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## 9.0 SUMMARY AND CONCLUSIONS

The Bear Head LNG Terminal is to be developed on a 64.7 ha parcel of land optioned by ANEI in the Point Tupper/Bear Head Industrial Park in Richmond County, Nova Scotia. The Project footprint, excluding the marine jetty, is approximately 17 ha. The land is provincial Crown Land designated for heavy industrial development. The municipal planning strategy has designated the Project area as Port Industrial (I-2) zoning, which includes fuel bunkering, marine terminals and other heavy industrial or port activities as required. A development strategy document prepared for the Municipality of the County of Richmond (2000) targeted this area for petrochemical and marine facility developments.

The Project includes the construction and operation of an LNG terminal and associated facilities, which will be built in two phases. Phase I of the Project involves the construction and operation of an approximately 7.5 mtpa capacity LNG terminal with a natural gas sendout capacity of 1,000 MMscfd. Phase II provides for the future expansion of the sendout capacity to 1,500 MMscfd (approximately 11.3 mtpa). This report evaluates both phases of the Project.

The LNG terminal consists of three major components: ship unloading facilities; the LNG storage tank area; and regasification areas (vaporization area). The LNG ship berthing facility and jetty will be designed to berth an LNG ship having a capacity of up to 250,000 m<sup>3</sup>. The storage tanks have an individual capacity of 180,000 m<sup>3</sup>. Phase I includes two such tanks for the initial development with a third tank planned for Phase II when market conditions are appropriate.

This report provides the basis for an Environmental Screening under the *CEAA* and satisfies the requirements for a Class I Registration under the Nova Scotia *Environment Act*. It describes and evaluates the potential environmental and socio-economic effects of the Project during all Project phases. The evaluation has included proposed mitigative measures, where required, to eliminate or minimize potential significant impacts arising from Project related activities. The report is based on information collected during field surveys, modelling, consultation with government and non-government agencies and individuals, background research and professional judgement of the Study Team.

A scoping process was undertaken to identify VECs and VSCs most appropriate for this assessment. This scoping included: regulator and stakeholder consultation; regulatory issues and guidelines; research; and professional judgement. The following VECs and VSCs were selected for the assessment:

- Groundwater;
- Air Quality;
- Acoustic Environment;
- Marine Benthic Habitat and Communities;
- Marine Fish and Fish Habitat;

- Marine Mammals;
- Freshwater Habitat;
- Wetlands;
- Rare Mammals;
- Rare Herpetiles;
- Birds;
- Rare Vegetation;
- Archaeological and Heritage Resources;
- Marine Transportation;
- Fisheries and Aquaculture;
- Land Use;
- First Nations Land and Resource Use;
- Community Services and Infrastructure; and
- Economic Development.

Each of the VECs and VSCs selected for the assessment was evaluated for potential interactions between the VEC/VSC and Project activities during all project phases (*i.e.*, construction, operation and decommissioning) and including malfunctions or accidents that may occur. These interactions were evaluated for potential significance after application of technically and economically feasible mitigative measures, where appropriate, to reduce or eliminate potential adverse Project related environmental effects. The potential for cumulative effects between the Bear Head LNG Project and other likely or reasonably foreseeable projects and activities was also evaluated. Environmental monitoring and follow-up measures will be undertaken, where necessary, to ensure compliance with applicable regulations, standards, and guidelines, as well as to verify impact predictions and refine mitigative measures where required.

## 9.1 Mitigation, Follow-up and Monitoring Summary

Table 9.1 summarizes the mitigative measures, and monitoring and follow-up actions proposed for each VEC/VSC.

<b>Table 9.1 Summary of Mitigation, Follow-up and Monitoring</b>		
<b>VEC/VSC</b>	<b>Mitigation</b>	<b>Follow-up and Monitoring</b>
Groundwater	<ul style="list-style-type: none"> <li>• Stormwater Management Plan</li> <li>• Adherence to EPP</li> <li>• Spill Management Plan</li> <li>• Emergency Response and Contingency Plan</li> </ul>	<ul style="list-style-type: none"> <li>• If bulk storage of petroleum hydrocarbons (other than LNG or diesel fuel for back up generators) or other chemicals are to be stored on the site then a groundwater monitoring program for the particular chemical of concern should be undertaken.</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>• Dust control program</li> <li>• Use of liquid nitrogen for initial cool-down, if feasible</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring particulate emissions during construction</li> <li>• Co-operative monitoring programs as part of an airshed management approach</li> </ul>

<b>Table 9.1 Summary of Mitigation, Follow-up and Monitoring</b>		
<b>VEC/VSC</b>	<b>Mitigation</b>	<b>Follow-up and Monitoring</b>
Acoustic Environment	<ul style="list-style-type: none"> <li>• Use of heavy acoustic blanketing material during pile driving activities</li> <li>• Impose time restrictions on pile driving activities if threshold levels are exceeded at nearby residences</li> <li>• Truck routing to avoid sensitive areas</li> <li>• Engineering design of the facility to minimize operational noise</li> </ul>	<ul style="list-style-type: none"> <li>• Noise monitoring during the construction period</li> <li>• Monitoring to be conducted if complaints arise due to truck traffic through the towns during construction.</li> <li>• One round of operational monitoring to establish baseline operational noise levels</li> </ul>
Marine Benthic Habitat and Communities	<ul style="list-style-type: none"> <li>• Silt curtains, debris booms, if feasible</li> <li>• Habitat compensation, if required by DFO</li> <li>• Adherence to EPP</li> <li>• Stormwater Management Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Stormwater runoff will be monitored to ensure that the TSS concentrations meet regulatory standards</li> <li>• Post construction annual underwater video survey of the jetty and surrounding area to verify predictions and compare with baseline data</li> </ul>
Marine Fish and Fish Habitat	<ul style="list-style-type: none"> <li>• Silt curtains, debris booms, if feasible</li> <li>• Adherence to EPP</li> <li>• Stormwater Management Plan</li> <li>• Compliance with <i>CEPA</i> requirements and any other applicable guidelines and regulations</li> </ul>	<ul style="list-style-type: none"> <li>• Stormwater runoff will be monitored to ensure that the TSS concentrations meet regulatory standards</li> </ul>
Marine Mammals	<ul style="list-style-type: none"> <li>• Halt pile driving activities if a whale is observed within 500 m and resume activities after whale has cleared the area</li> <li>• Standard vessel operating procedures including avoidance measures</li> </ul>	<ul style="list-style-type: none"> <li>• An observer will monitor a 500 m safety zone for whales during pile driving and should one be sighted, will issue an order to stop pile driving until the area is clear of whales</li> </ul>
Freshwater Habitat	<ul style="list-style-type: none"> <li>• Stormwater Management Plan</li> <li>• Avoid instream work during sensitive time periods (May 15 to July 15 and October to December) for onsite roads/pipelines, if necessary</li> <li>• Implement appropriate stream crossing techniques and comply with Water Approval</li> <li>• Adherence to EPP</li> <li>• Spill Management Plan</li> <li>• Emergency Response and Contingency Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Upon final siting of the road, piping and on-shore facilities, several follow-up surveys will be conducted to permit the refinement of site specific mitigative measures</li> <li>• Erosion and sedimentation control structures inspected</li> <li>• Surface water sampling</li> </ul>
Wetlands	<ul style="list-style-type: none"> <li>• Minimize ground disturbance in wetlands</li> <li>• Avoid wetland habitat whenever practical</li> <li>• Spill Management Plan</li> <li>• Stormwater Management Plan</li> <li>• Schedule clearing and grubbing outside of the breeding season for most migratory bird species (April through August)</li> <li>• Adherence to EPP</li> <li>• Ensure that cleared areas are well vegetated</li> <li>• Use of invasive non-native species for reclamation will be avoided</li> <li>• Clean equipment prior to and after working in or near wetlands to minimize potential for introduction of invasive non-native species.</li> </ul>	<ul style="list-style-type: none"> <li>• Field survey in Wetland 6 if the security fence passes through this area</li> </ul>
Rare Mammals	<ul style="list-style-type: none"> <li>• Minimize area of disturbance</li> <li>• Minimize duration of noise disturbance</li> <li>• Reduce speed limit on access road</li> </ul>	<ul style="list-style-type: none"> <li>• None recommended</li> </ul>

<b>Table 9.1 Summary of Mitigation, Follow-up and Monitoring</b>		
<b>VEC/VSC</b>	<b>Mitigation</b>	<b>Follow-up and Monitoring</b>
Rare Herpetiles	<ul style="list-style-type: none"> <li>• Minimize area of disturbance</li> <li>• Avoid wetland habitat to the extent practicable</li> <li>• Wetland mitigation including erosion and sediment control</li> </ul>	<ul style="list-style-type: none"> <li>• Herpetile studies to be conducted in Wetland 6 if required.</li> </ul>
Birds	<ul style="list-style-type: none"> <li>• Clear and grub outside of the breeding season for most bird species (April to August)</li> <li>• Minimize clearing as much as possible</li> <li>• Implement erosion control measures to minimize effects on aquatic bird habitat and foraging activities</li> <li>• Reduce speed on access roads</li> <li>• Use of low intensity lighting and direct light downward</li> <li>• Record bird mortality during routine site monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• In the event of a sizeable spill of oils, it is anticipated that the spill response program will include oiled bird monitoring and recovery</li> <li>• If significant lighting related mortalities are occurring, CWS will be consulted to discuss appropriate mitigative strategies.</li> </ul>
Rare Vegetation	<ul style="list-style-type: none"> <li>• Establish undisturbed buffer between proposed process area and Wetland 2</li> <li>• Adherence to EPP (particularly with regard to provisions to protect southern twayblade)</li> <li>• Stormwater Management Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Follow-up rare plant survey in June 2004 to assess the distribution and abundance of southern twayblade in the area</li> <li>• Develop and implement a monitoring plan for southern twayblade</li> </ul>
Archaeological and Heritage Resources	<ul style="list-style-type: none"> <li>• Report any features, artifacts or other cultural material to NSM prior to proceeding with construction activities</li> <li>• Archaeological excavation of resources that may be disturbed</li> <li>• Archaeological Contingency Plan</li> </ul>	<ul style="list-style-type: none"> <li>• If any alterations to the Project are made, any new areas under consideration will be subjected to a heritage resources impact review.</li> <li>• If previously unidentified archaeological or heritage resources are identified by site personnel during construction activities, the procedures in the Archaeological Contingency Plan should be followed, including immediate contact with the NSM.</li> </ul>
First Nations Land and Resource Use	<ul style="list-style-type: none"> <li>• To be developed, if required, following Mi'kmaq knowledge study (MKS) results</li> </ul>	<ul style="list-style-type: none"> <li>• To be determined following MKS results.</li> </ul>
Marine Transportation	<ul style="list-style-type: none"> <li>• MCTS Notices to Mariners and Notices to Shipping</li> <li>• All vessels subject to the standards and regulations under the <i>Canada Shipping Act</i>, the <i>Labour Code</i>, and the <i>Oceans Act</i></li> <li>• Movement of vessels subject to the <i>Practices and Procedures for Public Harbours</i> under the <i>Canada Marine Act</i>.</li> <li>• Crew of LNG carriers qualified to <i>IMO Standards for Training and Certification of Watchkeeper</i></li> <li>• LNG vessels meet standards of the Classification Societies</li> <li>• Inspections by Transport Canada Marine Safety Inspectors under the <i>Port State Control</i> legislation</li> <li>• Tugs used in the berthing process</li> <li>• <i>NWPA</i> approval process</li> <li>• Navigation aids as required</li> </ul>	<ul style="list-style-type: none"> <li>• The TERMPOL Review Process and current navigation and safety regulations built into the protocols for navigating in and near the Strait of Canso make up the necessary monitoring regime for the Project.</li> </ul>

<b>VEC/VSC</b>	<b>Mitigation</b>	<b>Follow-up and Monitoring</b>
Fisheries and Aquaculture	<ul style="list-style-type: none"> <li>• Establishing communications and dialogue with fisheries industry</li> <li>• Targeting construction in fall or winter to reduce the numbers of fishers potentially impacted by construction</li> <li>• Using established shipping lanes and other navigation safety protocols</li> <li>• Participation in the TERMPOL process</li> <li>• Fishery Compensation Plan</li> </ul>	<ul style="list-style-type: none"> <li>• ANEI will engage in the TERMPOL planning process and the <i>NWPA</i> application process to enhance navigation safety for all vessels including fishers.</li> </ul>
Land Use	<ul style="list-style-type: none"> <li>• Compliance with municipal zoning stipulations</li> <li>• Sufficient notice to Nova Scotia Community College (NSCC) to allow for planning of alternate access or training sites</li> <li>• Signage and/or security personnel to inform recreational users of restricted access</li> <li>• ANEI will take under consideration the development of a trail around the perimeter of the site for potential use for nature walking and access to Bear Island Head</li> </ul>	<ul style="list-style-type: none"> <li>• None recommended</li> </ul>
Community Services and Infrastructure	<ul style="list-style-type: none"> <li>• Development of a security plan with the RCMP and fire and emergency health response plans with local emergency responders</li> <li>• Communication of construction schedule with local business</li> <li>• Reconstruction of last km of Bear Island Road</li> </ul>	<ul style="list-style-type: none"> <li>• None recommended</li> </ul>
Economic Development	<ul style="list-style-type: none"> <li>• Communication with unions and local suppliers</li> </ul>	<ul style="list-style-type: none"> <li>• None recommended</li> </ul>

Decommissioning and abandonment of the Terminal facilities will be undertaken in accordance with the regulatory requirements at the time of such activities. Removal of buildings and structures is expected to have similar effects and considerations as construction and will be conducted in accordance with regulatory requirements applicable at the time of removal.

## 9.2 Residual Effects Summary

Table 9.2 summarizes the residual environmental effects for each VEC and VSC for Project construction and operation and malfunctions and accidents.

<b>VEC/VSC</b>	<b>Significance</b>			<b>Probability of Occurrence<sup>1</sup></b>	<b>Scientific Uncertainty</b>
	<b>Construction</b>	<b>Operation</b>	<b>Malfunctions and Accidental Events</b>		
Groundwater	N	N	N	n/a	n/a
Air Quality	N	N	S	1	3
Acoustic Environment	N	N	N	n/a	n/a
Marine Benthic Habitat and Communities	N	N	N	n/a	n/a
Marine Fish and Fish Habitat	N	N	N	n/a	n/a

<b>Table 9.2 Summary of Residual Environmental Effects</b>					
VEC/VSC	Significance			Probability of Occurrence <sup>1</sup>	Scientific Uncertainty
	Construction	Operation	Malfunctions and Accidental Events		
Marine Mammals	N	N	N	n/a	n/a
Freshwater Habitat	N	N	N	n/a	n/a
Wetlands	N	N	N	n/a	n/a
Rare Mammals	N	N	N	n/a	n/a
Rare Herpetiles	N	N	N	n/a	n/a
Birds	N	N	S	1	3
Rare Vegetation	N	N	S	1	3
Archaeological and Heritage Resources	N	N	N	n/a	n/a
First Nations Land and Resource Use	N	N	N	n/a	n/a
Marine Transportation	N	N	N	n/a	n/a
Fisheries and Aquaculture	N	N	S	1	3
Land Use	P	P	N	n/a	n/a
Community Services and Infrastructure	N	N	N	n/a	n/a
Economic Development	P	P	N	n/a	n/a

**KEY**

**Significance:** S= Significant Adverse Effect; N= Non-significant Adverse Effect; P= Positive Effect  
**Probability of Occurrence:** Based on professional judgement; 1= Low; 2 = Medium; 3 = High; n/a = not applicable (effect is not predicted to be significant).  
**Scientific Uncertainty:** Based on scientific information and statistical analysis or professional judgement; 1 = Low level of confidence; 2 = Medium level of confidence; 3 = High level of confidence; n/a = not applicable (effect is not predicted to be significant).

<sup>1</sup>Likelihood is defined only for effects that are evaluated as significant (CEA Agency 1994).  
n/a = Not Applicable

With the implementation of the proposed mitigation measures, adverse residual environmental effects of routine Project related construction and operation are predicted to be not significant for all VECs/VSCs with the exception of land use and economic development for which positive effects are predicted. Positive effects are predicted on economic development in the region during the construction and operations phases. In addition, a positive effect on land use is predicted based on compliance with zoning stipulations for the development of land for its intended use.

As in the construction phase, significant adverse effects associated with decommissioning and abandonment activities are not predicted.

In the highly unlikely event of a Project related ship collision with an oil tanker (which carries considerably more oil than LNG ships), resulting in a large oil spill, significant adverse effects are predicted for seabirds and fisheries and aquaculture resources; however, this significant effect is highly unlikely to occur. An accidental event at the terminal resulting in a fire spreading to surrounding vegetation could result in a significant adverse effect on rare vegetation (southern twayblade) and air quality; however, these significant effects are also highly unlikely. An Emergency Response and Contingency Plan is expected to reduce the magnitude of effects resulting from fire and other serious

accidental events. In addition, design features and safety precautions at the facility will minimize the likelihood of significant effects due to fires.

Cumulative effects have also been evaluated as part of this assessment. Past projects or activities potentially affecting VECs/VSCs have been considered in the description of existing conditions as applicable for each VEC/VSC. Likely future projects and activities identified include the proposed Point Tupper NSP Coal Terminal and the Maritimes and Northeast Pipeline (future tie-in). Temporal overlap with the coal terminal project is not likely, and the substantial spatial separation (8 km) will minimize the potential for cumulative effects with the LNG project. While the pipeline construction schedule is unknown and may overlap with the LNG project, the spatial overlap (in terms of potential effects on VECs and VSCs) is likely to be limited to the area in the vicinity of the tie-in. Both the coal terminal and pipeline projects will be subject to regulatory requirements for environmental management as will the LNG project. Significant adverse cumulative effects are predicted to be unlikely. As a result of these projects, a positive cumulative effect on economic development in the region is predicted. A positive impact on land use is also predicted. Implementation of the mitigative measures contained in this report and adherence to applicable legislation and guidelines will ensure that significant cumulative environmental effects will be unlikely.

Effects of environment on the project were evaluated as part of the assessment. Conditions evaluated include: extreme weather; sea ice; climate changes and sea level rise; and seismic activity. Project facilities will be designed and installed based on the appropriate environmental design criteria to ensure the safety and integrity of these facilities during severe environmental conditions. All Project facilities will be designed and constructed with the appropriate meteorological, climatological, oceanographic and geotechnical data. The design will incorporate an adequate factor of safety to deal with anticipated changes in weather severity during the lifetime of the Project, including storms and sea level rise associated with climate change. Monitoring and/or contingency planning will also serve to minimize any adverse effects. Effects of the environment on the Project are therefore predicted to be not significant.

### **9.3 Conclusions**

In conclusion, the Bear Head LNG Project is not likely to have significant adverse effects on the environment. The Project will contribute to the development of the oil and gas industry in Atlantic Canada by establishing a viable facility and operation that will result in economic benefits for the region. Positive effects on land use are also predicted. Adverse environmental effects will be reduced to acceptable levels through the use of technically and economically feasible design and mitigation measures.