan,

it is likely that the construction and operation phases of H-Energy and the Bear Head LNG Project would take place at the same time. It is probable that each project would result in similar types of environmental effects. Given the physical proximity of the two project sites and their planned marine traffic, the effects are likely to have overlapping spatial boundaries.

Goldboro LNG Project

Pieridae Energy (Canada) Ltd. proposes to construct and operate a natural gas liquefaction plant and marine terminal at the Goldboro Industrial Park in Guysborough County, N.S., approximately 50 km to the south and southwest of the Bear Head LNG site. This facility is being designed for a capacity of 10 mtpa. The regulatory process has been initiated, and an application has been made to the NEB for an export permit. Pieridae aims to have the Goldboro LNG Project operational by 2020.

Should the Goldboro LNG Project proceed according to its project development plan, it is likely that the construction and operation phases of the Goldboro LNG Project and the Bear Head LNG Project would overlap. Given the physical distance between the two project locations, construction and operation effects are not anticipated to overlap spatially, but would both contribute to GHG emissions. Both would also exert comparable demands for labour and services.

Provincial, National and Global GHG Emissions

Accelerated climate change is largely attributable to global GHG emissions, resulting in substantial regional, provincial, national and global impacts. Burning fossil fuels produces GHGs, and all fossil fuel-burning projects and activities contribute cumulatively to increasing levels of GHGs. Although global climate change is beyond the assessment scope for any one project or proponent, it is incumbent on all project proponents, developers, regulators and governments to minimize and reduce GHG emissions through consideration and application of policies, plans and programs, and the implementation of best available technologies and management practices.

5.4 Effects of the Environment on the Project

Several naturally occurring environmental factors, including fire, extreme weather events and climate change, could to varying degrees have consequences for the development and operation of the Project. These are referenced as appropriate in the evaluation of specific VECs and socio-economic issues in Section 6 and discussed further in Section 6.6.