1.0 INTRODUCTION

NSP Maritime Link Inc.[2] (operating as ENL), a wholly owned subsidiary of Emera Newfoundland and Labrador Holdings Inc., is proposing to construct and operate a new 500 megawatt (MW) [+/- 200 kilo volts (kV)] high voltage direct current (HVdc) and high voltage alternating current (HVac) transmission line, and associated infrastructure, between Granite Canal, Newfoundland and Labrador, and Woodbine, Nova Scotia (the Project; the Maritime Link). The Project will link the provincial electrical power transmission systems of Newfoundland and Labrador (NL) and Nova Scotia (NS). The location of the Project is shown in Figure 1.1.1.

This document is intended to fulfill the environmental assessment (EA) requirements for the construction and operation of the Project. Specifically, this document addresses the requirements of a transitional screening-level assessment under the former *Canadian Environmental Assessment Act (CEAA)* (1992); an Environmental Preview Report (EPR) under the Newfoundland and Labrador *Environmental Protection Act (*NL*EPA)*; and a Class 1 Undertaking under the Nova Scotia *Environment Act (*NS*EA)*. The EA has been prepared to respond to the Guidelines for the Preparation of an Environmental Assessment Report (the Guidelines) which were collaboratively developed for the Project by the Governments of Canada, Newfoundland and Labrador and Nova Scotia (2012) (Appendix A).

ENL regards environmental protection as a continuously evolving process that applies to all aspects of the company's operations. Environmental assessment is one step, albeit an important one, in this overall process of adaptive environmental management. The broader regulatory compliance continuum runs from policy to construction to operation, including design, EA, permitting, mitigation, follow-up studies, and effects monitoring.

Environmental assessment is designed specifically for application at the conceptual and design phases of project planning. It requires careful consideration of avoiding or minimizing potential environmental challenges as part of project design. This requires the planning process to be sufficiently advanced to identify and avoid where possible such challenges, but still leaving sufficient flexibility in design to mitigate remaining foreseeable problems. This approach promotes a seamless transition from the assessment to the balance of the regulatory approval processes (*e.g.,* permitting), wherein precise mitigation measures and monitoring activities specific to certain environmental effects are required before operations may commence.

[2] As of October 16, 2012 the corporate name of the proponent Emera Newfoundland and Labrador Holdings Inc. subsidiary for this Project was changed from ENL Maritime Link Inc.

Emera Newfoundland & Labrador

Coordinate System: WGS 94 Mercator

Data Sources: CEF, DFO, CHS, EDM

Scale: 1:7,500,000

Date: 18/12/2012

FIGURE 1.1.1

Project Site Location

ENL-053

The Project as presented in this environmental assessment report is based on the conceptual and functional engineering designs. Flexibility is built into the EA process by establishing a Study Area around the proposed route. This approach allows flexibility for changes, such as micrositing of towers, to meet the requirements of the EA and subsequent permitting processes that apply to the Project. ENL is firmly convinced that this hierarchical approach between assessment and permitting, coupled with the monitoring and other commitments made in this report, provides a very effective and reliable level of environmental protection and management.

By its very nature environmental assessment involves application of the precautionary principle. Determining and assessing the risks of various environmental effects draws upon the most recent information from the relative fields of the physical, biological, social and economic sciences, as well as traditional ecological knowledge. In spite of best efforts, however, full scientific certainty is seldom possible.

The precautionary principle has been defined and interpreted as it applies in a general legal sense, in a policy context, as well as in regard to environmental assessment. Thus, in the Supreme Court of Canada case *Spraytech v. Hudson* (Ville) the court ruled that where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. Canada's official policy on applying the precautionary principle (Privy Council Office 2003) states that, "Given the significant scientific uncertainty implicit in the application of precaution, follow-up activities such as research and scientific monitoring are usually a key part of the application of precaution." The Federal Court of Canada has provided guidance on the use of the precautionary principle to the effect that, eliminating all environmental risk is not a precondition to the approval of a project under *CEAA*; rather, adaptive management, being one form of preventative measure, is appropriately employed in the face of scientific uncertainty.

Accordingly, the precautionary principle does not suggest scientific certainty is required for any particular action to be approved. Rather, the principle suggests that when faced with scientific uncertainty, proactive measures should be taken to mitigate against harmful effects. In the context of an EA, the proposed mitigation measures are defined broadly prior to approval and more detail provided as the project becomes defined.

Taking account of this legal and policy guidance, in this environmental assessment ENL has been both rigorous and cautious with respect to the use of scientific information in defining and assessing environmental risks. To further bolster this cautionary approach, where there is some residual scientific uncertainty regarding residual effects following mitigation, commitments have been made for follow-up activities and monitoring programs to verify conclusions or adapt as appropriate.

What the precautionary principle requires in practice has been considered in a number of Federal Court of Canada decisions, arising from judicial review challenges to *CEAA* screenings and comprehensive studies. Federal Court decisions provide guidance, such as the following:

- "… a Screening Report and decisions under *CEAA* can describe general mitigation measures which will be detailed and resolved in the future when the exact project design is determined. This is consistent with the preliminary and predictive nature of an environmental assessment." In this case, the court specifically held that the responsible authorities did not breach the precautionary principle by relying upon the promise of future studies on migratory birds in determining that the proposed bridge would not result in significant adverse environmental effects [*Canadian Transit Co. v. Canada* (Minister of Transport), 2011 FC 515 at para. 214 (Federal Court of Canada)];

- eliminating all environmental risk is not a precondition to the approval of a project under *CEAA*; rather, adaptive management, being one form of preventative measure, is appropriately employed in the face of scientific uncertainty [*Pembina Institute for Appropriate Development v. Canada (Attorney General),* 2008 FC 302 at para. 32 (Federal Court of Canada)].

1.1 THE PROPONENT

Emera Inc. (Emera) is an energy and services company that provides electricity generation, transmission and distribution, as well as gas transmission and utility energy services. Emera shares are listed on the Toronto Stock Exchange and trade under the symbol EMA. Emera is the parent company of Emera Newfoundland and Labrador Holdings Inc., of which NSP Maritime Link Inc. (operating as ENL), the proponent of the Project, is a wholly owned subsidiary.

ENL was established following the signing of a Term Sheet agreement between Emera and Nalcor Energy (Nalcor), on November 18, 2010, with the endorsement of the governments of Nova Scotia (NS) and Newfoundland and Labrador (NL). Under this agreement, Emera agrees to construct the Maritime Link and to provide transmission capacity on the Maritime Link to Nalcor, and Nalcor agrees to supply renewable power to Emera. The development of the Maritime Link is being managed and executed by ENL. As the Project proponent, ENL is responsible for Project design, engineering, construction, commissioning, operation, and maintenance. The Maritime Link, as well as the agreement with, and undertakings by, Nalcor, are components of a major economic development opportunity for Canada. The Maritime Link will significantly contribute to the federal government requirements for meeting greenhouse gas (GHG) emissions targets, which align with provincial legislation. Moreover, construction and operation of the Project will contribute to positive economic outlook of the Atlantic Provinces through: employment opportunities: contributing to the stabilization of power rates by reducing dependence on imported fossil fuels; reduction GHG emissions; and greater reliance on regional domestic sources of energy created by the first-time interconnection of the power transmission systems of the two provinces. Furthermore, the Project is a capital intensive undertaking at a time when the cost of borrowing is at historic lows.

Health and Safety is ENL's number one priority. The Project Health, Safety and Security Management Plan (HSSMP) promotes safety at every opportunity. Through this Plan, a Health and Safety Program has been implemented which includes the establishment of a Joint Occupational Health and Safety Committee. The mandate of the Joint Occupational Health and Safety Committee is to implement and foster respect for the Health and Safety Management System. Similarly, the Environment Policy establishes a commitment to meeting business objectives in a manner which is respectful and protective of the environment, and in full compliance with legal requirements and Company policy. For more information, refer to the ENL website (www.emeranl.com).

Emera is working towards a healthy environment by building a cleaner, more sustainable energy future for our communities. As an Emera company, ENL benefits from a long history of environmental stewardship and experience. ENL is committed to operating in a manner that is respectful and protective of the environment. All operations are subject to an Environmental Management System (EMS) that is consistent with the ISO 14001 standard. The overall objective of the EMS is continual improvement in environmental performance while complying with all regulatory requirements.

The Proponent contact information is as follows:

Name of Corporate Body:	NSP Maritime Link Inc.
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Telephone:	(902) 450.0507 / 1.800.450.0507
Fax:	(902) 428.6112
Website:	www.emera.com
President:	Rick Janega P.Eng.
Signature: Rick Janega	
Principal Contact for the Purpose of the EA Report:	Ken Meade B.Sc., MES Senior Manager, Environment and Aboriginal Affairs Phone: 902.428.6582 E-mail: ken.meade@emera.com

This EA Report was prepared by ENL staff under the supervision of Ken Meade B.Sc., MES, Director, Environment and Aboriginal Affairs with input from:

- Gordon Beanlands Ph.D.
  Senior Advisor to ENL
- Carys Burgess B.Sc., MMM
  Sr. Environmental Specialist
  Strum Environmental
- Subject Matter Experts
  Stantec Consulting Ltd.

Qualifications of individuals involved with field surveys in support of migratory birds, species at risk (SAR), species of conservation interest (SOCI), and wetland delineations, are available upon request.

1.2 PROJECT OVERVIEW

The Maritime Link involves the construction and operation of a new 500 MW (+/- 200 kV) HVdc as well as a 230 kV HVac transmission line, and associated infrastructure, between Granite Canal, Newfoundland and Labrador, and Woodbine, Nova Scotia. An overview of all relevant jurisdictions is shown in Figure 1.2.1.

The Project is divided into three distinct geographical regions described below:

1. Island of Newfoundland: The Project overview for the island of Newfoundland includes an estimated 293 km of transmission line along new and existing corridors between Granite Canal and Cape Ray (Figure 1.2.2). The associated infrastructure will include one switchyard; one converter station; one transition compound; one onshore cable anchoring site; up to approximately 28 km of grounding line; and approximately 2 km of underground cable. The transmission line from Granite Canal to Bottom Brook will be HVac; the HVdc portion will run from Bottom Brook and end near Cape Ray.
2. Cabot Strait: Two subsea HVdc cables will span approximately 180 km from Cape Ray, Newfoundland and Labrador, to Point Aconi, Nova Scotia (Figure 1.2.3). This portion of the Project includes two grounding sites (Figures 1.2.2 and 1.2.4), and two landfall sites where the cables will come ashore in Nova Scotia and on the island of Newfoundland.
3. Nova Scotia: The Project overview for Nova Scotia includes an estimated 46 km of new HVdc transmission line, parallel to an existing transmission corridor, between Point Aconi and an existing substation at Woodbine (Figure 1.2.4). Associated infrastructure includes one converter station; one transition compound; one anchor site; up to approximately 50 km of grounding line; and approximately 1 km of underground cable.

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Data Sources: Geobase - Road Network; Geogratis - National Atlas

Scale: 1:2,000,000

Date: 21/11/2012

FIGURE 1.2.1

Overview of the Maritime Link Project

ENL0054

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Data Sources: Geobase - Road Network, Geogratis - National Atlas

Scale: 1:850,000

Date: 9/21/12

FIGURE 1.2.2

Overview of the Project
Island of Newfoundland

ENL0055

Emera Newfoundland & Labrador

FIGURE 1.2.3

Overview of the Project
Cabot Strait

Coordinate System: UTM NAD 83 Zone 21

Data Sources: Geogratis- National Atlas

Scale: 1:800,000

Date: 18/12/2012

ENL056

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 20

Data Sources: Geobase - Road Network, Geogratis - National Atlas

Scale: 1:400,000

Date: 9/18/12

FIGURE 1.2.4

Overview of the Project
Cape Breton, Nova Scotia

ENL0057

In Atlantic Canada, as in many other jurisdictions, new energy resources are being aggressively pursued and developed, particularly wind and tidal power. Although these renewable energy alternatives can collectively account for a substantial increase in electrical power, unfortunately, even when fully developed, operations remain intermittent and inadequate for providing a sufficient or reliable base load without redundant backup sources. Substantial commercial tidal power production is a number of years away and there are no remaining untapped major hydroelectric opportunities within Nova Scotia. The Maritime Link offers a valuable opportunity to build a diversified energy portfolio within Nova Scotia. Power from the Lower Churchill Hydroelectric Generation Project will result in surplus energy in Newfoundland and Labrador which qualifies as renewable energy, and will greatly contribute to meeting Nova Scotia's Renewable Energy Standards (RES). In addition to reductions in coal imports, displacing coal-fired powered generation with stable, renewable energy from Newfoundland and Labrador will lead to reduced emissions of carbon dioxide (CO_2), as well as proportionate reductions of sulphur dioxide (SO_2), nitrogen oxides (NO_x), particulates and other emissions.

Table 1.2.1 illustrates the potential reductions of CO_2, SO_2, NO_x (nitric oxide and nitrogen dioxide), and mercury when displacing one terawatt hour of energy produced from a typical coal-fired generating unit with one terawatt hour of renewable energy. Under the terms of the definitive agreements with Nalcor, one terawatt hour per year will be transmitted on the Maritime Link for use in Nova Scotia, with an additional 2 terawatt hours per year available for use in Atlantic Canada.

Table 1.2.1 Potential Annual Emissions Reductions in Kilo Tonnes (kt) Resulting from the Displacement Of Energy Produced from Coal with Renewable Energy Delivered Through the Maritime Link

	NS Block (approximately 1TWh)	Expanded Block (2TWh)	Total (3TWh)
CO_2	1000 kt	2000 kt	3000 kt
SO_2	10 kt	20 kt	30 kt
NO_x	2 kt	4 kt	6 kt
Mercury	20 kg	40 kg	60 kg
*Numbers are based intensities from all four units of the Lingan Generating Station using 2011 data.			

Energy will be delivered through the Maritime Link to existing transmission facilities in Cape Breton to distribute more renewable energy to Nova Scotia and throughout the Maritime region.

1.3 NON-GOVERNMENTAL PARTICIPANTS

The main non-governmental participants in the EA process include:

- Aboriginal groups (*i.e.*, the Mi'kmaq of Nova Scotia as represented by the Assembly of Nova Scotia Mi'kmaq chiefs, Mi'kmaq of Nova Scotia living off reserve, and the Mi'kmaq of Newfoundland as represented by the Qalipu Mi'kmaq First Nation Band);
- local residents/communities (Project community);

- landowners;
- commercial fishing interests;
- special interest groups;
- economic development associations;
- non-governmental organizations (NGOs); and
- Emera and affiliate employees.

Engagement with these stakeholders is described in greater detail in Section 3.

1.4 REGULATORY FRAMEWORK

Federal and provincial regulatory approvals under the former *CEAA*, NL*EPA* and NS*EA* are required for the Maritime Link to proceed. Environmental legislation and other regulatory approvals that are applicable to the Project are described below.

1.4.1 FEDERAL

On November 30, 2011, ENL filed a Project Description with the Canadian Environmental Assessment Agency (CEA Agency) (Emera 2011). Subsequently, a Notice of Commencement for January 19, 2012 was posted to mark the start of the federal EA process and to advise of coordination among the governments of Canada, Newfoundland and Labrador and Nova Scotia. According to the federal Cabinet Directive on Improving the Performance of the Regulatory System for Major Resource Projects, it was determined that the Project would be considered a Major Resource Project (MRP) by the Major Projects Management Office (MPMO). Based on available information the following federal departments are likely Responsible Authorities (RAs) for the Project, as they may exercise one of the following powers or, perform one of the following duties or functions:

- Transport Canada (TC) for approval under the *Navigable Waters Protection Act* (*NWPA*);
- Fisheries and Oceans Canada (DFO) for authorization under the *Fisheries Act* (amended June 2012);
- Environment Canada (EC) for a permit under the *Canadian Environmental Protection Act (CEPA)*;
- Public Works and Government Services Canada (PWGSC) is an RA as it may issue a permit for the occupation of real property;
- Enterprise Cape Breton Corporation (ECBC) is a possible RA due to the likely requirement to acquire federal lands in Cape Breton to carry out the Project; and
- Natural Resources Canada (NRCan) is an RA as it may provide financial assistance through the provision or purchase of a loan guarantee for the Project.

- *CEAA* 2012 came into force on July 6, 2012. On that date, the Maritime Link was designated by the federal Minister of Environment to continue as a screening level environmental assessment under the former *CEAA* (*i.e.*, *CEAA* 1992). Under the MPMO initiative for the Project it has been determined that the EA process will be conducted within a nine-month time line.
- The status of the environmental assessment for the Maritime Link Project is available on the Canadian Environmental Registry: www.ceaa-acee.gc.ca.

1.4.2 PROVINCIAL

1.4.2.1 Newfoundland and Labrador

The provincial EA requirements for Newfoundland and Labrador are set out in the NL*EPA*. The Project was registered under the NL*EPA* (Part X), and pursuant to s.3 4(2) of the associated Environmental Assessment Regulations whereby “an undertaking that will be engaged in the construction of new electric power transmission lines or the relocation or realignment of existing lines where a portion of a new line will be located more than 500 m from an existing right of way (RoW) shall be registered.” Considerable efforts were made in the Project planning process to identify a route alternative that followed existing RoWs to the extent feasible. Over 85% of the proposed 293 km transmission route on the island of Newfoundland meets this requirement, thereby reducing potential environmental effects when compared with alternatives.

As the first step of the EA process, the Project was registered with the submission of the Project Description (Emera 2011) to the Newfoundland and Labrador Department of Environment and Conservation (NLDEC) on November 30, 2011. This document described the Project and demonstrated how the best practicable technology and methods would be used to minimize potential harmful effects. Based on a review of the Project Description, the Minister issued a decision on January 30, 2012, that an Environmental Preview Report (EPR) would be required for the Project.

Feedback from the Interdepartmental Land Use Committee (ILUC) was received in March 2012. All comments from participating departments and recommendations from the ILUC have been incorporated into this document.

1.4.2.2 Nova Scotia

The Nova Scotia provincial EA requirements are set out in the NS*EA*, under the Environmental Assessment Regulations. Schedule A of the Regulations designates specific undertakings for the EA, and the Environmental Assessment Branch of Nova Scotia Environment (NSE) is responsible for administering the EA process. Accordingly, the Project has been designated as a Class 1 undertaking since it involves, “a modification, extension, abandonment, demolition or rehabilitation of an undertaking listed in Schedule A which was established either before or after March 17, 1995.”

1.4.3 MI'KMAQ OF NOVA SCOTIA

Policies and guidelines relating to engaging the Mi'kmaq of Nova Scotia throughout the EA process include:

- Proponent's Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia (NSOAA 2011a); and
  - Mi'kmaq Ecological Knowledge Study Protocol (Assembly of Nova Scotia Mi'kmaq Chiefs 2007).

The Proponent's Guide was used in the planning of the Project to guide engagement activities with the Mi'kmaq of Nova Scotia. Section 3 outlines engagement activities conducted to date and provides a plan for on-going engagement. The Mi'kmaq Ecological Knowledge Study (MEKS) Protocol was followed in the MEKS conducted by Membertou Geomatics Solutions (MGS).

1.4.4 APPLICABLE LEGISLATION, POLICIES, GUIDELINES AND STANDARDS

The *Maritime Link Act,* which received Royal Assent in the Nova Scotia legislature on May 17th, 2012, ensures regulatory review of the Maritime Link by the Nova Scotia Utility and Review Board. Further applicable legislation, policies, guidelines and standards at the federal, provincial and municipal levels which may be required for the Maritime Link are listed below.

Government of Canada

- *CEAA* and associated Regulations;
  - Addressing Cumulative Environmental Effects under *CEAA* (CEA Agency 2007a)
  - Cumulative Effects Assessment Practitioners Guide (Hegmann *et al.* 1999)
  - Addressing "Need for," "Purpose of," "Alternatives to" and "Alternative Means" under *CEAA* (CEA Agency 2007b)
  - Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada (EC 2004)
  - Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners (CEA Agency 2003)
- *Fisheries Act*;
  - Policy of the Management of Fish Habitat (DFO 1986)
  - A Proponent's Guide to the Development of Fish Habitat Compensation Strategies and Plans (DFO 2010a)
- *NWPA* and Regulations;
- *CEPA,* Disposal at Sea Regulations;
- *Species at Risk Act (SARA)*;

  - *SARA* Environmental Assessment Checklists for Species Under the Responsibility of the Minister Responsible for EC and Parks Canada –(EC –Parks Canada 2010)
- *Radiocommunication Act* and Regulations;
- *Explosives Act*;
- *Migratory Birds Convention Act (MBCA)* and Regulations;
- *Federal Real Property Act;*
- *Immovable Act;*
- Federal Policy on Wetland Conservation (EC 1991);
- *Canada Shipping Act* and Regulations;
- International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) and Pollution Prevention Regulations of the *Canada Shipping Act;* and
- National Critical Infrastructure Program under Public Safety Canada.

Government of Newfoundland and Labrador

- *Provincial Parks Act* and Provincial Parks Regulations
- *Environmental Protection Act* and Environmental Assessment Regulations;
- *Land Act*;
- *Water Resources Act;*
- *Endangered Species Act*;
- *Urban and Rural Planning Act, Works, Services and Transportation Act,* Protected Road Zoning Regulations;
- *Quarry Materials Act* and Regulations;
- *Forestry Act* and Cutting of Timber Regulations;
- *Forestry Act* and Forest Fire Regulations;
- *Historic Resources Act*;
- *Environmental Protection Act,* and Storage and Handling of Gasoline and Associated Products Regulations;
- *Environmental Protection Act* and Environmental Guidelines for Fuel Cache Operations;
- *Fire Prevention Act* and Fire Prevention Flammable and Combustible Liquids Regulations;
- *Dangerous Goods Transportation Act* and Regulations;
- Sanitation Regulation, under the *Health and Community Services Act*;
- *Environmental Protection Act*;

- *Environmental Protection Act* and Waste Management Regulations;
- *Health and Community Services Act, Food and Drug Act* and Food Premises Regulations;
- *Wildlife Act*;
- *Fire Prevention Act,* and Fire Prevention Regulations;
- Environmental Control Water and Sewage Regulations (under *Water Resources Act*);
- *Health and Community Services Act,* and Sanitation Regulations;
- *Occupational Health and Safety Act and* Regulations; and
- *Occupational Health and Safety Act,* and Workplace Hazardous Materials Information System (WHMIS) Regulations.

Province of Nova Scotia

- *Provincial Parks Act*
- *Environment Act* and Environmental Assessment Regulations;
  - Greenhouse Gas Emissions RegulationsGuide to Considering Climate Change in Environmental Assessments in Nova Scotia (NSE 2010a) Guide to Considering Climate Change in Project Development in Nova Scotia (NSE 2010b)
  - Guide for Addressing Wildlife Species and Habitat in an EA Registration Document (NSE 2009)
- *Crown Lands Act*;
- *Enterprise Cape Breton Corporation Act*;
- *Forests Act*;
- *Special Places Protection Act*;
- *Public Highways Act*; and
- NS Wetland Conservation Policy (NSE 2011a).

Municipalities

- Newfoundland and Labrador *Urban and Rural Planning Act*, 2000;
- Newfoundland and Labrador *Municipalities Act*, 1999;
- Newfoundland and Labrador Local Service District Regulations; and
- NL and NS relevant Municipal Plan and Development Regulations.

Standards

- National Standards of Canada for electricity distribution and transmission issued by the Canadian Standards Association (CSA) under the Canadian Electrical Code, Part III:
  - CAN/CSA-C22.3 No. 1-10 - Overhead Systems;
  - CAN/CSA-C22.3 No. 60826-10 - Design Criteria of Overhead Transmission Lines;
- National Fire Code of Canada; and
- National Building Code of Canada.

A number of permits and approvals will also be required for both provinces. Appendix B provides a list of potential permits and approvals. Although this Appendix provides a comprehensive list of permits and approvals, each one is considered to be a "potential" requirement. In other words, only some of these permits/approvals will be applicable as a matter of law, while others will not apply. This table has been created as a checklist to help ENL ensure that it has given, and will continue to give, considered analysis to relevant legislative and policy requirements, or guidance, at all levels of jurisdiction for appropriate consideration of all potential effects of the Project.

2.0 PROJECT DESCRIPTION

2.1 PROJECT CONTEXT

The Maritime Link will be a high voltage electrical transmission system that will facilitate the flow of renewable electrical energy and link the existing electrical systems of NL and NS (Figure 1.1.1). The Project will transmit energy between the island of Newfoundland and Cape Breton, utilizing a subsea cable to cross the Cabot Strait. The system will consist of an HVdc bipole design of +/- 200 kV, able to transmit up to 500 MW of power, and a 230 kV HVac component.

The socio-economic context for the Maritime Link is the desire for more renewable energy. This will reduce greenhouse gas (GHG) and other emissions, due to the use of fossil fuels for electricity generation, and will mitigate the associated price volatility resulting from reliance on these fuels which are procured on world markets. In addition to supply/demand management, a key component of this strategy is the need to gradually reduce or eliminate dependency on existing commercial-scale, carbon-based generation facilities. In Atlantic Canada, as in many other jurisdictions, energy alternatives are being aggressively pursued and developed, particularly wind and tidal power. Although these intermittent renewable energy alternatives can collectively account for a substantial increase in renewable electrical generation, they are not sufficient to provide continuous power generation required for base load purposes.

The Lower Churchill Hydroelectric Generation Project will significantly contribute to the increasing production of renewable energy in the province of NL, to the point where, after meeting current and foreseeable energy requirements, surplus energy will be available for export through the Maritime Link to the existing mainland power grid in Nova Scotia. The connection will be scheduled to deliver energy when needed and will not require the same backup capacity that intermittent sources, in particular wind, require.

2.2 PROJECT PURPOSE AND RATIONALE

The primary objective of the Maritime Link is to provide a direct, safe, reliable and cost-effective connection between the electrical system of NL and the electrical system in NS. Additional objectives include planning, designing, building and operating the Project with minimal adverse environmental, economic, social and cultural effects, and to foster economic cooperation between NL and NS once the connection is completed.

The energy will be delivered through the Maritime Link to existing transmission facilities in Cape Breton to distribute more renewable energy throughout NS and the Maritime region. The *Maritime Link Act*, which received Royal Assent on May 17th, 2012, ensures regulatory review of the Maritime Link by the Nova Scotia Utility and Review Board.

The life of the Project is projected to be 50 years, at which time it can be decommissioned and remediated. However, it is more likely that the Project will be refurbished and will continue to operate on a similar basis in perpetuity.

In September 2012, the federal government published regulations for the coal-fired electricity sector. These regulations require the closure of coal generation facilities 50 years after the original commissioning date. Shortly thereafter, the Federal government published a draft equivalency agreement allowing the Nova Scotia Greenhouse Gas Emissions Regulations to supersede the federal regulations in Nova Scotia. Under the equivalency agreement, the Nova Scotia Regulations that impose an absolute limit on GHG emission from the electricity sector through 2020, would be extended to 2030. The 2020 emission cap is 7.5 million tonnes; the equivalency agreement would require an emission cap of 4.5 million tonnes. The Maritime Link will contribute to meeting these regulated reductions.

The Project will also assist the province of NS in meeting the Nova Scotia Renewable Electricity Regulations. Amendments to the Regulations, which came into force on May 19th 2010, require the Minister of Energy to implement goals requiring the achievement of 40% renewable electricity generation by 2020. Since there are no untapped major hydroelectric opportunities remaining in the province, the government is currently accelerating the requirement for development of wind farms and is actively supporting tidal power development, although significant commercial power production from the latter is a number of years in the future. Development of the Lower Churchill Hydroelectric Generation Project will result in a new source of additional energy in NL. This surplus, transmitted via the Maritime Link, qualifies as renewable energy under the Nova Scotia Regulations and will contribute to meeting the province's RES. Effectively, the intention of the NS Block (approximately 1 TWh) is to provide sufficient new renewable generation to meet the 2020 renewable electricity standard (40% of total electricity consumption in NS). The new source of additional energy may be used to help meet further GHG emission reductions that will be required beyond 2020.

The new regulatory requirements to reduce emissions and increase energy supplied from renewable resources will lead to reduced coal-based generation. Furthermore, renewable electricity transmitted from Newfoundland to Nova Scotia on the Maritime Link will assist the province of NS to meet renewable electricity content requirements and to reduce emissions of CO_2, SO_2, NO_x, particulates and other emissions. If all of the energy not required in NL and available for the Maritime Link were to be used in Nova Scotia, the result would be an elimination of more than three million tonnes of CO_2, SO_2, NO_x, particulates and other emissions, annually.

2.3 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

This section summarizes key alternative means of carrying out the Project. The examination of the alternative means of carrying out the Project involves the following steps:

- identification of potential alternative means to carry out the Project;
- identification of the alternatives which are technically and economically feasible;

- determination of potential environmental effects associated with feasible alternatives; and
- description of the rationale for selecting the preferred alternative.

Several alternative means of carrying out the Project were considered throughout the early phases of Project planning with respect to the following Project components:

- transmission corridor routing;
- transmission technology - HVac and/or HVdc;
- overhead or buried transmission cables;
- method for onshore/nearshore cable installation;
- locations of subsea cable landfall sites; and
- locations of grounding sites.

Only Project alternatives which meet applicable safety standards are presented in this report. Criteria were developed to assess the alternative means, including economic and technical feasibility, as well as environmental and socio-economic considerations. Any alternative not considered economically or technically feasible, was not evaluated for environmental and socio-economic considerations. Table 2.3.1 presents a summary of the assessment of alternative means for undertaking the Project.

Table 2.3.1 Summary of Assessment of Alternative Means of Carrying out the Project

Alternative Means	Technical Feasibility	Economic Feasibility	Environmental and/or Socio-economic Considerations	Selected Means
Transmission Corridor Routing				
Transmission corridor south of Granite Lake	Considered feasible. The proximity to existing access roads could facilitate access for construction and maintenance activities; approximately 20 km longer than north of Granite Lake alternative.	Considered feasible; although following the longer route would increase the unit cost of constructing and maintaining the transmission line.	The Regulatory process (NL*EPA*, *CEAA*) encourages proponents of new transmission projects to follow existing RoW corridors since this has less of an environmental impact when compared with creating a new corridor, particularly in less disturbed areas. Although this alternative increases Project footprint overall, it runs parallel with, or adjacent to, existing transmission lines and roads wherever feasible, thus minimizing habitat fragmentation, altered viewsheds, and the need for new access, when compared with the alternative.	Selected means

Table 2.3.1 Summary of Assessment of Alternative Means of Carrying out the Project

Alternative Means	Technical Feasibility	Economic Feasibility	Environmental and/or Socio-economic Considerations	Selected Means
Transmission corridor north of Granite Lake.	Considered feasible. Shortest distance between Burgeo Highway and Granite Canal, but no existing access to area north of Granite Lake and requires construction of new access road.	Considered feasible.	Although this route is shorter, it would require construction of a new access road which would result in additional habitat loss and fragmentation and other disturbance effects on wildlife associated with increased access (*e.g.*, predation, hunting).	
Selection of Transmission Technology				
HVac	Technical feasibility varies depending on its application. HVac is considered not feasible for long submarine crossing due to energy losses associated with the technology. The electric currents set up by inductive and capacitive components result in losses occurring within the AC transmission circuit and reduce the amount of energy which can be delivered to the load. These loss properties are not present with the use of DC technology. However, HVac is considered feasible and is widely used for overland transmission.	Economic feasibility varies depending on its application. Considered not feasible, for the subsea component of the Project as a third cable would be required, thereby increasing costs. Overland use of HVac technology is widely used and economically feasible.	No further assessment required as the primary transmission technology alternative is not technically or economically feasible in the marine environment.	Use of HVac only where technically required and is assessed for environmental and socio-economic considerations in subsequent sections of this EA Report

Table 2.3.1 Summary of Assessment of Alternative Means of Carrying out the Project

Alternative Means	Technical Feasibility	Economic Feasibility	Environmental and/or Socio-economic Considerations	Selected Means
HVdc	Considered feasible. Widely used for long distance, submarine crossings. HVdc system is a more efficient means to transmit bulk power, compared with the HVac alternative.	Considered feasible. Requirement of AC/DC conversion increases initial Project capital costs relative to installation of AC transmission; but, the Maritime Link exceeds the break-even distance at which DC systems become more economical than AC systems.	This alternative is preferred in the marine environment and is assessed for environmental and socio-economic considerations in subsequent sections of this EA Report.	Selected means
Overhead or Buried Transmission				
Overhead	Considered feasible.	Considered feasible.	This alternative is preferred and is assessed for environmental and socio-economic considerations in subsequent sections of this EA Report.	Selected means
Buried	Considered feasible although the geology of the terrain in NL is technically challenging.	Considered not feasible, due to the prohibitive cost of burying the lines for a total of about 340 km.	No further assessment required as this alternative is not economically feasible.	
Method for Onshore/Nearshore Cable Installation				
Horizontal Directional Drilling (HDD)	Considered feasible.	Considered feasible.	Potentially high noise levels during drilling activities and disturbance to site-specific land uses associated with HDD drill site; effects, however, are temporary and can be mitigated through design. HDD technology used for cable landfall avoids disturbance of sensitive coastal habitat. This avoids or substantially reduces potential adverse effects to commercial/recreational/traditional fisheries, sensitive habitats, land use, traditional land use, species of conservation interest (SOCI), and cultural resources and uses.	Selected means

Table 2.3.1 Summary of Assessment of Alternative Means of Carrying out the Project

Alternative Means	Technical Feasibility	Economic Feasibility	Environmental and/or Socio-economic Considerations	Selected Means
Trenching	Considered feasible, although inclement weather poses a risk to activity and schedule.	Considered feasible.	Surficial disturbance creates a significantly larger area of impact than HDD, particularly in productive nearshore and shoreline habitats. Potential adverse effects to commercial/recreational/traditional fisheries, sensitive habitats, land use, SOCI, and cultural resources and uses.	
Micro-tunnelling	Technically feasible but not selected because of execution risk.	Considered feasible.	Potentially high noise levels and disturbance to site-specific land uses associated with micro-tunnelling, however these are temporary and can be mitigated through design. Micro-tunnelling technology used for landfall avoids disturbance of sensitive coastal habitat and reduces the potential of adverse effects to commercial/recreational/traditional fisheries, sensitive habitats, land use, traditional land use, SOCI, and cultural resources and uses.	N/A
Selection of Subsea Cable Landing Sites				
Point Aconi Generating Station	Considered feasible.	Considered feasible.	This alternative is preferred and is assessed for environmental and socio-economic considerations in subsequent sections of this EA Report.	Selected means
Lingan	Considered less feasible due to coastal topography, nearshore geology, and stability of the seafloor.	Considered feasible but with the following assumptions given that this route is longer and crosses several existing communication cables: cable cost/metre; communication splicing cost; overland transmission to Woodbine.	This alternative would have similar environmental and socio-economic considerations as the Point Aconi Generating Station option although added design work, mitigation and monitoring would likely be required due to the stability of the seafloor in this area.	

Preliminary locations for the grounding sites were selected using high-resolution orthophotography based on criteria such as proximity to the converter station, proximity to existing transmission and/or road right of way, extent of natural shore protection, and proximity to buried metallic infrastructure (Figure 2.3.1 and Figure 2.3.2). Following preliminary selection (based on available information), field reconnaissance of the sites validated the selection criteria and determined local seawater salinity, a critical criterion in determining technical feasibility. Concurrently, local knowledge was obtained through research and stakeholder consultation on key environmental and socio-economic criteria such as land availability, land protection, Mi'kmaq interests (in NS), commercial fishery interests, and potential for interaction with SOCI.

Technical feasibility could not be determined to the extent required for siting decisions without knowledge of site-specific criteria such as ground resistivity, nearshore bathymetry, shoreline topography, and results of corrosion studies. Considering the extent of specific knowledge and calculations required to determine technical feasibility, some sites were ruled out based on environmental and socio-economic criteria and the top two ranked sites in each of Newfoundland and Nova Scotia were advanced to determine technical feasibility. Table 2.3.2 presents a summary of the assessment of alternative means for selection of two potential grounding sites.

Table 2.3.2 Summary of Assessment of Alternative Grounding Sites

Alternative Means	Technical Feasibility	Economic Feasibility	Environmental and/or Socio-economic Considerations	Selected Means
Island of Newfoundland				
Shallop Cove	Considered not technically feasible because of insufficient water depth.	Considered feasible.	No further assessment required as this alternative is not technically feasible.	
St. George's	Considered feasible.	Considered feasible.	Considerations include sensitive habitat, conservation and watershed protected areas, SAR, current resource use for traditional purposes, recreational use, commercial fishing activity, interference with fish migration, and an existing brownfield site. This alternative is assessed for environmental and socio-economic considerations in subsequent sections of this EA Report.	Selected alternative
Indian Head	Considered feasible although design of breakwater expected to be challenging to protect against wave action.	Considered feasible although protection against the prevailing wind and wave direction would require a robust and costly breakwater.	Reported by local fish harvester as an area of lobster harvesting.	Selected alternative

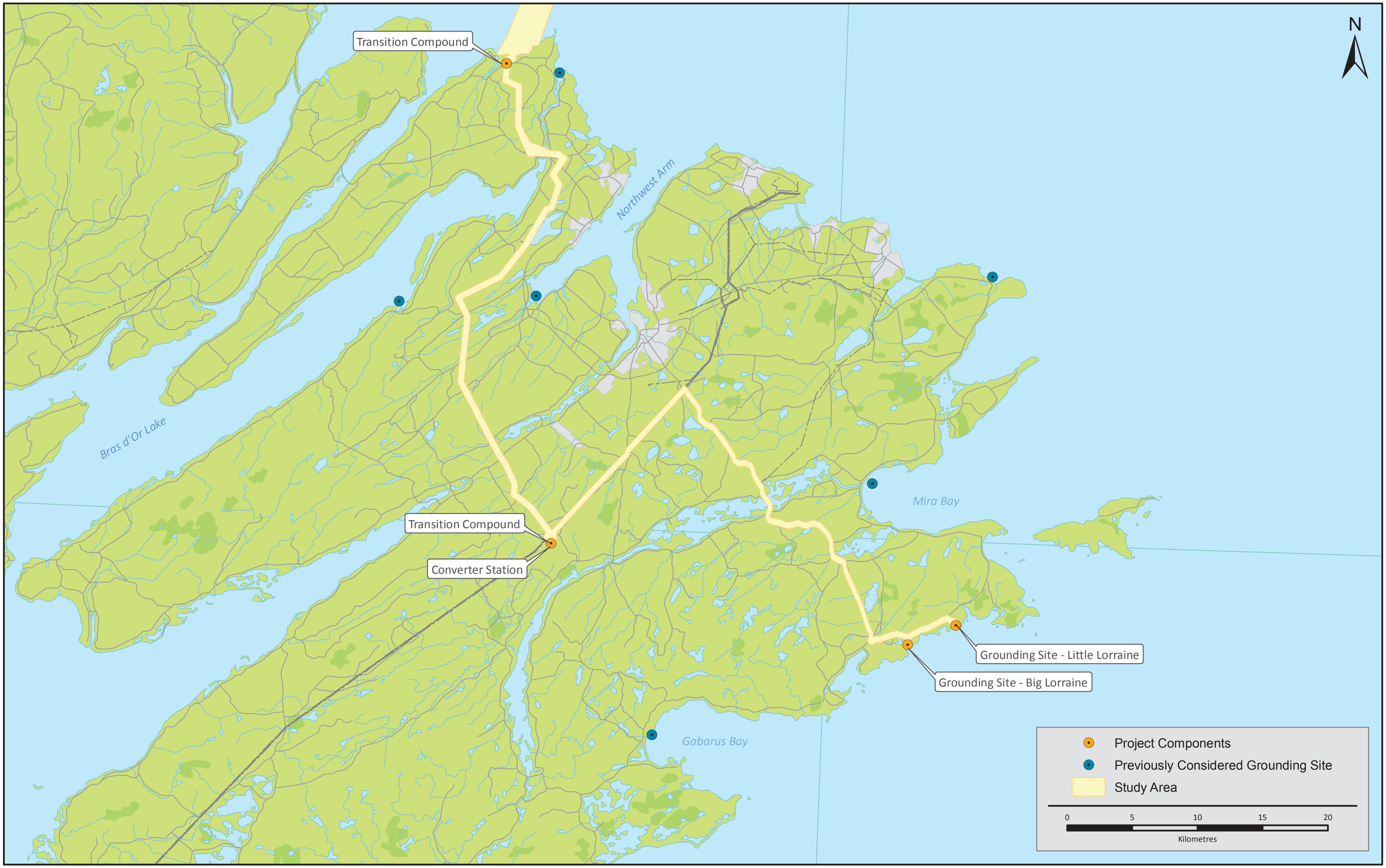
Table 2.3.2 Summary of Assessment of Alternative Grounding Sites

Alternative Means	Technical Feasibility	Economic Feasibility	Environmental and/or Socio-economic Considerations	Selected Means
St. George's River estuary	Considered technically feasible although channel between estuary and St. George's Bay creates a challenge for effective mitigation of effects on salmon migration.	Considered feasible.	Portion of the estuary is protected under Town of Stephenville Crossing Municipal Stewardship Agreement. Channel into estuary is also an identified salmon migration route.	
Port Harmon	Considered not technically feasible due to presence of channel and effect of flow on electrical current	N/A	No further assessment required as this alternative is not technically feasible.	
Cape Breton				
Alder's Point	Considered not feasible due to proximity to subsea cable landfall site.	Considered feasible.	No further assessment required as this alternative is not technically feasible.	
NW Arm Sydney Harbour	Considered feasible.	Considered not feasible due to expense of mitigation of corrosion of surrounding metallic infrastructure.	No further assessment required as this alternative is not economically feasible.	
Donkin	Considered not feasible due to conflicting land use.	Considered feasible.	No further assessment required as this alternative is not technically feasible.	
St. Andrew's Channel	Considered not feasible due to low water salinity in Bras d'Or lakes.	Considered feasible.	No further assessment required as this alternative is not technically feasible. Also, the Mi'kmaq (through KMKNO on behalf of the Assembly of Nova Scotia Mi'kmaq Chiefs) expressed concern early in the process of Project components and activities interacting with the Bras d'Or Lakes.	
Gabarus Bay	Considered feasible.	Considered feasible.	Dense lobster harvesting.	
Mira Bay	Considered feasible.	Considered feasible.	Densely populated with permanent and seasonal residences, recreational use of waters; lobster harvesting.	

Table 2.3.2 Summary of Assessment of Alternative Grounding Sites

Alternative Means	Technical Feasibility	Economic Feasibility	Environmental and/or Socio-economic Considerations	Selected Means
Big Lorraine	Considered feasible.	Considered feasible.	This alternative is assessed for environmental and socio-economic considerations in subsequent sections of this EA Report. Reported by local fish harvester as a difficult area to access for fishing vessels. This site is included in the government of Nova Scotia's 12 percent lands review process.	Selected alternative
Little Lorraine	Considered feasible.	Considered feasible.	This alternative is assessed for environmental and socio-economic considerations in subsequent sections of this EA Report. This site is included in the government of Nova Scotia's 12 percent lands review process.	Selected alternative
East Bay	Considered not feasible due to low water salinity in Bras d'Or lakes.	Considered feasible	No further assessment required as this alternative is not technically and economically feasible. Also, the Mi'kmaq (through KMKNO on behalf of the Assembly of Nova Scotia Mi'kmaq Chiefs) expressed concern early in the process of Project components and activities interacting with the Bras d'Or Lakes.	

Alternative means for carrying out the Project evolved throughout the early planning phase of the Project. These were considered and evaluated based on technical, economic and environmental/socio-economic considerations. The preferred alternatives comprise the proposed Project as it is assessed in this EA Report and the potential environmental and socio-economic effects of each selected alternative are assessed in subsequent sections.



Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 20

Data Sources: Geobase - Road Network; Geogratis - National Atlas

Scale: 1:400,000

Date: 9/18/12

FIGURE 2.3.1

Previously Considered and Current Grounding Site Locations
Cape Breton, Nova Scotia

ENL-0165

Emera Newfoundland & Labrador

Coordinate System:
UTM NAD 83 Zone 21

Data Sources:
Geobase - Road Network
Geogratis - National Atlas

Scale:1:750,000

Date: 11/22/12

FIGURE 2.3.2

Previously Considered and Current Grounding Site Locations
Newfoundland

2.4 PROJECT OVERVIEW

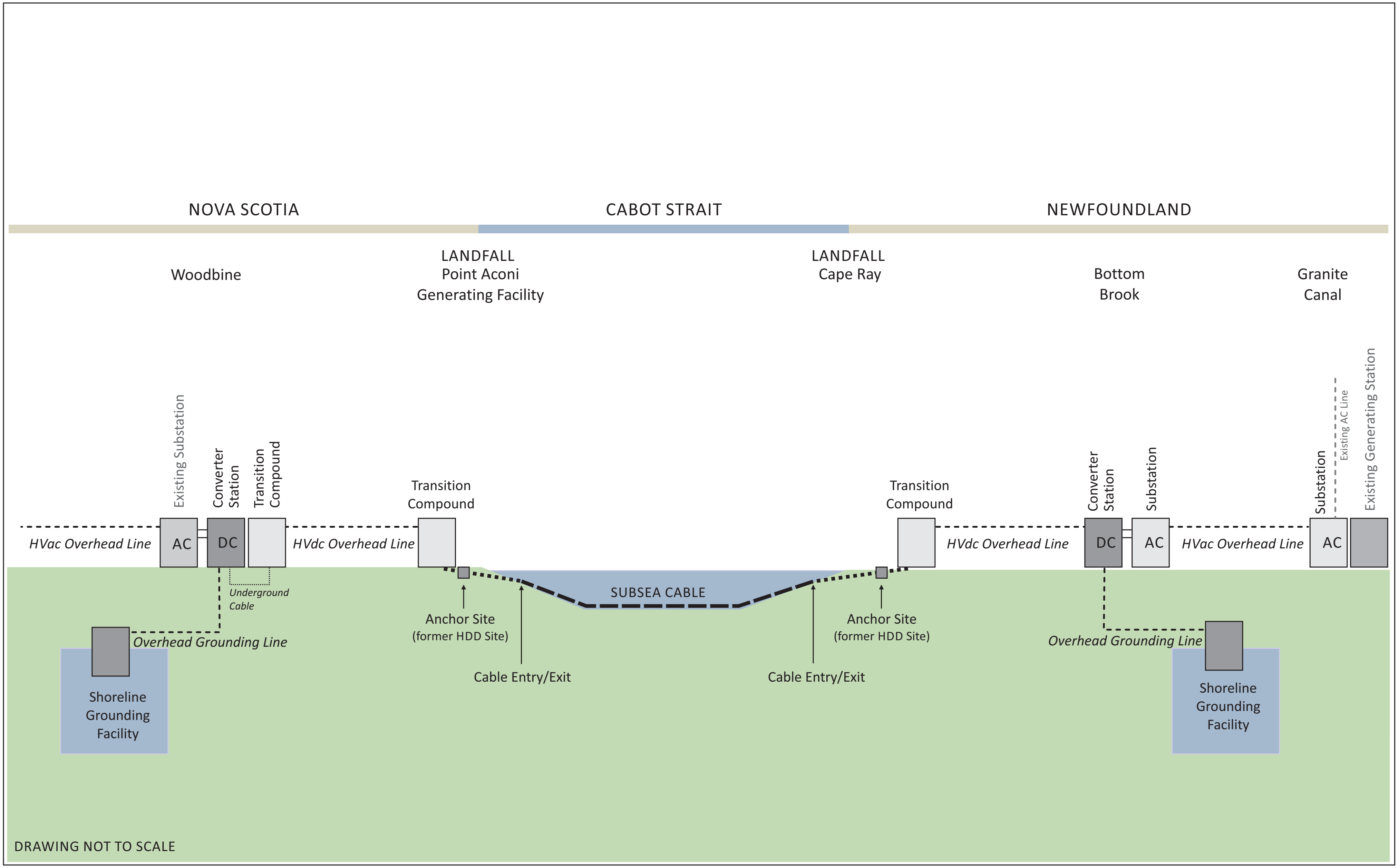
The Maritime Link is comprised of a 500 MW (+/- 200 kV) HVdc and a 230 kV HVac transmission line, and associated infrastructure, between Granite Canal, Newfoundland and Labrador, and Woodbine, Nova Scotia. The DC component is comprised of a bipole DC transmission system involving two transmission paths and two converters of opposite polarity at each end of the circuit. The converter stations connect DC components to AC systems in each province. The following section provides an overview of the Project components in each jurisdiction as illustrated in Figure 2.4.1. Project components have been designed to take advantage of existing facilities and/or adjacent infrastructure footprints where feasible, thereby reducing potential Project interactions with the environment. Siting of Project components, including alignment of the transmission route, is a key step in the EA process that optimizes electrical system stability, and involves consideration of engineering design, constructability, and environmentally and/or socially sensitive features.

2.4.1 ISLAND OF NEWFOUNDLAND

The portion of the Project located on the island of Newfoundland is shown on Figure 1.2.2. This includes an estimated 293 km of transmission line from Granite Canal to Cape Ray, of which 258 km follow existing RoW and 35 km of which would be new transmission corridor (Table 2.4.1). At Granite Canal, a 230 kV HVac switching station will be constructed to accommodate termination and interconnection of the Granite Canal - Bottom Brook line into the Newfoundland and Labrador Hydro (NLH) system. The switching station will be constructed adjacent to the existing Granite Canal hydro development.

From the switching station, a new 230 kV HVac transmission line will parallel the existing hydro access road for an estimated 64 km to the NLH control structure at Victoria Lake **(Granite Canal Access Road segment)** (Figure 2.4.2). From Victoria Lake, a newly constructed line will extend an estimated 27 km to the intersection with the Burgeo Highway **(Area of New Access segment)** (Figure 2.4.3).

From the Burgeo Highway intersection to the Bottom Brook substation, near Stephenville, the new HVac line will parallel the existing transmission corridor for an estimated 64 km **(Burgeo Highway segment**) (Figure 2.4.4). The existing transmission corridor will either be widened or a separate but parallel transmission corridor created to accommodate the new line construction where widening doesn’t provide sufficient safe working and operating conditions. Separating the new from existing transmission corridor may be related, for example, to landownership, physical terrain conditions, or environmental/socio-economic concerns.



Emera Newfoundland & Labrador

Data Sources:
ENL

FIGURE 2.4.1

Overview of Technology

ENL009

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Scale: 1:120,000

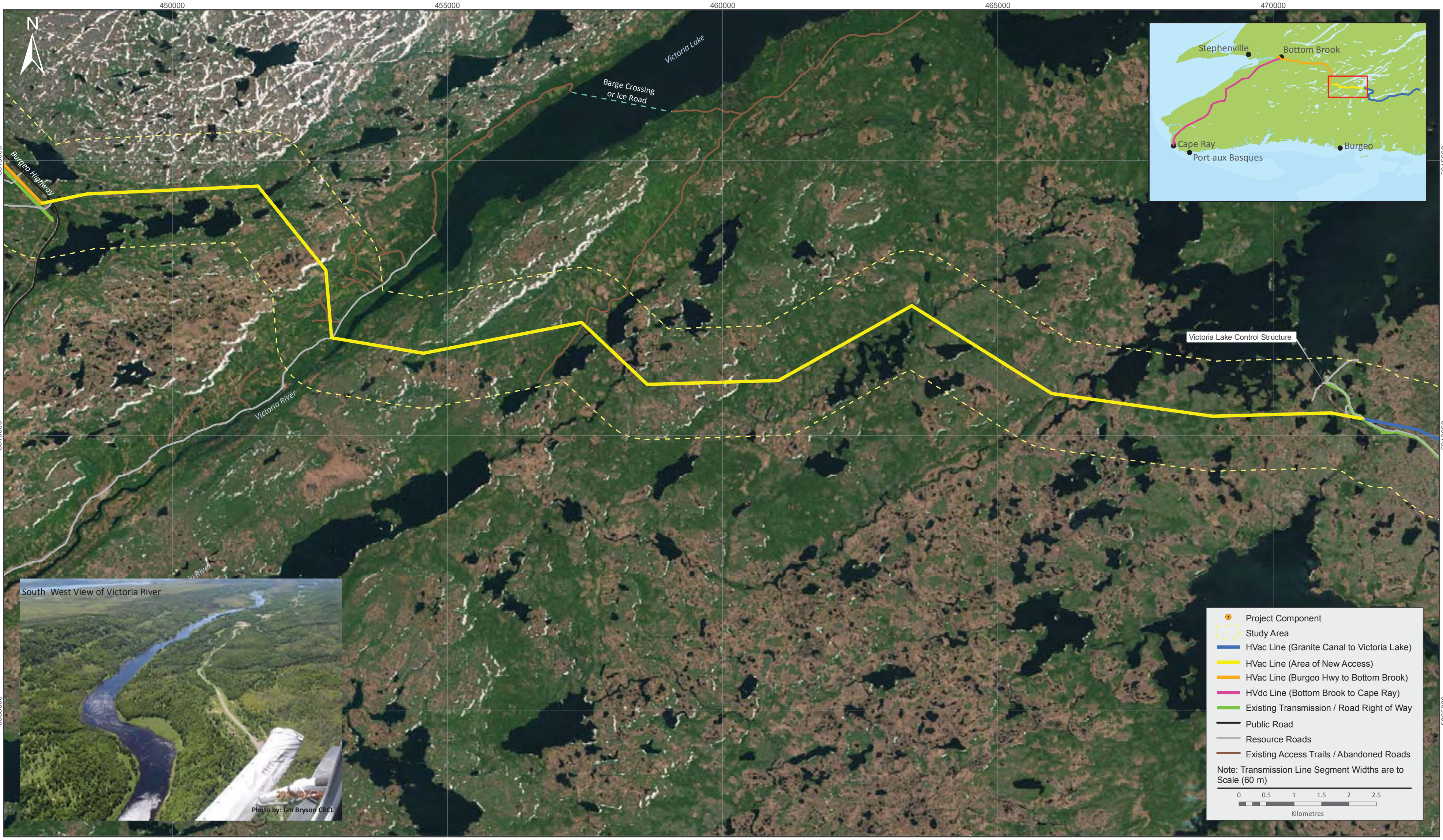
Date: 12/17/12

Data Sources:
Road Network
- Geobase
- Department of Environment and Conservation National Atlas - Geogratis

Overview of Granite Canal Access Road Segment
Island of Newfoundland

FIGURE 2.4.2

ENL0147



Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Scale: 1:65,000

Date: 12/17/12

Data Sources:
Road Network
- Geobase
- Department of Environment and Conservation National Atlas - Geogratis

Overview of Area of New Access Segment
Island of Newfoundland

FIGURE 2.4.3

ENL0143

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Scale: 1:150,000

Date: 9/6/12

Data Sources:

Road Network

- Geobase

- Department of Environment and Conservation National Atlas - Geogratis

Overview of Burgeo Highway Segment

Island of Newfoundland

FIGURE 2.4.4

ENL0145

At Bottom Brook, a new 500 MW +/- 200 kV asymmetric bipole DC converter station will be constructed and interconnected into the NLH system by expanding the existing 230 kV substation. From the converter station, a +/- 200 kV bipole overhead HVdc transmission line will follow the existing transmission corridor, between Bottom Brook and Cape Ray, for an estimated 138 km to the Cape Ray transition compound **(Bottom Brook to Cape Ray segment)** (Figure 2.4.5). This includes an estimated 3 km of new RoW required near the converter station and an estimated 4 km of new RoW up to the Cape Ray transition compound. A grounding line will originate at the converter station and be routed an estimated 28 km to a grounding facility proposed in the St. George's Bay area.

From the Cape Ray transition compound, the overhead lines will extend as underground cables approximately 2 km to the shoreline landfall site at Cape Ray.

2.4.2 CABOT STRAIT

The Cabot Strait portion of the Project is shown on Figure 1.2.3. Two +/-200 kV HVdc subsea power cables will extend across the Cabot Strait from Cape Ray to an area near the Nova Scotia Power Inc. (NSPI) Point Aconi Generating Station in Cape Breton. Depending on the final routing, this distance is estimated to be 180 km (Table 2.4.1).

2.4.3 NOVA SCOTIA

The NS portion of the Project (Figure 2.4.6) includes a subsea cable landfall which will be located on the west side of the Point Aconi Generating Station. From the landfall location the cables will extend underground approximately 1 km inland to the transition compound where they will transition to +/- 200 kV HVdc overhead lines. From the transition compound the HVdc transmission line will run parallel to an existing HVac 230 kV transmission corridor for an estimated 46 km, terminating at the 500 MW +/- 200 kV asymmetric bipole DC/AC converter station at Woodbine (Table 2.4.1). The HVdc lines will connect to the existing Woodbine converter station via an underground connection. A transition compound, located approximately 600 m north of the substation, will transition the overhead lines to underground cables, within a buried conduit, to avoid crossing three existing high voltage overhead transmission lines. From the Woodbine converter station, a grounding line will run for an estimated 50 km to a grounding facility location in northeast Cape Breton County near Big Lorraine.

Emera Newfoundland & Labrador

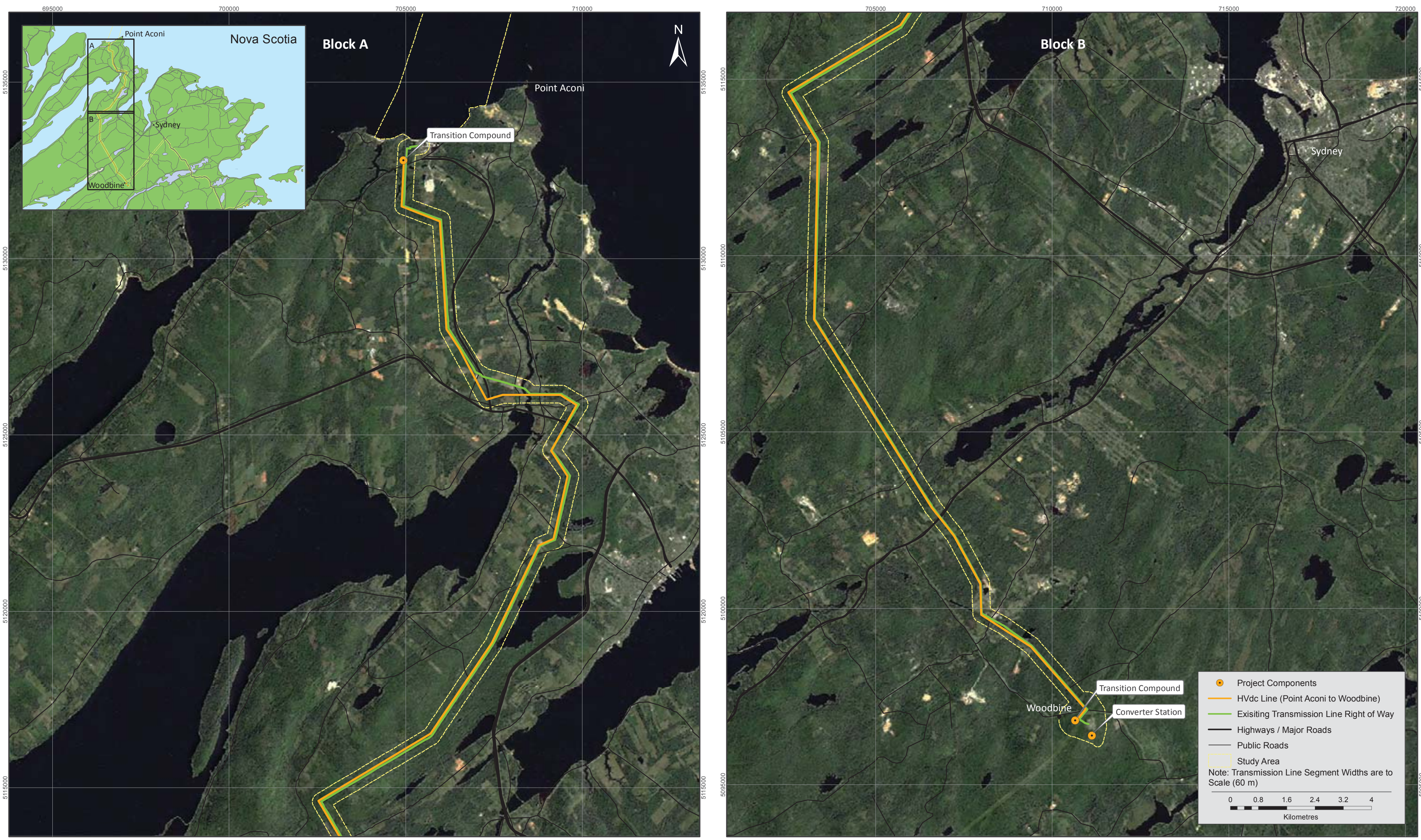
Coordinate System: UTM NAD 83 Zone 21
Scale: 1:225,000
Date: 12/18/12

Data Sources:
Road Network
- Geobase
- Department of Environment and Conservation National Atlas - Geogratis

Overview of Cape Ray to Bottom Brook Segment
Island of Newfoundland

FIGURE 2.4.5

ENL0160



Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 20

Data Sources: Geobase - Road Network Geogratis - National Atlas

Scale: 1:100,000

Date: 12/18/12

Overview of Point Aconi to Woodbine Segment
Cape Breton, Nova Scotia

FIGURE 2.4.6

ENL0149

Table 2.4.1 Summary of Project Distances

Jurisdiction / Segment	Distance (km)
Island of Newfoundland	
Granite Canal Access Road	64
Area of New Access	27
Burgeo Highway	64
Bottom Brook to Cape Ray	138
Grounding Line	Approximately 28
Cabot Strait	
Cape Ray to Point Aconi Generating Facility	180
Nova Scotia	
Point Aconi Generating Station to Woodbine	46
Grounding Line	Approximately 50

2.5 Project Components

2.5.1 OVERLAND TRANSMISSION INFRASTRUCTURE

Transmission tower structures will consist of wood pole and steel lattice designs for tangent and dead-end structures.The choice of tower structure and transmission line is based on prescribed National Standards of Canada (*e.g.*, CAN/CSA-C22.3 No. 1-10 - Overhead Systems and CAN/CSA-C22.3 No. 60826-10 - Design Criteria of Overhead Transmission as set by the CSA and issued under the Canadian Electrical Code, Part III), as well as functional and engineering considerations, including climatic conditions, transmission line characteristics (*e.g.*, conductor sag limits, wind and ice loading requirements, *etc.*), topography and terrain, insulation requirements, electrical clearances, transmission corridor width requirements, structural design requirements, acceptable performance of similar structures in the area, and foundation and anchor design requirements.

Transmission towers planned for the Maritime Link will generally be comparable to existing high voltage transmission towers in the region and will consist of two main types:

- Tangent towers—also referred to as suspension towers, these are typically wooden or steel structures that function to hold the conductor in place (suspended) and are used on straight runs or low angles. Guy wires anchored into the ground are used to provide lateral structural support.
- Dead end structures—these are typically steel lattice structures which serve multiple functions. Unlike the tangent structure which keeps the conductor suspended when forces in both directions are equal and opposite (symmetrical), the dead end structure is built to withstand asymmetrical loading, which can occur, for example, from planned maintenance activities or weather-related forces on a structure. They are also used in situations of high

angle turns/bends in the line and when the span is typically larger than normal, such as when spanning environmentally sensitive areas, (*e.g.,* wetlands, and water crossings).

The materials and designs of both types of towers can vary depending on engineering and environmental conditions. Wooden tangent structures consist of two poles approximately 6 m apart which are strengthened by steel cross-member beams. Guy wires provide lateral support and are attached to rock or soil anchors, depending on the surficial geology. Wooden dead-end structures consist of three poles separated from each other by approximately 6 m and strengthened by steel cross-member beams: guy wires are used to provide lateral support. Figure 2.5.1 provides drawings of typical wood tower designs. Steel lattice towers, both tangents and dead-ends, will be used for the HVdc segments of the transmission line in both Cape Breton and the island of Newfoundland (Figure 2.5.2).

Tower foundation designs will depend on selection of tower type as well as the results of geotechnical studies and environmental conditions. Wooden poles are typically installed with approximately 3 m of the pole buried and seated on a solid foundation. Steel lattice tangent tower foundations are bolted to steel plates stabilized within rock-filled cribbage. Similar to the wooden pole tangents described above, the steel tangents will be anchored with guy wires as necessary, to provide lateral support. Dead-end structure foundations typically use buried steel grillage beneath each of the four tower feet, or a poured concrete foundation with a depth that is dependent on geotechnical conditions. Section 2.6.2 describes in more detail the activities associated with the construction of the towers and foundations.

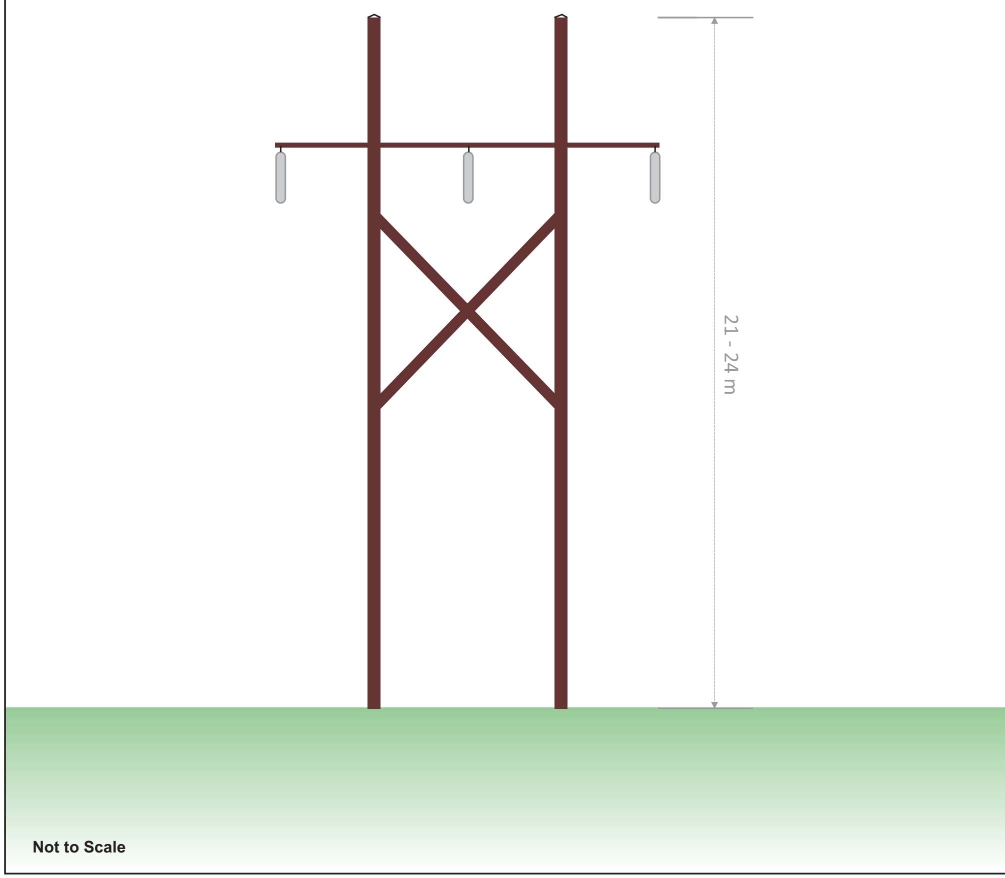
2.5.1.1 HVac

The HVac portion of the Maritime Link Project represents 155 km of the total 293 km of the Newfoundland overland transmission, and includes three of the four previously identified transmission segments: Granite Canal Access Road; Area of New Access; and Burgeo Highway. The towers in these segments will be predominantly wooden poles as shown in Figure 2.5.1, with the exception of dead-end structures which will steel lattice towers as shown in Figure 2.5.2.

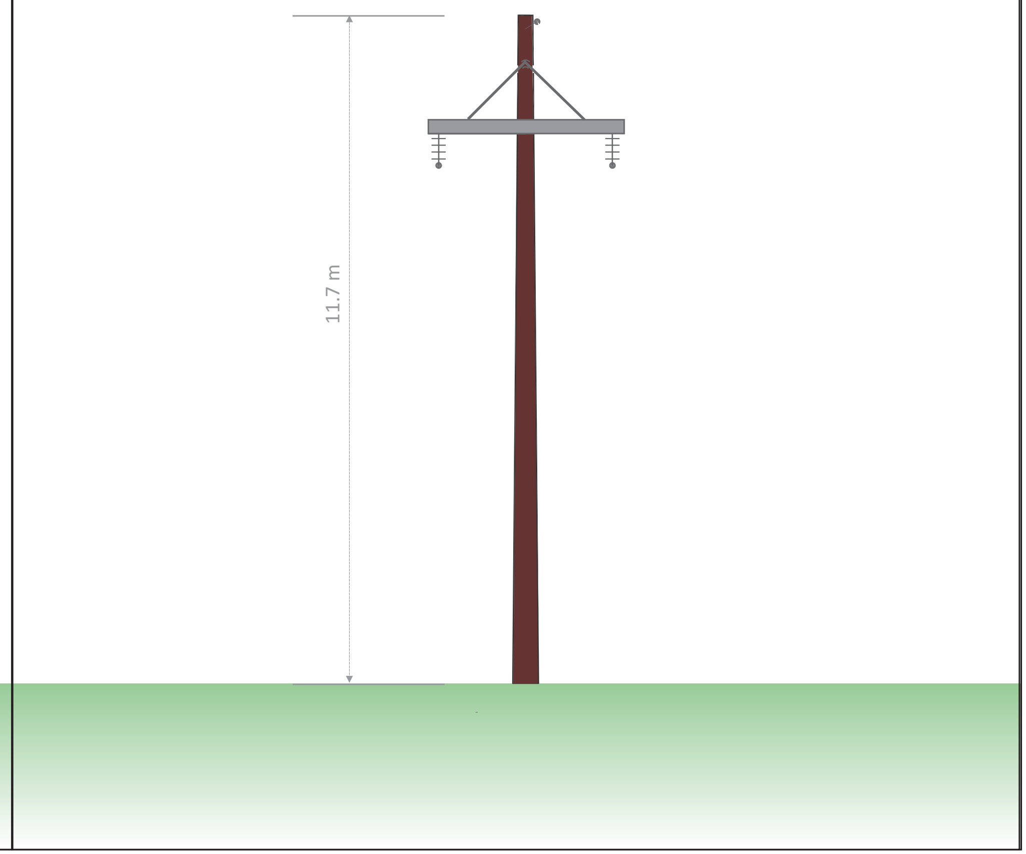
Existing AC transmission line paralleling the Burgeo Highway consists of wooden pole structures ranging in height from 15 to 23 m. The new towers will be marginally taller, ranging from 21 to 24 m. Tower heights can vary and are presented as ranges since they depend on terrain topography.

The existing Burgeo Highway transmission corridor is approximately 30 m in width. In areas where the new HVac line parallels the existing AC line, the width will increase by 50 m resulting in a new transmission corridor width of approximately 80 m, as shown by Figure 2.5.3. In areas where the new line deviates from directly paralleling the existing line, the new transmission corridor will be no less than 50 m wide (Figure 2.5.3). There is currently no existing transmission corridor within both the Area of New Access and Granite Canal Access Road segments. In these areas, the width of the new transmission corridor will be 50 m (Figure 2.5.3).

Tangent Wooden Cross Member Tower Design



Grounding Line Wooden Tangent Tower Design



Emera Newfoundland & Labrador

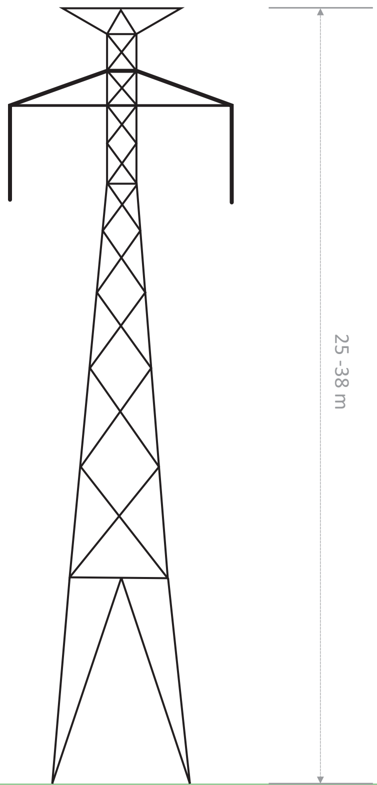
Data Sources:
HATCH

FIGURE 2.5.1

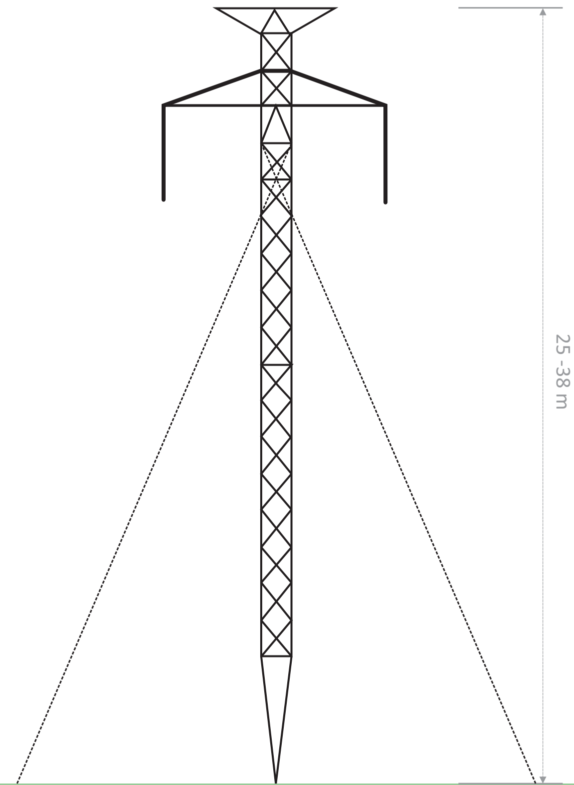
Project Tower Designs (Wooden)

ENL002

Dead-end Lattice Steel
Tower Design



Tangent Lattice Steel
Tower Design



Not to Scale

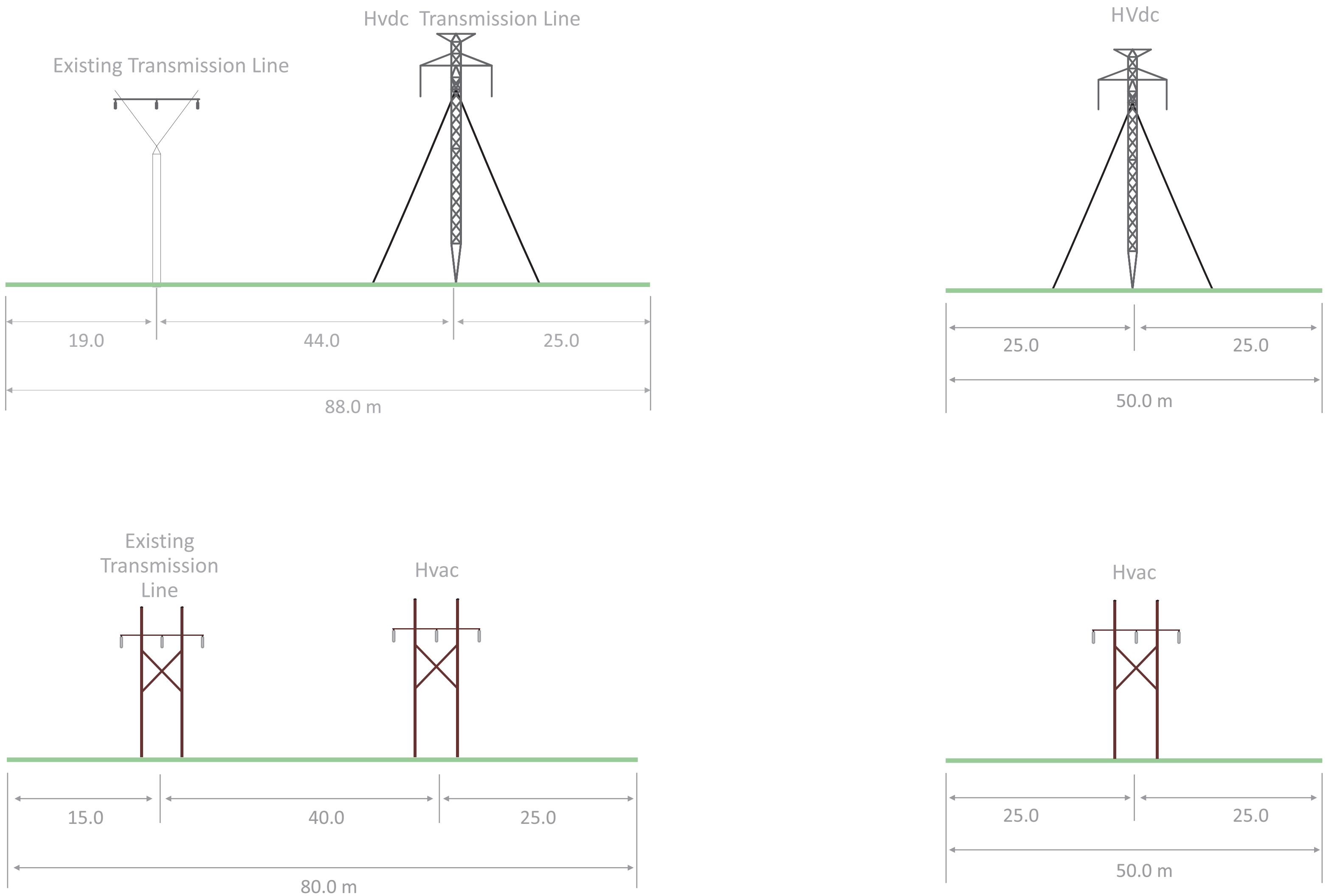
Emera Newfoundland & Labrador

Data Sources:
HATCH

FIGURE 2.5.2

Project Tower Designs (Steel)

ENL0054D



Not to Scale

Emera Newfoundland & Labrador

Data Sources:
HATCH

FIGURE 2.5.3

Transmission Corridor Configuration
Island of Newfoundland

ENL008

The span distance between the tower structures in the HVac segments depends on various engineering and environmental factors, but will average approximately 250 m.

2.5.1.2 HVdc

The HVdc portion of the Maritime Link Project represents 138 km of the total 293 km of the Newfoundland overland transmission (Cape Ray to Bottom Brook segment) and all 46 km of the NS transmission. All HVdc towers will be steel lattice structures of tangent or self-supporting designs (Figure 2.5.2).

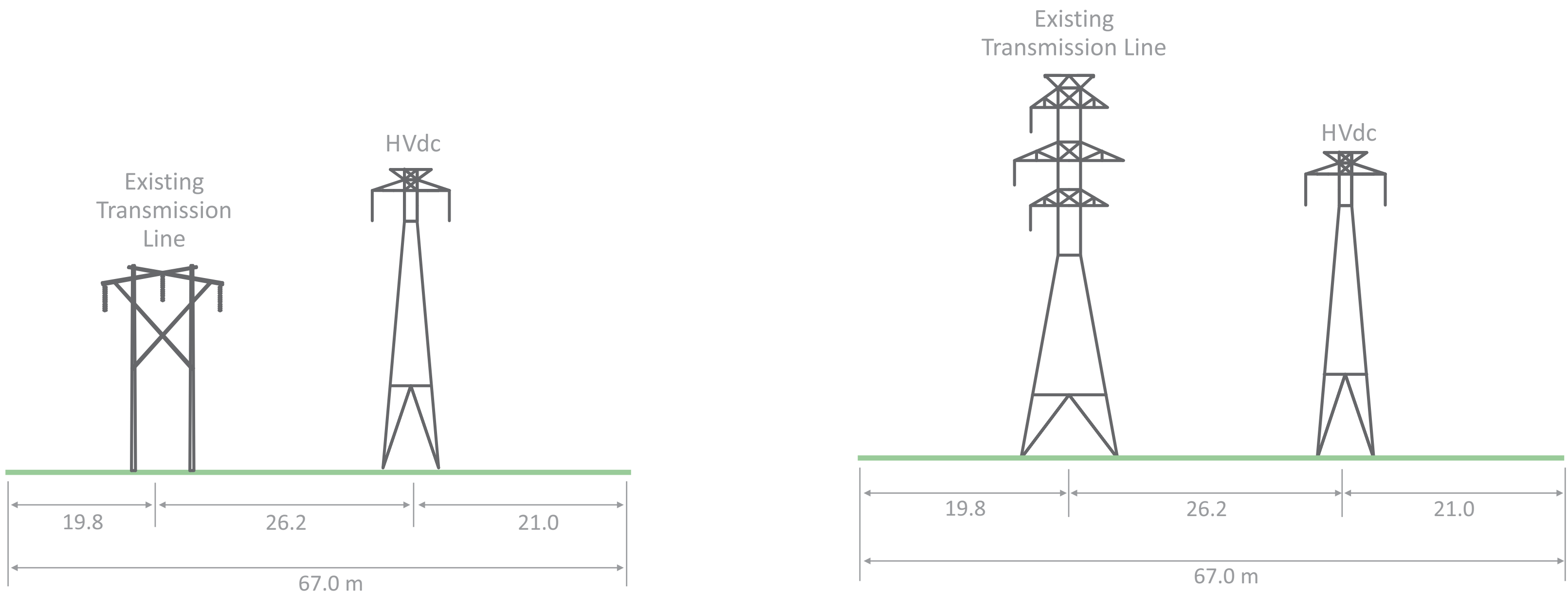
In Newfoundland, new HVdc transmission in the Cape Ray to Bottom Brook segment will run parallel with, or adjacent to, existing AC transmission lines consisting of both aluminum and wooden towers with aluminum used on the 138 kV line from Bottom Brook to Doyles substation, and wooden towers for the 69 kV line from Doyles substation serving Cape Ray and surrounding communities. The existing aluminum towers range in height from 22 to 24 m and the wooden towers from 15 to 22 m. The new towers paralleling the existing transmission corridor will range from 25 to 38 m. As noted above, tower heights can vary and are presented as ranges since they depend on terrain topography, including spans over waterbodies.

The existing transmission corridor in the Cape Ray to Bottom Brook segment is approximately 38 m wide. In areas where the new HVdc line parallels the existing AC line, the width will increase by an additional 50 m resulting in a new transmission corridor width of approximately 88 m as shown by Figure 2.5.3. In areas where the new line deviates from directly paralleling the existing line, the new transmission corridor will be no less than 50 m wide (Figure 2.5.3).

In NS, existing 230 kV AC transmission lines transmit power from the Point Aconi Generating Station to the Woodbine substation along a series of wooden and steel lattice structures, with the latter covering approximately 4 km of the total 46 km distance. The existing wooden towers range in height from 20 to 29 m and steel lattice towers from 33 to 39 m. The new towers paralleling the existing transmission corridor will range in height from 25 to 38 m (Figures 2.5.1 and 2.5.2). Tower heights can vary and are presented as ranges since they depend on terrain topography, including spans over waterbodies.

The existing NS transmission corridor is 67 m wide, of which 40 m is cleared to accommodate the existing transmission line. The new HVdc line will parallel the existing line and utilize the remaining currently uncleared portion of the transmission corridor (Figure 2.5.4).

Two DC conductors approximately 45 mm in diameter will carry power. Each DC conductor will be protected against lightning strikes by shield-wires, each containing an alumoweld (aluminum-covered) steel wire and an overhead optical fibre ground wire for communication. The fiber communication wires are wrapped with the steel shield wire inside a tubular structure and located above the conductors. The optical ground, containing 24 to 48 fibers, will provide communication channels between the two converter stations as well as other Project components.



Not to Scale

Data Sources:
HATCH

FIGURE 2.5.4

Transmission Corridor Configuration
Nova Scotia

ENL007

2.5.1.3 Underground Cables

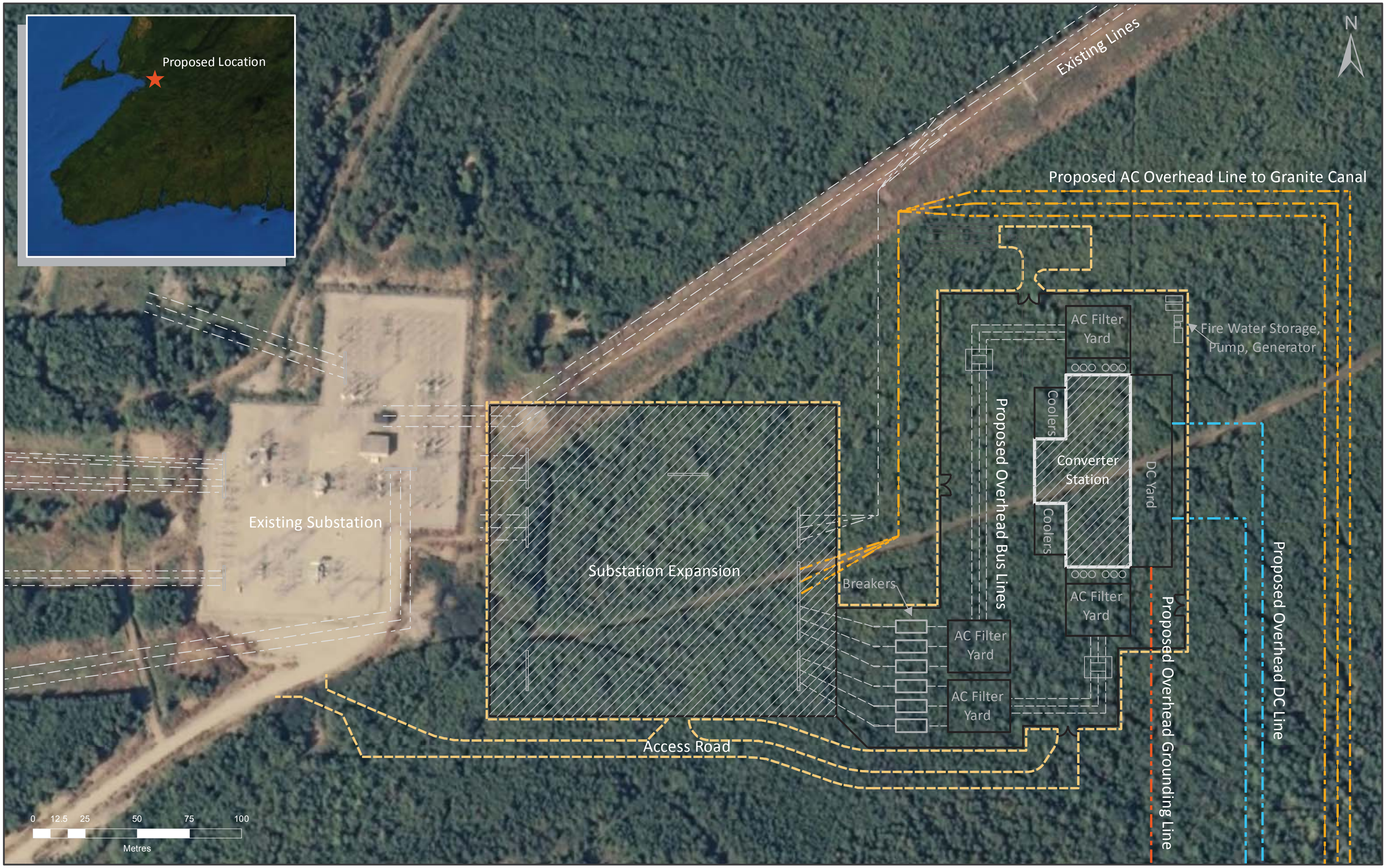
Buried underground cables will be used for HVdc transmission at three different locations, totalling approximately 3.6 km in length. The three locations include both landfalls, *i.e.*, from transition compounds to anchor sites, and the connection to the Woodbine converter station. Transition compounds function to transition aerial conductors to buried cables with the land cables buried in a trench approximately 2 to 3 m deep. Land cables will contain a conductor and insulation but no sheathing like the subsea cables, which require added protection. The cables will be approximately 10 cm in diameter and contained within a high density polyethylene (HDPE) conduit approximately 25 cm in diameter.

2.5.2 CONVERTER STATIONS AND GROUNDING FACILITIES

Converter stations house the technology that performs the power conversion between AC and DC. The AC/DC converters for the Maritime Link will operate as two 500 MW +/- 200-kV asymmetric bipole converters located at Bottom Brook, on the island of Newfoundland (Figure 2.5.5), and at Woodbine, NS (Figure 2.5.6). The Newfoundland facility will be connected to an expanded Bottom Brook substation; the NS facility will be connected to an expanded Woodbine substation. One pole will operate at + 200 kV DC and the other will operate at - 200 kV DC, each with the capability of supplying 250 MW of power. The AC/DC converters are designed as both a bipole and monopole installation. When operated as a monopole, with only one pole in service, current will flow through the active pole conductor and return through the earth via the grounding site. When operated as a bipole, with both poles in service, current will flow out one pole conductor and return through the other. If there is an imbalance on the bipole system only the small differential current will be transmitted through the earth via the grounding sites. In the event of a failure that causes a pole to be taken out of service, the system will switch automatically from bipole to monopole operation using the remaining healthy pole and the grounding site as a return path.

To accommodate the connection of the converter technology to the existing electrical systems, modifications and expansions of substations adjoining each converter station will be required and are considered part of the converter station footprint. Substations are strategically located within the electrical grid and function to either step up voltage for transmission purposes or to step down voltage for eventual distribution to customers.

An area of approximately 4 ha will be required for each converter station and substation expansion. Each facility will consist of a concrete foundation; galvanized supporting steel structures; electrical equipment and switchgear; a control building; associated office and maintenance areas; and an access road (Figures 2.5.5 and 2.5.6). The facilities will be fenced with locked gates for security.



Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Data Sources: HATCH, CBRM

Scale: 1:2,500

Date: 22/11/2012

FIGURE 2.5.5

Site Layout of Converter Station
Bottom Brook, Newfoundland & Labrador

EN0114

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 20

Data Sources: HATCH, CBRM

Scale: 1:5,000

Date: 22/11/2012

FIGURE 2.5.6

Site Layout of Converter Station & Inland Transition Compound

Woodbine, Nova Scotia

ENL112

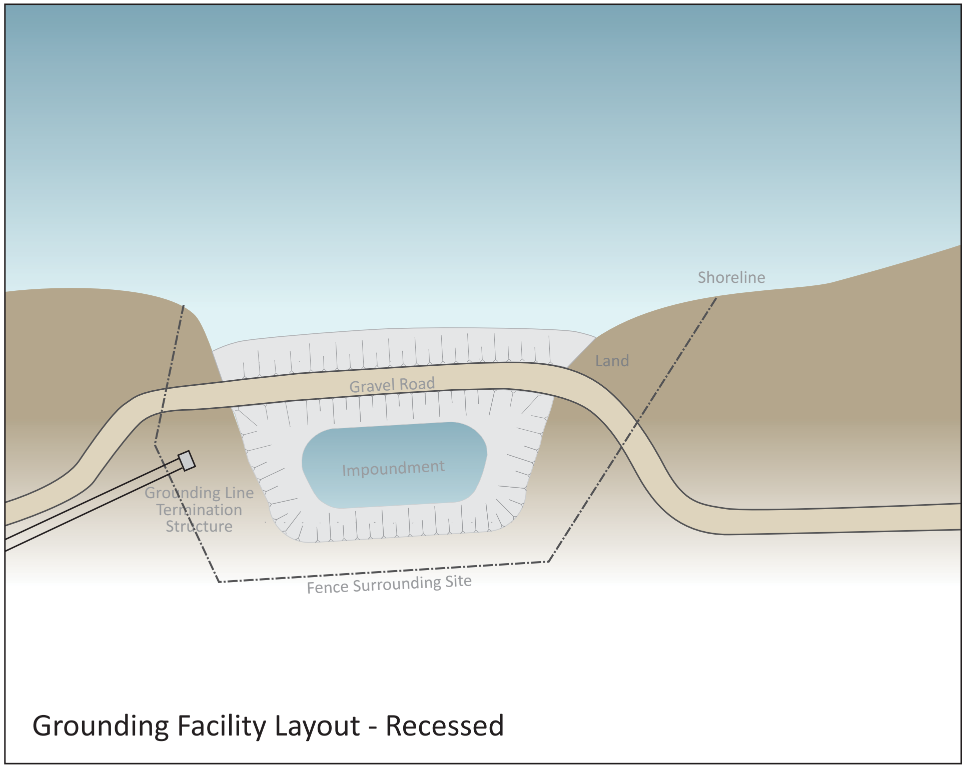
Grounding facilities associated with the operations of the converter technology are an important component of an HVdc system. These facilities serve to stabilize any operational control imbalances occurring between converter poles, known as stray current. In addition, grounding sites will be designed to provide a return circuit to ground in the event that monopole system operation becomes necessary, (*e.g.,* equipment outages). All electrical systems, AC or DC, have grounding systems, including the ground rod located at every home connected to the grid.

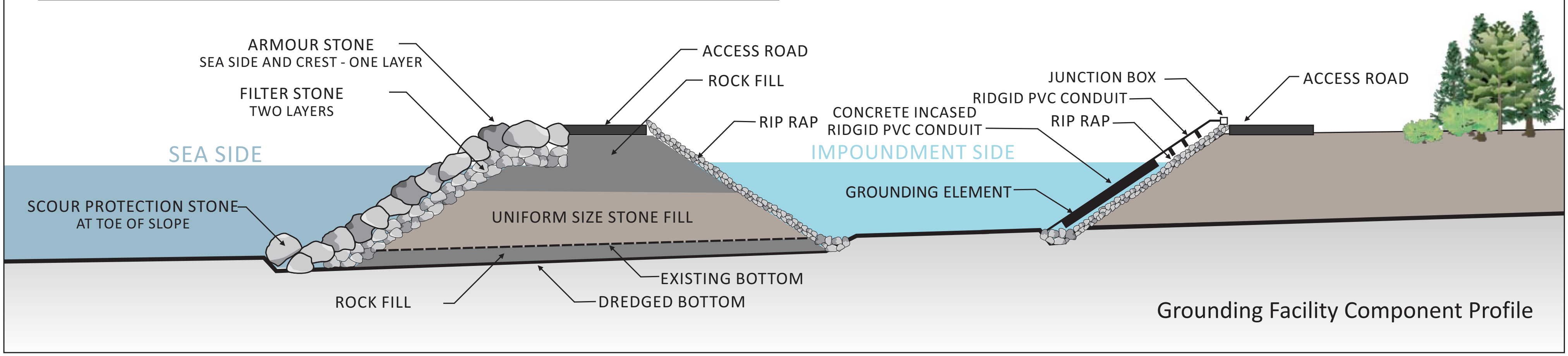
Grounding facilities can be designed as ground-based, shore-based or sea configurations. The operational objective is to provide a highly conductive current path to ground; however, the selection of the configuration and reliability of the component depends on the conductivity of the medium. The most common layouts are ground-based or shore-based, and selection is based on the measured property of ground potential rise (GPR). GPR occurs when current flowing to ground exceeds the earth's natural grounding capacity at that location. High levels of GPR are avoided in the design as they can result in adverse effects on infrastructure and the environment (as discussed in Section 2.6.2). The GPR level is highest at the point where current enters the ground and declines with distance from the source, although in areas of low conductivity a high GPR level can persist over greater distances because the earth in these cases can only reduce the current over longer distances.

Shore-based grounding sites take advantage of seawater salinity to provide additional neutralizing capacity to lower regional GPR levels. Since the geology of Newfoundland and the northern part of NS is characteristically low in conductivity, higher levels of GPR are a potential concern. For this reason shore-based grounding sites have been chosen for this Project to manage the GPR and therefore reduce potential effect to the surrounding area.

Connection between each converter station and grounding facility will occur via grounding lines that will look like common electrical distribution lines located in residential areas, (*i.e*., single wooden poles separated by approximately 60 m spans). The poles will support two heavy gauge conductors designed for low voltage (approximately 5 kV) and high current load [1250 Amperes (Amps)] required for monopole operations.

A shoreline configuration for a grounding facility can be constructed according to a number of layout options. Potential options under consideration include: recessed design (Figure 2.5.7), and extruded design (Figure 2.5.8). Both arrangements function in the same way, but differ in the design of the associated breakwater. The breakwater structure is used to create a physical barrier separating the grounding facility from natural marine events (*e.g.*, movement of sea ice, high sea-state conditions, *etc.*) as well as to create a water impoundment area needed for immersion of the grounding elements. The potential effect of ice build-up on the breakwater has been considered during the Project design as part of the engineering studies and analysis.





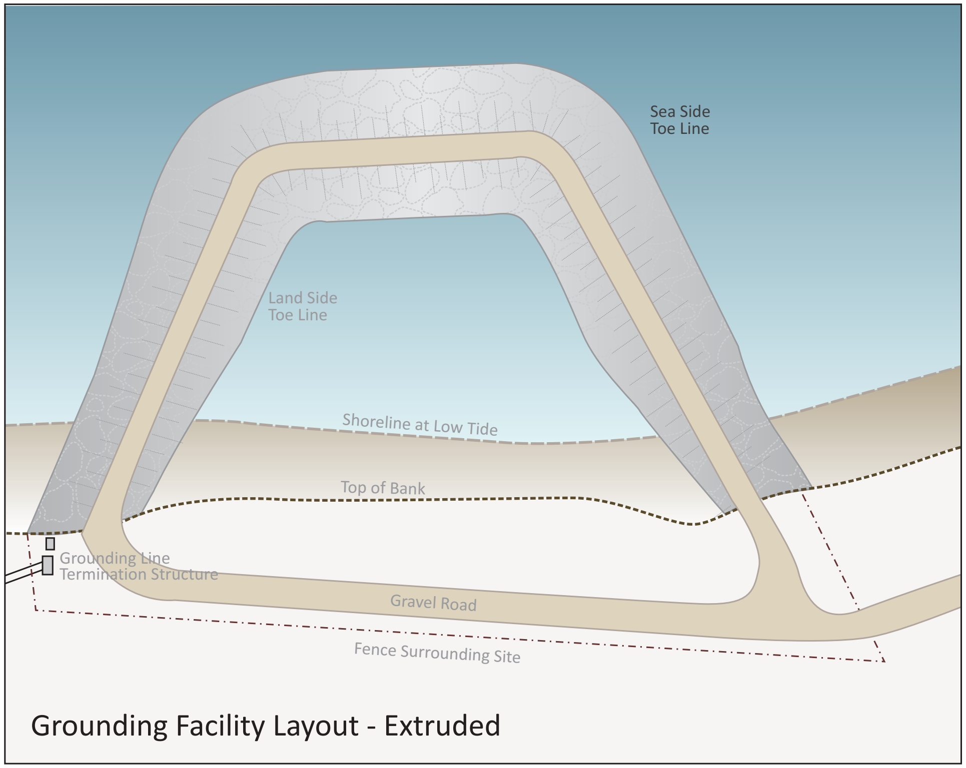
Emera Newfoundland & Labrador

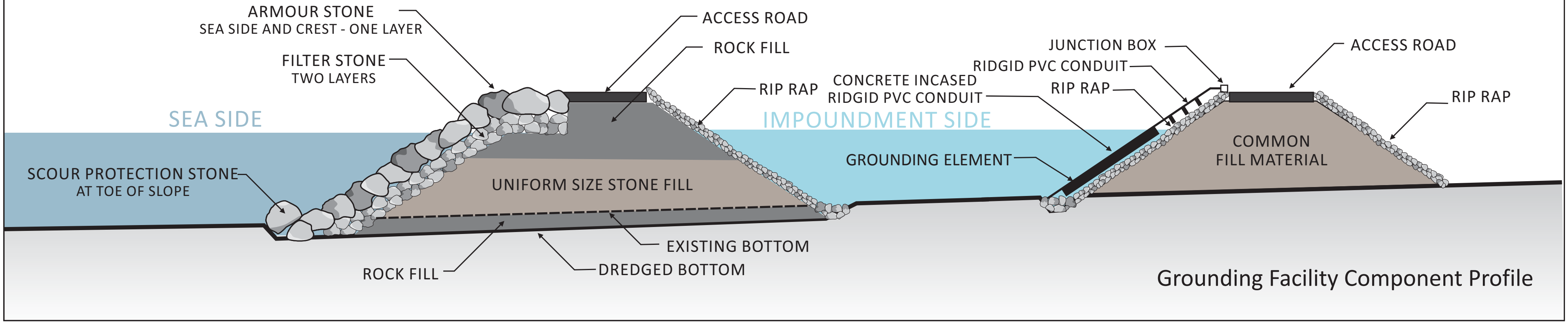
Data Sources:
HATCH

FIGURE 2.5.7

Recessed Grounding Site Conceptual Design

ENL004





Emera Newfoundland & Labrador

Data Sources:
HATCH

FIGURE 2.5.8

Extruded Grounding Site Conceptual Design

ENL003

The recessed arrangement incorporates a sheltered bay or cove, and thereby uses the natural protection afforded by the shoreline topography as part of the breakwater structure (Figure 2.5.7). The extruded design requires the construction of a breakwater that extends out from the shore (Figure 2.5.8). In both instances, the breakwater incorporates a void ratio that is determined by local soil resistivity measurements and is designed to achieve a voltage gradient safety factor of 1.25 volts per metre (V/m) on the sea side of the breakwater (Hatch 2011). An average human may feel discomfort at a voltage gradient of 2.5 V/m in sea water. A value of 1.25 V/m is selected as safe design value for large fish and humans (CIGRE Working Group 1998, Electric Power Research Institute (EPRI) 1981, Kimbark 1971). In addition to soil resistivity measurements, the breakwater design takes account of marine geotechnical data, nearshore marine bathymetry and environmental/stakeholder input. Length of the breakwater structure, material composition and layout relative to the shoreline will depend on the electrical performance requirements, sea state and geotechnical structural integrity parameters as well as operation and maintenance needs.

In either the recessed or extruded design, current is discharged into the facility via grounding elements comprised of a soft iron material, protected in a non-conductive conduit, and connected to a pole-mounted outdoor switch structure by a series of bundled cables. The incoming overhead lines will also terminate on an outdoor wooden pole structure that may also support isolation switches for each grounding line and the anticipated four associated grounding element banks. The grounding facilities will also include an access road, monitoring and protection equipment, and fencing with appropriate signage for safety considerations. Each grounding facility may have a marine footprint of up to 30,000 m^2.

The exact location of grounding facilities has not been determined at the time of submission. From the numerous options listed in Table 2.3.1, two locations in each of Cape Breton and the island of Newfoundland were short-listed for further evaluation. Based on the evaluation, two options for grounding sites have been selected in northeast Cape Breton County near Big Lorraine and Little Lorraine, NS and near Indian Head and St. George's, NL (Figures 1.2.2 and 1.2.4).

The grounding sites will be designed in a manner to facilitate safe operation and mitigate potential environmental effects, including but not limited to the following criteria:

- adequate size for current duties while maintaining current densities specified by the manufacturer;
- pre-established safety criteria (*i.e.,*designing GPR limits that are within pre-determined safety limits);
- management of GPR levels to avoid a compromise to the local AC system performance; prevent corrosion and structural damage; and minimize magnetic fields to decrease potential effects on vessel navigation and on marine life (*e.g.*, behaviour, migration); and
- reduce physical and chemical emissions.

2.5.3 GRANITE CANAL SWITCHYARD

Switchyards provide the ability to interconnect power circuits and switch the transfer of energy between circuits. Additionally, a switchyard facilitates maintenance activities by allowing some lines to be taken out of service while maintaining essential operations. The location of the Granite Canal switchyard will be approximately 500 m to the southwest of the existing Granite Canal hydro station, adjacent to the existing access road, which will facilitate initial construction and long-term maintenance and operational requirements (Figure 2.5.9). The switchyard site is approximately 75 m x 115 m and will include station electrical switch and voltage control equipment and other civil infrastructure (ditching, fencing, underground services, *etc.*).

2.5.4 TRANSITION COMPOUNDS

The transition compound is the location of transition between overhead conductors and underground cables. The arrangement of conductors will remain the same through the transition, that is, the +200 kV conductor transitions to the +200 kV cable and likewise for the -200 kV conductor and cable. Both overhead shield wires will terminate at the transition compound.

On the island of Newfoundland, the transition compound will be located approximately 2 km inland (Figure 2.5.10). In Cape Breton, the transition compound will be located approximately 1 km inland (Figure 2.5.11). This distance from the immediate coastal environment aids in protecting the line insulators from salt contamination. A salt coating over the insulators can produce a conductive path that impedes the ability of the insulator to function properly, and results in reduced levels of operational performance and reliability.

As shown in Figures 2.5.10 and 2.5.11, the transition compounds will occupy an area of approximately 500 m^2, will be about 16 m in height and will be constructed over an underground conductive grounding grid. Commonly used in all substation areas, the grounding grid is part of the system used to protect the safety of utility workers as well as the equipment located within the compound.

2.5.5 CABLE ANCHOR SITES

Cable anchor sites function throughout construction and operation. Two cable anchors will be established at each site during construction. The anchor sites will be located at the site of the borehole entrance, created by the HDD operation. Following establishment of the borehole, the sites will be used during the cable landing process as a base for the cable pull equipment, and for the cable anchors during operation. The anchor sites are also the locations where the marine cables will be spliced to buried, land-based cables.

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Data Sources: HATCH

Scale: 1:1,000

Date: 7/12/12

FIGURE 2.5.9

Site Layout of Switchyard
Granite Canal, Newfoundland & Labrador

ENL115

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Scale: 1:2,000

Data Sources: HATCH, NL Gov

Date: 21/11/2012

FIGURE 2.5.10

Site Layout of Transition Compound
Cape Ray, Newfoundland & Labrador

ENL113

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 20

Data Sources: HATCH, CBRM

Scale: 1:1,500

Date: 19/11/2012

FIGURE 2.5.11

Site Layout of Transition Compound
Point Aconi, Nova Scotia

EN110

The Project will utilize two anchor sites, one at each landfall site in Cape Ray, NL and the Point Aconi Generating Station, NS. The sites will be located adjacent to the shoreline above the high-water mark. These components will occupy a small area (approximately 100 m^2), consisting of a buried junction structure, with at-grade access. At each site, there will be an anchor (steel and concrete ballast or foundation block to hold the cable in place) for each cable, separated by approximately 10 m to protect borehole integrity.

2.5.6 LAYDOWN AREAS AND ACCOMMODATION FACILITIES

Laydown areas (material storage areas) and temporary accommodation facilities are necessary auxiliary components during the construction phase of large-scale construction projects, especially linear developments spanning long distances. Laydown areas are strategically located to optimize travel distances for work crews and machinery. Three to five temporary construction laydown areas are currently proposed on the island of Newfoundland, approximate locations as shown Figure 2.6.1. In NS a minimum of two laydown areas are proposed at sites to be determined. Construction typically requires a level pad and involves site preparation activities such as clearing and grubbing, and foundation preparation with granular material.

Temporary accommodation facilities will consist of mobile pre-fabricated modules that will accommodate personnel in remote access areas. The facilities will be equipped with power (connected to the grid or diesel generators), septic and potable water services, and communication services (satellite phone or internet provider connections). Water for domestic use will be brought into the facilities and wastewater and domestic wastes will be contained and disposed of according to regulatory requirements. All aspects of the temporary accommodation facilities will be planned in consideration of environmental and social concerns.

It is expected that one or two remote temporary accommodation facilities in the vicinity of Granite Canal will be required. Construction will require activities such as clearing and grubbing, levelling and foundation preparation with granular material. The facilities will have the capacity to lodge between 25-50 workers and are expected to occupy an area of about 150 m by 150 m. Any facilities constructed for the Project will be removed once construction activities are complete to encourage a return to natural conditions.

The locations of laydown areas and accommodation facilities will, where feasible, take advantage of previously disturbed areas, and will avoid identified ecological and archaeological sensitive sites.

2.5.7 SUBSEA CABLES

Subsea cables (+/-200 kV HVdc) will provide the transmission path connecting the island of Newfoundland and Cape Breton. The cable technology will be of a demonstrated design, previously manufactured for commercial application, and will incorporate a proven splice technology. The subsea cables will be designed under a documented manufacturing process, using high quality materials, and incorporating quality control and quality assurance processes.

The specifications of the subsea cables will be based on the results of ongoing engineering and technical investigations, but will be within the range of 100 mm to 120 mm in diameter and 30-40 kg/m in weight. The conductors of the subsea cables will be made of copper or aluminum material. The cables will not contain oils or other colling fluids which could leak. Two options for the cable type are employed for applications like the Maritime Link.

- Mass impregnated (MI) cable: This cable is insulated with viscose-fluid impregnated paper. The manufacturing of this cable involves wrapping the conductor with layers of kraft paper which is then dried under heat. The paper is then impregnated (under pressure) with a mineral oil (not free flowing) which creates a viscous interface and acts to dissipate heat from the conductor.

- Cross-linked polyethylene (XLPE) cable: This cable is insulated with high-density polyethylene which contains cross-linked bonds in the polymer structure creating a highly durable material with appropriate electrical properties.

For damage protection, the cables include two counter-helical armour layers of round or flat galvanized steel wires. This outer cable armour layer is wrapped in polypropylene or polyethylene yarn that provides a further protection layer from abrasion during loading, laying, trenching and pull-in of the cable.

The two subsea cables will follow parallel routes across the Cabot Strait. A 2-km-wide Study Area (Figure 1.2.3), between Cape Ray, NL and the Point Aconi Generating Station, NS, was established for the purpose of technical and environmental assessment. The final cable route will be sited within the Study Area and will be based on engineering considerations and avoidance of hazards and sensitive areas, where feasible, while minimizing overall cable length. Design considerations for cable placement include water depth, variations in seabed elevation, stability and thickness of the sediment layer immediately below the sea floor, and special features or physical impediments that might interfere with the cable installation. The location of fisheries, protected areas and sensitive marine habitat will also influence the cable placement. Depending on site conditions along the cable route, pre- or post-installation leveling may be required in some locations to accommodate the positioning of the subsea cables. Geotechnical surveys have provided detailed information on seafloor conditions, particle size distribution, and soil thermal conductivity properties.

Internal system communication between electrical system components may be achieved through fiber optic cables and/or radio communication. Third party fiber infrastructure exists across the Cabot Strait which could be utilized or a separate fiber cable may be wrapped with the power cables, or laid in parallel with the cables.

2.6 CONSTRUCTION ACTIVITIES

Construction activities will be timed to take advantage of seasonal conditions; for example, such activities may include access across bog/wetland habitats, installation of structure foundations, and placement of construction materials along the transmission corridor during freeze-up conditions. Structure framing and line stringing activities are more suited to summer months, to take advantage of drier conditions and extended daylight hours. The following sections outline the general steps for construction of the Project. Standard environmental mitigations that have been incorporated into Project design are presented in Section 2.8.3.

2.6.1 SITE ACCESS

Safe construction, operation and maintenance of the on-land component of electrical power transmission systems inherently involve developing and maintaining a cleared transmission corridor. Although necessary for operational reliability and safety reasons, the transmission corridor also provides an opportunity for access along the transmission line. Given that over 85% of the overhead transmission corridor in NL is parallel with, or adjacent to, existing roads and/or power transmission corridors (Figure 2.6.1), the resulting increase in new access will be minimal and is not considered to pose a significant increase in environmental risk in those areas.

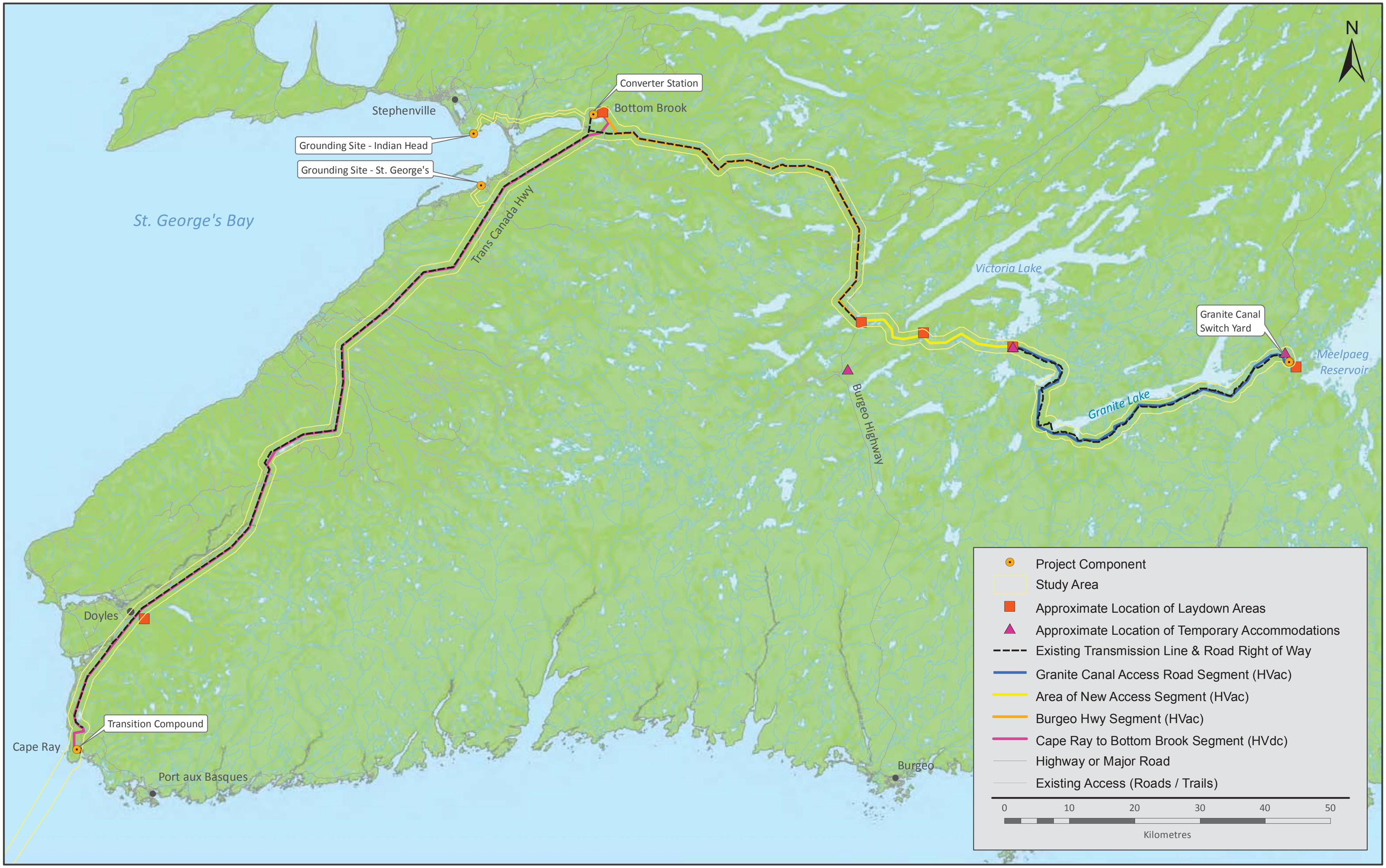
Early engagement with regulators and stakeholders identified construction access, in particular through the Area of New Access, as a key detail for consideration in Project planning and design of mitigation options. This section describes the plan for access across all segments of the Project, however, in keeping with the feedback received, additional emphasis and focus is provided for the Area of New Access segment.

Watercourse Crossings

Watercourse crossings will be executed in one of four ways depending on crossing width and length of the span required, hydrology, environmental sensitivities (*e.g.,* scheduled salmon rivers) and engineering considerations. The four possible means for crossing watercourses are as follows:

1) Use of existing structures, where feasible.
2) Use of temporary engineered structures where no permanent crossings are present. Clear span bridges will be the preferred option and will be installed in accordance with applicable provincial and federal guidelines.
3) Winter ice crossings will be utilized where and when feasible. Winter mobilization and distribution of materials will be scheduled to take advantage of freeze-over conditions.
4) Fording of watercourses, which is crossing the channel bed at stable, low gradient, low flow locations, will be considered as a last resort option under specific conditions and in accordance with regulatory requirements.

An assessment of watercourses along the proposed route was conducted and is summarized in Section 4.



Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Scale: 1:800,000

Date: 12/3/12

Data Sources:
Road Network
- Geobase
- Department of Environment and Conservation National Atlas - Geogratis

FIGURE 2.6.1

Overview of Overland Transmission Line Corridor Segments
Island of Newfoundland

ENL0142

Wetland Crossings

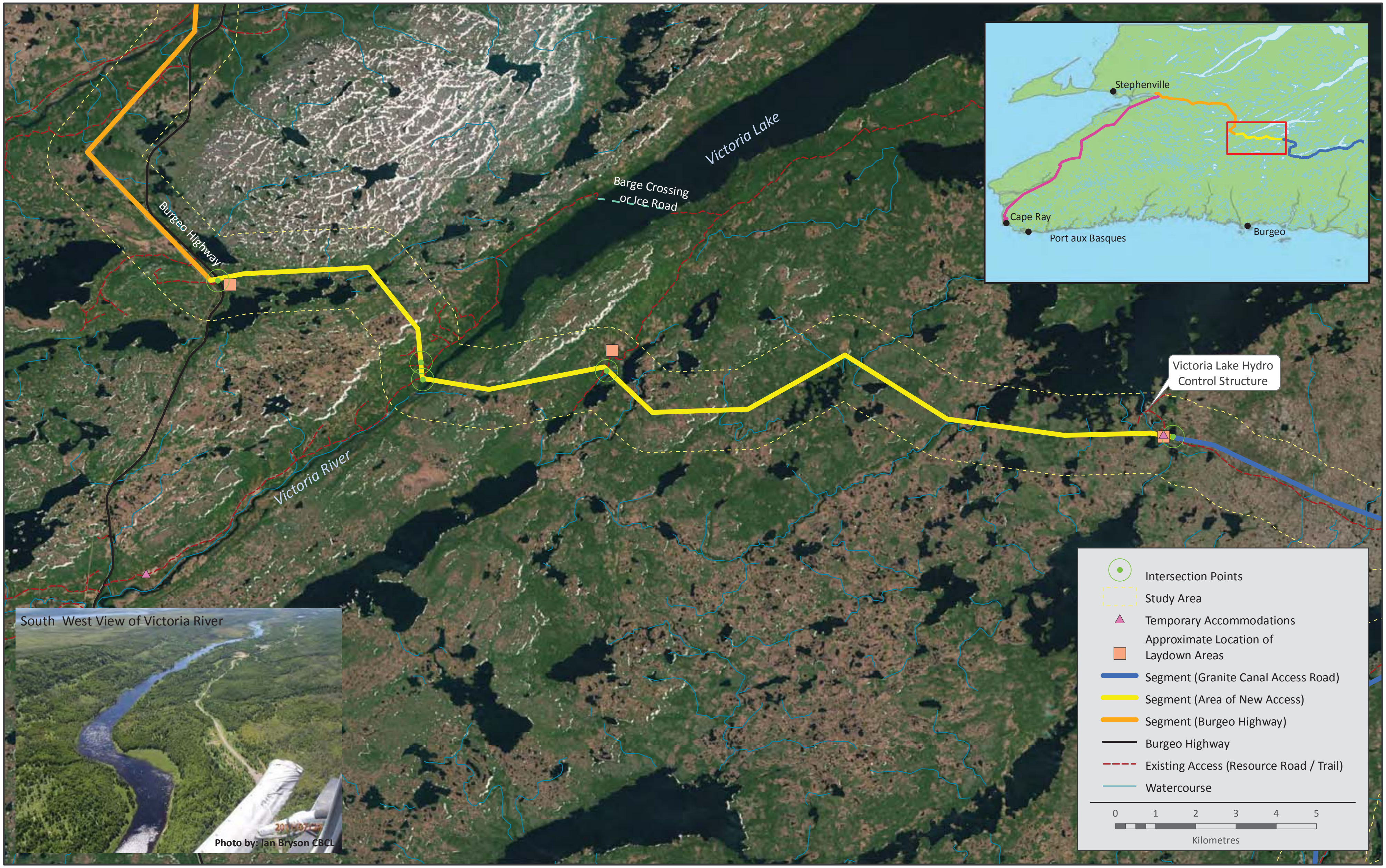
Crossing of wetlands during construction will be accomplished by using existing roads (*e.g.,* public roads, resource roads, trails) and the existing transmission corridor, to the maximum extent feasible. The preference will be to move equipment and materials, in advance of construction, linearly along the cleared transmission corridor thereby minimizing the extent of disturbance outside the corridor. In situations where wetlands traverse the entire transmission corridor width, access will deviate from the corridor around the wetland, where feasible, or temporary mitigation such as swamp mats or brush mats will be employed. Since the mats distribute the load weight over a much larger area, any disturbance is expected to be temporal in nature and quickly rehabilitate to original conditions. Mats will be removed at the end of the construction following the crossing of the last piece of equipment. An assessment of wetlands along the proposed route was conducted and is summarized in Section 4.

2.6.1.1 Area of New Access

The Area of New Access to be traversed by the Project corridor is relatively inaccessible, compared with the balance of the Project in Newfoundland, and includes habitat for a number of important wildlife species, particularly caribou. An important aspect of managing such sensitive or relatively pristine ecosystems includes controlling access in order to reduce the risks often associated with increased human presence (disturbance, harassment, hunting, poaching, habitat destruction, *etc.*). The design and planning of the Project within the Area of New Access is focused on that objective.

It should be noted, however, that access is a relative term since there are few places that are inaccessible. There are also degrees of accessibility, ranging from easy to difficult. Furthermore, the degree of accessibility may have a seasonal connection. Thus, while access may be somewhat limited for some of the year, during winter months it is greatly enhanced with snowmobiles. Surveys of the Area of New Access have shown there is some access, such as the existing 17-km road along the Victoria River which intersects the Project Study Area at the 10 km mark (Figure 2.6.2). This access road, as well as the intersection with Burgeo Highway, will provide the primary access points to the transmission corridor from the west. The existing Granite Canal access road will provide the access in the east (Figure 2.6.1).

For any degree of accessibility there is an important difference between access to an area and access within an area. In the latter case the access, whether easy or difficult, represents a transmission corridor to other destinations, thereby resulting in a more heavily used traffic route with associated ecological impacts. All-weather roads currently provide controlled access to the eastern and western portions of the Area of New Access, as shown in Figure 2.6.2, and the interior is accessible by snowmobiles in the winter and, to some extent, by all-terrain vehicles during other seasons.



Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Scale: 1:130,000

Date: 9/19/12

Data Sources:
Road Network
- Geobase
- Department of Environment and Conservation National Atlas - Geogratis

FIGURE 2.6.2

Overview New Access Area
Island of Newfoundland

ENL0143

These points were taken under consideration in the design and planning of the transmission corridor through the Area of New Access. The framework within which access for construction is being planned for this part of the Project is described below:

- The Area of New Access is not inaccessible or pristine, since it is already subject to the effects of historical timber harvesting, seasonal habitation and effects of all-terrain vehicles during the summer months and snowmobiles during the winter. Thus, the objective of mitigation is to minimize, to the extent feasible, the cumulative effects of the Project as they relate to increased access.
- With regards to access to the Area of New Access, the above-noted existing access roads will be enhanced to suitable construction conditions and will be used as jumping-off points for clearing of the transmission corridor in both easterly and westerly directions (Figure 2.6.2). Materials, equipment and personnel will be transported using track-mounted machines over existing terrain and within the bounds of the new corridor to the extent feasible. As surfaces and terrain allow, four-wheel drive and all-terrain vehicles will also be employed. Deviations from the new corridor would be minor, potentially relating to wetland avoidance, water crossing locations and challenging terrain conditions. At this point in the Project planning process, and with this combination of mitigation measures, the requirement for construction of new access roads is not anticipated.
- With regards to access within the Area of New Access, the alignment of the transmission corridor offers the advantage of natural “break points”, *i.e.*, areas where the corridor will cross large bodies of water (rivers or lakes) or steep rock faces that act as barriers to motorized vehicles. The most pronounced break point is the Victoria River crossing which will have a tower span of approximately 400-600 m with no clearing of trees in between in the river valley. Although such natural obstacles will effectively limit access by all-terrain vehicles, they will have little effect on access by snowmobiles, which is virtually impossible to control.
- In order to maintain an access break point at the Victoria River it will be necessary to mobilize equipment across Victoria Lake utilizing an ice road or barge system. For construction purposes, specifically the movement of equipment and materials, it will be essential to have access, from the west, to the transmission corridor east of Victoria River. An ice road on Victoria Lake (shown in Figure 2.6.2) was historically used for resource harvesting and connected to existing roads on the east side of the lake, one of which intersects the proposed transmission corridor. The potential reinstatement of this ice road and/or a barge system will provide access the east side of Victoria River. The barge system will require some shoreline stabilization, however, the benefits of having the flexibility to construct from both directions will expedite the construction process in this area, thereby reducing impacts to wetlands and other habitats. It is important to note this alternative is still under consideration at this point in the planning process.

This Area of New Access includes 20 watercourses which need to be crossed for the purpose of construction (Table 2.6.1). Of the 20 watercourses, 5 are of class C or D (averaging 14 m and 45 m in width, respectively).

Table 2.6.1 Summary of Watercourse Crossings

Stream Class	Watershed Area	Channel Width (m)			Number of Watercourses by Project Segment				
		Min	Max	Avg	Cape Ray to Bottom Brook	Burgeo Highway	Area of New Access	Granite Canal Access Road	Point Aconi to Woodbine
A[1]	<2km^2	N/A[1]			29	25	13	37	35
B	>2km^2 and <4km^2	4	14	7	7	9	2	5	11
C[2]	>4km^2 but not "large"	5	29	14	32	7	2	2	4
D[3]	>4km^2 and "large"	12.5	86	45	11	3	3	4	3
		Total			79	44	20	48	53

1: Aerial validation of Class 'A' streams as not fish habitat; Nil to Intermittent Flow
2: Considered a stream and is mostly represented by a single line in the 1:50,000 digital topographic base mapping
3: Considered a large stream and/or river with both stream banks represented in the digital topographic base mapping

2.6.1.2 Granite Canal Access Road

This segment of transmission line will parallel, or be in the vicinity of, the existing seasonal access road that runs on the south side of Granite Lake and north alongside Burnt Dam (Figure 2.6.1). Accessibility for construction of this segment of line will be via this road, which is currently utilized by NLH to access Burnt Dam and Victoria Lake. Although heavy equipment would have been mobilized along these roads in the past for construction of the NLH infrastructure, they will require refurbishment, repairs and passing areas to facilitate the movement of equipment required to build the transmission line.

This access segment has 48 watercourse crossings (Table 2.6.1), all of which are crossed by the existing road using culverts or permanent bridges.

2.6.1.3 Burgeo Highway Access

This segment of transmission line will parallel, or be in the vicinity of, an existing 69 kV transmission line. Like the existing line, the new line will also be located within 300 m of the Burgeo Highway (Figure 2.6.1). Numerous access points to the current line exist for operational needs, and will be utilized during construction and for laydown materials, where required. This segment of the transmission corridor is constrained by terrain slope so the use of helicopters for the distribution of materials and erection of towers is a consideration.

This access segment includes 44 watercourses (Table 2.6.1), all of which are crossed by the current transmission line. Due to the proximity of the Burgeo Highway, and considering the landscape topography, watercourses will be accessed from either side for crossings.

2.6.1.4 Bottom Brook to Cape Ray

This segment of transmission line will parallel, or be in the vicinity of, an existing 138 kV transmission line (Figure 2.6.1). Like the existing line, the new line will also be located within 2 km of the Trans-Canada Highway. Numerous access points to the current line exist for operational needs, and will be utilized during construction and for laydown materials, where required. These access points are located, on average, every 1.85 km of line, with a maximum distance of approximately 8.4 km. This segment of the transmission corridor is relatively flat and most likely will be constructed with land-based equipment rather than helicopters.

This access segment has 79 watercourses (Table 2.6.1), all of which are crossed by the current transmission line. Due to the proximity of the Trans-Canada Highway, and considering the extent of existing access, watercourses will be crossed using standard techniques described below and mitigation best practices as described in Section 2.6.7.

2.6.1.5 Point Aconi Generating Station to Woodbine

This segment of transmission line will parallel an existing 230 kV transmission line. Numerous access points to the current line exist for operational needs and will be utilized during construction and for laydown materials, where required. This segment of the transmission corridor is relatively flat and most likely will be constructed with land-based equipment rather than helicopters.

This access segment has 53 water courses, all of which are crossed by the current transmission line. Due to the proximity of the existing roads and considering the extent of existing access, watercourses will be crossed using standard techniques described below and mitigation best practices as described in Section 2.6.7.

2.6.2 SITE PREPARATION

Vegetation clearing will be among the first activities undertaken during Project construction and will include: all transmission corridors; the grounding lines; static Project infrastructure such as converter stations, transition compounds and switchyards; construction of permanent and temporary access roads, laydown areas, and temporary accommodation facilities. The initial clearing activity creates the transmission corridor that is maintained throughout the life of the asset. Many of the environmental controls established for clearing activities (*e.g.*, temporary bridges for watercourse crossings, erosion and sedimentation controls, *etc.*) will be maintained for subsequent construction equipment and traffic. Proper and successful execution of the environmental protection measures will include regular inspection of controls; inadequate or compromised controls will be re-installed or addressed as required.

The extent of clearing for transmission corridors will depend on the forest cover and extent to which the existing line will be paralleled. The typical transmission corridor width requirements for the island of Newfoundland are shown on Figure 2.5.3 and, depending on the type of structure and whether the corridor parallels an existing transmission line, vary in width from 50 m for a new transmission corridor to 88 m when an existing transmission corridor is paralleled. The typical transmission corridor width requirements for NS are shown on Figure 2.5.4 and are approximately 67 m, depending on the type of transmission structure.

Within the transmission corridor, the exception to these clearing widths will be locations for long spans, which will require slightly wider corridors to accommodate the larger tower size and associated construction. Clearing permission will be obtained and requirements for harvesting of merchantable timber (*e.g.,* felling, extraction, processing, loading and trucking) will be adhered to following discussions with the respective provincial regulatory authorities.

Soil and aggregates required for fill for foundation towers will be obtained from existing and/or new pits and quarries, or from within the transmission corridor.

Grubbing involves the removal of organic material and unsuitable overburden above the underlying soil. Transmission routes typically require minimal grubbing, but it may be required for dead-end towers, depending on foundation requirements. In addition to the large tower foundations, other infrastructure including buildings and access roads will also require grubbing.

2.6.3 TRANSMISSION AND GROUNDING LINE INFRASTRUCTURE

Installing transmission and grounding line infrastructure involves the preparation of foundations, tower assembly and erection, installation of counterpoise wire and stringing of conductor. With the exception of about 3 km of overland buried transmission cable, the remaining line (including grounding line) involves conventional construction practices. The activities associated with the line construction, including the overland buried cables, are further described below. Environmental mitigations during construction are described in Section 2.6.6 and further in the effects assessment sections. However, the initial and fundamental basis for minimizing environmental effects is through mitigation by design. For the purpose of minimizing environmental effects, the design of the Project has taken into account: wetlands and rare plant high potential models (accurate to 1:25,000 scale); archaeological high potential modeling; watercourse crossing information; extent to which current use of land and resources for traditional purposes by the Mi'kmaq occurs; and other baseline data.

Tower foundation design, depth and construction profile will depend upon tower type as described in Section 2.5.1 and will be influenced by geotechnical studies and environmental conditions. Typically guy wires, anchored into the ground in combination with a central grillage or concrete footing, are used to support tangents and low-angle structures. Self-supporting structures generally use four separate steel grillage or poured concrete footings.

The design of tower foundations is influenced by tower type and subsurface geology conditions, (*e.g.,* bedrock, soil and wetlands):

- Regardless of the type of tower, foundations in bedrock require removal of rock to a minimum depth of 2.5 m, depending on tower height. In rockblasting, blast holes drilled with pneumatic percussion machinery are covered with blast mats to contain rock debris and the blasted rock is used as back fill to support the tower. Wooden poles are typically placed in the blasted hole, on well-tamped solid foundations, then backfilled with compactable granular material. Foundations for steel lattice tangents or self-supporting legs involve a footing anchored into bedrock at the base of the hole then built up with concrete, steel grillage and/or rock.

- Foundations in soil require excavation to a depth of at least 2.5 m, depending on tower type. Steel lattice, self-supporting towers are typically founded with steel grillage or concrete footings and backfilled with the original material. As with foundations in bedrock, steel rods connected to the grillage or reinforced concrete footing protrude to the surface and are used to seat the tower legs. Wooden poles are founded on tamped rock at the base and backfilled with compactable granular material. Where local material is not suitable, engineered backfill is required.

- Tower foundation preparation in wetlands depends on the depth of the wetland. The design includes a firm bottom hole and side hole support. Wooden pole installation involves excavation of wetland material to a depth of approved structural material (*e.g.*, rock or soil layer of adequate strength) if firm bottom is reached within the minimum 2.5 m pole burial depth. If organic material extends beyond the minimum pole burial depth a timber or concrete pole pad is employed to engineer a firm bottom support. Side or lateral foundation support in wetlands requires the use of timber or stainless steel cribs. The pole is placed in the foundation crib and then backfilled with a suitable engineered backfill. Self-supporting structures constructed in wetlands typically involve the use of piles embedded 5 to 8m below wetland depth to support each tower leg.

Tower materials will be transported and stockpiled at strategically located laydown areas as close to the transmission corridor as possible. Distribution of materials from the laydown areas to the precise tower locations will generally be by track-mounted pole cats that physically drag materials over the ground surface and place them at the appropriate location for assembly. In areas of challenging topography, such as within the Burgeo highway section and the Area of New Access, construction workers and materials may be distributed by helicopter. Once the materials are distributed along the transmission corridor and the foundations are in place, the towers will be assembled and erected. Steel sections will be bolted together to form the lattice structure and cranes will be used to lift the sections onto the foundations to which they will be bolted and stabilized by guy wires. Insulators will be installed on each tower prior to line stringing. In areas of challenging topography, erection of towers may require the use of helicopters.

Stringing transmission conductors will involve conventional ground pulling equipment and techniques, sometimes in combination with helicopters. Once the entire span (dead-end to dead-end) of conductor is installed the puller and tensioner are used to achieve the required tension before fixing the conductors to the dead-end towers.

To protect against lightning-related backflash, lightning shield wires, located above the conductors, are part of a commonly-used counterpoise system designed to absorb lightning strikes and then dissipate the energy to the ground. The system typically consists of a copper-coated galvanized steel wire system that spans the entire length of the transmission route, connected at each tower to the lightening shield wires and buried approximately 30 cm below surface. At watercourses, the counterpoise wire is connected to ground rods, also made from copper coated galvanized steel, buried approximately 2 to 3 m below grade on both sides of the watercourse.

At each of the cable anchor sites the two subsea cables will be spliced to two land cables (+/- 200 kV HVdc), both of which will be placed in an excavated trench separated by approximately 30 cm. The trench will be approximately 2 m deep, constructed with granular material, and backfilled.

2.6.4 CONVERTER STATIONS

The access road and the overall site will be cleared and prepared for construction. Fill materials may be brought onsite to construct the road and to level the site. An engineered concrete foundation slab will support equipment housing, manufactured off-site and transported to the respective locations in Woodbine, NS and Bottom Brook, NL.

2.6.5 GROUNDING FACILITIES

The main activities associated with the construction of the grounding facilities is the creation of a breakwater structure and associated impoundment pond.

2.6.5.1 Breakwater

The area where the breakwater will be located may require dredging to remove any unstable silt or soft clay materials, and to create an even and stable surface for construction. Using clean, coarse fill, that is free of sediment, the breakwater will be constructed with the use of dump trucks and an excavator for rock placement. The breakwater will be designed to be permeable, as a hydraulic connection to the marine environment is required so that the water impoundment retains a comparable salinity to that of the ocean. Concrete anchors will be installed on the impounded side of the breakwater and will be used to fasten the non-conductive conduit casements of the grounding elements to the breakwater structure.

2.6.5.2 Water Impoundment

The water impoundment has a minimum depth requirement of 4 m to protect the grounding elements from winter ice conditions; therefore, dredging may be required within the impoundment area. Dredged material will be disposed of at an approved facility on land.

2.6.6 SUBSEA CABLES

2.6.6.1 Seabed Preparation and Cable Placement

Prior to laying the subsea cables, a grapnel will be dragged along seabed surface of the installation route to remove minor debris such as abandoned fishing gear. A grapnel is an apparatus that can take different shapes and forms but in most cases looks like a large anchor or hook that is tethered to the vessel and is dragged across the seabed along the cable route. The grapnel run occurs prior to the cable laying campaign and can take place anywhere from a few weeks ahead of time to immediately prior to cable laying.

Certain seabed features, such as areas of historic iceberg furrows and/or pockmarks created by gas releases from the ocean floor, could compromise cable integrity during installation. These furrows and pockmarks may be substantial enough in depth and width to require pre- and post-installation span rectification. This procedure involves levelling or infilling with clean rock to create a stable sub-grade and eliminate cable suspension. Areas with smaller cavities and in softer soils may be dealt with using pre-installation ploughing. Wherever feasible, substantial seabed features will be avoided. Where avoidance is not possible, ENL will comply with the regulatory/permitting process regarding disturbance of habitat within these features.

The subsea cables will be transported to the area and installed using a large, dynamically positioned cable laying vessel similar to that shown in Figure 2.6.3. For perspective on vessel size, general vessel dimensions are provided in Table 2.6.2.

Table 2.6.2 Typical Dimensions and Equipment for Cable Laying Vessels

Length	100 - 150 m
Width	30 - 35 m
Draught	8 - 10 m (fully loaded)
Gross Tonnage	10,000 – 12,000 t
Maximum Cable Load	7,000 – 9,000 t

The main equipment on board the vessel is a hydraulically operated laying capstan wheel and large turntable, with various tension devices and roller paths. In addition, there is equipment for measuring the pull tension on the cable during installation; measuring the length of the cable laid out and splicing cable lengths at sea. The vessel also carries a remotely operated vehicle (ROV) for subsea monitoring during installation. During operations all data related to cable laying will be logged and reviewed for quality control.

The cable laying speed of the vessel will be influenced by weather, water depth, and cable design. Maximum transit speed is approximately 19 km/hr (10 knots) with a cable laying speed estimated to be approximately 0.5 km/hr (0.3 knots). This equates to an expected cable laying duration of 2 to 3 months.

Emera Newfoundland & Labrador

Data Sources:
Photo Credit: www.burgerinternationalinc.com

FIGURE 2.6.3

Typical Cable Laying Vessel

ENL006

2.6.6.2 Cable Protection

The timing of cable protection can vary as described in Section 2.6.6.1 between a simultaneous cable lay and burial and a post-burial following cable laying. Many factors influence the sequence of cable installation and protection including, but not limited to, substrate type, probable sea-state conditions, vessel criteria and water depth. Regardless of the sequence, the method of cable protection also varies with the level of protection generally commensurate with the risk of damage. Risk assessment takes into account factors such as the extent and location of commercial fishing activity, oceanographic environment (*e.g.,* water depth, current, sediment transport), geophysical and geotechnical environment (*e.g.*, substrate characteristics, regional geology, active seabed features), iceberg and pack ice studies, vessel traffic and anchorage statistics, cable inspection and repair requirements. In relatively shallow waters protection of the subsea cables will involve engineered methods which are described below, while in more offshore areas the greater water depth may inherently provide sufficient natural protection. The type of engineered protection will be determined in the detailed design phase of the Project. With respect to natural protection, however, water depths through the Laurentian Channel greatly reduce the potential for damage from fishing gear and dropped objects and risk from emergency anchorage.

Engineered cable protection will be required in waters shallower than approximately 200 m where there is a higher risk of damage from trawl fishing activities or pack ice conditions. Methods typically involve burial of the cable in a trench or covering the cable with a rock or concrete mattress berm. The chosen method of cable protection is primarily dependent on substrate composition and required depth of protection. Cable burial through trenching is the preferred option for addressing risk of cable contact with pack ice and mobile fishing gear. Cable trenches can range from 30 cm in bedrock to approximately 3.5 m in depth in soft sediment. Trench widths also vary depending on the substrate type and technology employed and typically range in soft sediment from 30 cm with water jetting technologies to 1.5 m with conventional plough equipment. In bedrock, trenches created through rock cutting will be approximately 1 m in width. Trenching techniques conventionally used for this application, and which are under consideration include:

- Water jetting: This method employs an ROV that fluidizes the sediment with high pressure water, allowing the cable to sink to a controlled depth. The majority of suspended sediment naturally settles and, through localized sediment transport, the trench becomes backfilled.

- Ploughing: This method employs a cable plough tethered to a vessel. Ploughing displaces the sediment creating a trench in which the cable is laid. The ploughed sediment berm then moves back to the trench through the natural sediment transport process.

- Rock Cutting: In areas requiring burial into bedrock, rock cutters will be employed to establish a bedrock trench to a depth typically double the cable diameter. Trenches in bedrock may require backfilling with suitable engineered material to meet cable thermal insulation specifications and cable protection.

2.6.6.3 Horizontal Directional Drilling

HDD is the technique chosen for nearshore installation of the subsea cables. HDD is a mode of drilling that is commonly used for installation of pipes/conduits beneath physical obstructions and beneath water and other environmentally sensitive areas. In the Maritime Link, HDD will be used to construct a conduit to bring the subsea cables from land to exit locations offshore, thus achieving nearshore cable installation and protection without disturbing sensitive shoreline marine habitat and minimizing interaction with nearshore commercial fisheries.

In this report, reference to landfall sites are those locations near the shoreline selected for the HDD rig site and subsequent entrance location of the borehole. Cable landfalls shown on Figure 2.6.4 and 2.6.5 are located at Cape Ray, NL and near the Point Aconi Generating Station in Point Aconi, NS. The HDD borehole will exit the seafloor approximately 450 m offshore Newfoundland at a depth of about 22 m and in NS approximately 1 km offshore at a depth of approximately 12 m. These nearshore landfall sites, including borehole exit locations, have been determined by various factors including, but not limited to, commercial fishing activities, subsea bathymetry and results of various technical investigations including pack ice and metocean studies.

The HDD site (approximately 150 m x 200 m) will accommodate access, equipment, material storage and construction trailers. The typical layout of an HDD operation is shown on Figure 2.6.6, and includes site offices, laydown and parking areas, pipe racks, drill rig, mud return pit and ancillary components (*e.g.,* diesel generators, mud pumps, water supply).

On each shoreline the HDD construction sequence involves drilling two boreholes , approximately 10 m apart, from the shore to exit the seafloor at the predetermined distance (approximately 450 m offshore Newfoundland and 1 km offshore NS). The profile of the boreholes will be established at a later stage of design but it is expected that the bend or curve radius will not exceed 15 degrees. The boreholes will be drilled starting with a 10" (25 cm) pilot hole followed by a series of reaming passes to widen it to the desired diameter of approximately 24" (61 cm). Liners will be installed to create cased holes. Each of the cables will then be pulled through their respective cased holes, using pennant wires connected to a high-powered cable pull system that will be set up at the anchor site.The HDD process utilizes a drilling fluid commonly referred to as "drilling mud" that serves to lubricate the drill bit and down-hole assembly as well as to facilitate removal of cuttings from the drilling hole. The drilling mud will be water-based with a bentonite additive to create the desired level of viscosity for suspension and removal of cuttings.

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 21

Data Sources: Department of Environment and Conservation

Scale: 1:15,000

Date: 03/12/2012

FIGURE 2.6.4

Landfall Site
Cape Ray, Newfoundland & Labrador

ENL0104

Emera Newfoundland & Labrador

Coordinate System:
UTM NAD 83 Zone 20

Data Sources:
Nova Scotia Property
Records Database

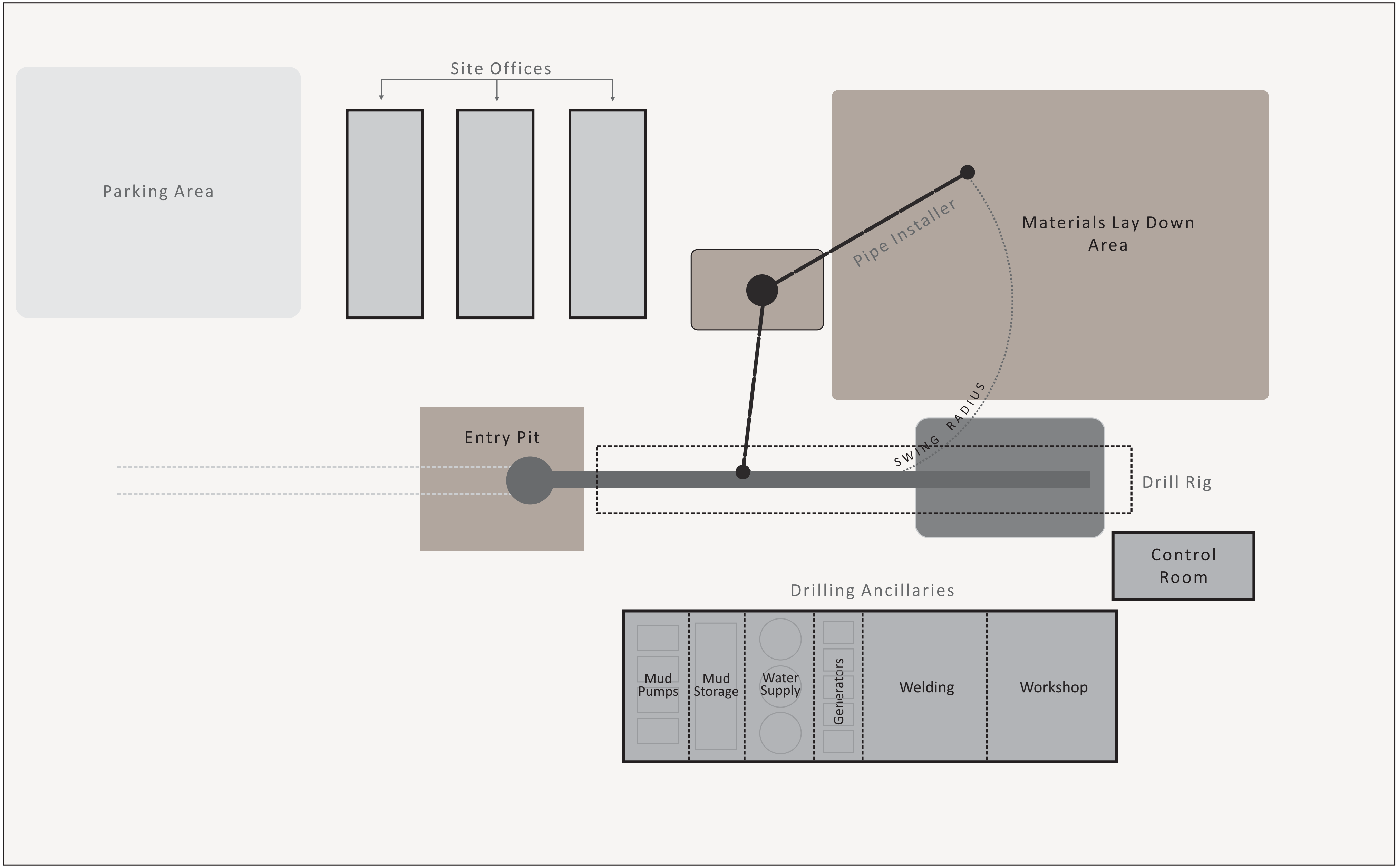
Scale: 1:8,000

Date: 03/12/2012

FIGURE 2.6.5

Landfall Site of Subsea Cables
Point Aconi, Nova Scotia

ENL0103



Emera Newfoundland & Labrador

Data Sources:
HATCH

FIGURE 2.6.6

Typical Horizontal Directional Drilling Layout

ENL0054M

The pilot holes end at the exit locations where the boreholes breach the seabed. Described below are the two most common methods for executing the breach. Both methods require the drill bit and high pressure muds to exit the seabed; however, with appropriate mitigations as discussed in Section 2.6.7, the loss of drilling muds will be minimal.

- Drill short - this method results in the least amount of drilling fluid escaping as the objective is to stop the pilot drill short of breaching the seabed. This method depends on specific geological conditions, substrate type, bottom hole drill assembly configuration and accuracy of drill monitoring equipment. It is also most viable when exiting sediment rather than bedrock. Once the hole is drilled and reamed to the desired width, the remaining plug of natural sediment is drilled through at the end, with various mitigation options available such as changing mud type, use of divers and suction equipment.
- Drill through – this method involves installation of a grout plug with the drill pipe following breaching of the seabed. It is a trial and error process and results in drill fluid loss.

Following the completion of the HDD borehole pilot drill and reaming operations, the boreholes are cased with either HDPE or stainless steel casing of approximately 24-in (61 cm) diameter, depending on the final cable diameter. The casing is installed from the surface using the drill rig in nine-metre sections with joints screwed then fused in place. The casing is pushed into the borehole the full length to the exit location.

Cable installation involves pulling the cable through the casing to surface on land. It will require the use of ROVs and/or divers at the HDD seabed exit location to ensure proper guidance into the casing. Pennant wires connected to the anchor sites and running through the casing will be connected to the cable by the divers and pulled through the casing via a hydraulic winch system anchored onshore. Following HDD operations, the site at which the casing enters the ground is referred to as the anchor site and is the splice point between the subsea cables and the on-land buried cables which extend to the transition compound.

2.6.7 ENVIRONMENTAL MITIGATION/BEST PRACTICES

The following general mitigation is considered to be standard practice and will be implemented as part of the Project design. Specific mitigation, monitoring, and follow-up that may be required to address residual environmental effects are discussed in the individual valued environmental component (VEC) sections.

2.6.7.1 Clearing and Grubbing

- Tree clearing activities will be executed in a manner that complies with the *MBCA and SARA*, specifically to avoid incidental take:
  - primary mitigation will be through Project planning and scheduling of clearing activities, on a best-efforts basis, to avoid key migratory bird nesting periods; and

- secondary mitigation will be the development and implementation of an avifauna management plan designed to reduce the likelihood of interaction; establish training protocols for personnel to identify active nests; and protocols for nesting surveys by trained ornithologists in advance of clearing activities.

- Harvesting of timber on private lands will be subject to agreement of a legal interest in the land and/or a timber harvesting agreement.
- Permission to access areas for clearing purposes will be obtained from property owners.
- Harvesting timber on Crown Land will be done in accordance with Provincial Crown requirements.
- A commercial harvesting permit will be obtained from the respective forest management district office prior to commencement of activities.
- All timber harvested under a commercial permit will be scaled and stumpage paid as per the timber royalty regulations.
- All timber will be harvested in accordance with the Cutting of Timber Regulations.
- All timber, both merchantable and non-merchantable vegetation, will be harvested using standard forest harvesting technologies, including both felling and mulching, and in accordance with applicable regulatory requirements. The transmission corridor to be cleared will be marked to visually define limits of the Project area.
- Stump heights will be kept as low as feasible for future vegetation management purposes.
- An operating permit will be obtained from each forest management district in the fire season.
- Brush disposal will include options such as chipping, mulching and/or removal.
- Where feasible existing access (*i.e.*, logging roads, farm roads and trails) will be utilized through design and routing decisions, to minimize the area to be cleared for new access. Existing roads may require upgrading to accommodate the size and weight of expected construction equipment and transport trucks. These upgrades may include grading, widening, top dressing, ditching, *etc.*
- In Nova Scotia, any work areas created on provincially owned roads will conform with the Nova Scotia Temporary Workplace Traffic Control Manual (updated 2012).
- Environmentally sensitive features will be identified and clearly marked where feasible (*e.g.,* watercourses, wetlands, areas of high archaeological potential).
- All watercourses will be kept free of chips and debris resulting from clearing activities.
- Established watercourse crossings will be utilized where feasible; otherwise, new temporary crossings will be designed and constructed in accordance with hydrological conditions, weight restrictions and other criteria as defined by standard best practices.
- Trees that are inadvertently felled into a watercourse will be removed immediately.

- In Nova Scotia, with the exception of access to temporary watercourse crossing locations, a 30 m partially altered buffer will be retained on both sides of all waterbodies, including wetlands as per the NS Watercourse Alteration Manual (2010). “Partially altered” is defined as vegetation of less than 2 m in height will remain. Vegetation over 2 m will be hand cleared to meet system reliability standards. In Newfoundland, in non-protected water supply areas, the minimum buffer zone width is 20 m for all waterbodies, including wetland, with slopes less than 30%. For slopes greater than 30%, the buffer distance will be determined using the formula: 20 m + 1.5 m x slope of the land (%) or 20 m, whichever is larger, as per the Guidelines for the Protection of Freshwater Fish Habitat in Newfoundland. Vegetation over 2 m will be hand cleared to meet system reliability standards.
- Appropriate erosion and sedimentation controls will be implemented to stabilize the slopes/banks on either side of watercourses and prevent sediment run-off.
- Clearing within the riparian buffer zones for access to temporary watercourse crossings will be minimized to accommodate construction traffic requirements only, and will not span the full transmission corridor width. Cutting will be undertaken by hand or using equipment with a long-reach mechanical arm within these buffer areas. At tower locations where grubbing is required, grubbed materials will be re-spread or stockpiled and as many stumps and roots as feasible will be left on the ground surface.
- Dewatering of excavated areas will involve measures to minimize and control the release of sediment-laden water by means of filtration through vegetation or engineered erosion control devices.
- Felling of trees adjacent to an energized transmission corridor will employ qualified personnel in regular scheduled contact with the energy centres and following appropriate protocols established by the respective utilities in both provinces.
- Soil and aggregates required for construction of access roads, tower foundations and facility foundations will be sourced from existing approved pits and/or quarries. If new pits or quarries are required, the proponent will follow applicable regulations and standard industry practices.
- Work vehicles and/or heavy equipment will be cleaned and inspected prior to use upon initial mobilization at a work site, and/or following transportation between sites, to prevent the introduction of weed/invasive/non-native species to terrestrial corridors. This excludes construction activities that occur in continuous manner along the transmission corridor.
- Final alignment and access routing will consider the locations of known high concentrations of waterfowl and SAR, to the extent feasible.

2.6.7.2 Blasting

- Should blasting be necessary for rock excavation, it will be conducted in accordance with provincial legislation and subject to terms and conditions of applicable permits.
- Should blasting be required on provincially owned roads in Nova Scotia, a permit will be obtained from NS Transportation and Infrastructure Renewal’s local Area Manager.

- Potentially affected landowners will be notified of any blasting activities through a communication plan, to be developed as part of the Environmental Protection Plan (EPP).
- All blasts are to be conducted and monitored by certified professionals.
- A pre-blast survey of all structures (*e.g.,* homes, wells, *etc.*) will be completed within a radius of the blasting zone that is consistent with regulatory requirements. The survey will include, where applicable, analysis of well water quality (*e.g.,* chemistry, bacteria).
- Where blasting is planned within 500 m of residences, activities will comply with the requirements of existing by-laws (where applicable).
- Blasting near watercourses will only occur in consultation with DFO, and will follow the requirements of the *Fisheries Act* as well as the requirement of the DFO Factsheet: Blasting – Fish and Fish Habitat Protection (DFO 2010b); and/or the DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998), as applicable.
- If sulphide bearing materials are identified through pre-construction geotechnical surveys, these areas will be referenced in the EPP. Rock removal in known areas of elevated potential will conform to relevant legislation (*e.g.*, the Sulphide Bearing Material Disposal Regulation of the NS*EA*), and in consultation with relevant regulatory departments.

2.6.7.3 Dust and Noise

- Where required, dust will be controlled by using water or a suitable, approved dust suppressant.
- Construction equipment will be maintained in good working order and properly muffled.
- Noise control measures (*e.g.*, sound barriers, shrouds, enclosures) will be used where warranted.
- Noise-generating construction activities will comply with the requirements of existing by-laws (where applicable).

2.6.7.4 Erosion and Sedimentation Control

Contractors will use the erosion and sedimentation control measures listed below at all sites where soil or sub-soil has been exposed and there is potential for erosion.

- Where feasible, Project design and routing will avoid areas where conditions could elevate the potential for erosion and sedimentation (*e.g.*, erodible soils, steep slopes).
- The area of exposed soil will be limited, and the length of time soil is exposed without mitigation (*e.g.*, mulching, seeding, rock cover) will be minimized through scheduled work progression. Steeper slopes susceptible to erosion will be stabilized with rock, hydroseed, *etc.*
- Both temporary and permanent control measures for erosion and sedimentation will be implemented in an appropriate time frame.

- Erosion and sedimentation control structures will be maintained and inspected regularly with particular emphasis before and after forecasted heavy rain events, and with consideration of the timing and types of activities involved.
- Existing roads and access routes will be used to the extent feasible.
- With the exception of temporary water crossing locations, travel through wetlands and within watercourse buffers with machinery will be avoided, when feasible. If travel through a wetland is required, the appropriate mitigation measures will be employed, (*e.g.,* swamp matting).
- Site run-off from access roads and construction areas will be intercepted and diverted away from watercourses and wetlands. The quality of the water released from the site will be monitored so that it does not exceed the level of suspended solids specified by regulatory approvals and will follow the DFO Factsheet*:* Guidelines for the Protection of Freshwater Fish Habitat in Newfoundland and Labrador (Gosse *et al*. 1998) for work undertaken in that province.
- In Nova Scotia, site run-off from access road and construction areas will be intercepted and diverted away from watercourses and wetlands as per the requirements of the NS*EA* and associated regulations.
- Where necessary, mitigation measures will remain in place after work is completed and areas have stabilized. Erosion and sedimentation control measures will be temporary until natural re-vegetation occurs. All temporary erosion and sedimentation control materials will eventually be removed from the construction site.
- Permits/approvals related to site construction will be kept on-site.

2.6.7.5 Watercourse Crossings

- Watercourses will be crossed utilizing existing structures where feasible. Where no permanent crossings are present, temporary engineered structures will be used. Clear span bridges will be the preferred option for temporary crossings and will comply with regulatory requirements. ENL is aware of the DFO National Operational Statement for Clear Span Bridges and DFO Factsheet: Guidelines for the Protection of Freshwater Fish Habitat in Newfoundland and Labrador (Gosse *et al*. 1998). DFO will be contacted for advice, if required, during construction. In locations where temporary crossings are not possible, fording will be considered as a last resort and only under unique and well-defined circumstances. When existing access and temporary crossings options are ruled out, Letters of Advice for Fording will be sought from DFO and NL's Environmental Guidelines for Fording (NLDEC 1992) will be adhered to. All fording activity that may be required will be carried out in compliance with the terms and conditions of a Certificate of Approval for Alternation to a Water Body under Section 48 of the *Water Resources Act* (NL).
- In Nova Scotia, watercourses will be crossed utilizing existing structures where feasible. Where no permanent crossings are present, temporary engineered structures will be used. Clear span bridges will be the preferred option. ENL will follow the requirements of the

NS*EA*, and associated regulations, and the NSE document Nova Scotia Watercourse Alteration Specifications – Temporary Bridge Specifications (2006). DFO will be contacted for advice, if required, during construction. In locations where temporary crossings are not possible, fording will be considered as a last resort.

- During freeze-up conditions, vehicles may cross watercourses via ice bridges, provided that the ice cover is sufficient to hold the weight of the vehicle and the watercourse is not disturbed.
- All watercourse crossings will be done in compliance with existing regulatory requirements.
- Watercourses and wetland crossings will not result in permanent diversion restriction or blockage of natural flow
- Temporary crossings will be engineered to take into account hydrological characteristics; span length, stream bank stability, and other criteria; will be built to handle the expected load of equipment and materials; and will be maintained throughout the Project through regular inspections.
- Crossings will be restricted to a single location and occur at right angles to the watercourse or wetland. Crossings should be located in areas which exhibit a stable soil type and where grades approaching the crossings will not be too steep.
- Temporary spans will be located at a narrow point on the watercourse.
- The approaches to watercourse crossings will be stabilized with brush mats, where necessary. Stream banks prone to erosion may require additional stabilization. Material used to stabilize/repair stream banks will be clean, non-erodible and will not come from the stream bank or bed.
- If wetland disturbance cannot be avoided, it will be undertaken under the relevant provincial requirements.
- Removal of beaver dams will be undertaken only where required to facilitate construction or access. Beavers will be removed by a licenced control officer and dam removal will be in accordance with applicable permits and/or guidelines.

2.6.7.6 Wetlands

- Guidance on wetland conservation in NS will follow the Nova Scotia Wetland Conservation Policy (NSE 2011a).
- Guidance on wetland conservation in Newfoundland will adhere to the Policy for Development in Wetlands (NLDEC 2001).
- Wetland avoidance is the primary objective in wetland habitat conservation and is achieved through mitigation by design. A wetlands model, generated at a 1:25,000 scale, was used as an input into the route design to minimize siting infrastructure within wetlands. Having said that, interaction with wetlands is expected both from the construction of physical components of the Project (*e.g.,* clearing of transmission corridor, tower foundation

excavation) and gaining access to and through the Project transmission corridor for the purpose of mobilizing equipment and personnel and transporting material.

- To the extent feasible, access for the purpose of construction will utilize existing roads (public roads, resource roads, trails) and existing cleared transmission corridor. It is preferred that construction equipment and materials advance linearly along the cleared transmission corridor, minimizing the extent of disturbance. In situations where wetlands traverses the entire transmission corridor width, access will deviate around the wetland, where feasible, or temporary mitigation such as swamp mats or brush mats will be used to cross the wetland. Since the mats distribute the load weight over a much larger area, any disturbance is expected to be temporal in nature and quickly rehabilitate to original conditions. Mats will be removed at the end of the construction.
- Alteration as a result of tower foundations will be permanent. Mitigation by design allows for the lengthening spans between towers and moving towers laterally to avoid wetlands.
- Natural vegetated buffers or engineered sedimentation controls will be used if construction activities are required within 30 m of a wetland.
- Final alignment and access routing will consider the locations of known high concentrations of waterfowl and SAR, to the extent feasible.
- Hydrologic function of the wetland will be maintained.
- Runoff from construction activities will be directed away from wetlands.

2.6.7.7 Dangerous Goods Management

- All fuels and lubricants used during construction will be stored according to containment methods in designated areas, located a minimum 30 m from surface waters, wetlands, and water supply areas (including the location of known private wells).
- Where possible, refueling in the field will not occur within 30 m of watercourses and water supply areas (including the known location of private wells). Where equipment is located near a wetland and must be refueled at that location, special precautions will be used to prevent spilled fuel from entering any sensitive receptors (*e.g.*, absorbent pads located below nozzles and spill response kits fully stocked and located at the refueling location).
- Storage of all hazardous materials will comply with WHMIS requirements. Appropriate material safety data sheets (MSDS) will be located at the storage site.
- Fuel storage areas will have approved secondary containment.
- Transportation of dangerous goods will comply with Transport Canada's *Transportation of Dangerous Goods Act*.
- Equipment will be kept in good working order, will be inspected regularly and any observed leaks will be repaired.
- For on land construction activities, spill kits and trained personnel will be present at sites at all times.

2.6.7.8 Site Reinstatement

- Construction laydown areas will be sited in areas of prior disturbance to the extent practical.
- Construction materials and debris will be removed from laydown areas when construction is complete, and the areas returned to original land-use capability.

2.6.7.9 Waste

- All sites will be kept free from the accumulation of waste material and debris, and on completion of the works surplus materials and temporary structures will be cleaned from the sites.
- Solid wastes, including waste construction material, will be disposed of in approved facilities.
- Temporary storage of waste materials on-site will be located at least 30 m from known watercourses, wetlands, and water supply areas (including known groundwater wells).
- Temporary on-site sewage systems required during construction will be installed and operated according to relevant provincial legislation.
- All solid waste will be properly sorted for recycling, reuse, composting, or landfilling. Segregated materials will be stored in a manner to prevent degradation, burning or burying on site until they are sent to the appropriate, provincially approved waste disposal, recycling or composting facility.

2.6.7.10 Horizontal Directional Drilling

- For HDD, the rig layout will include containment facilities designed to contain a release of drilling fluid from the mud circulation system.
- Breaching of the seabed with HDD borehole exits may result in a small release of drilling mud. Mitigation options are described in Section 2.6.6.3 and will be determined in detailed design phase with more geotechnical information. The loss of drilling fluids is unavoidable however, the effect will be localized and best practices with proper contingency planning will minimize the fluid loss. Good mud system control and bit locational controls through accurate telemetry technology is paramount in mitigating drilling fluid loss. Depending on the geology, options may be available to alter the mud composition near the exit location. The use of divers and suction equipment may also be an option depending on safety conditions.
- Noise abatement measures will be installed if deemed necessary in consideration of Health Canada guidelines for daytime and nighttime noise limits (Health Canada 2010).
- An emergency response plan will be developed as part of the Environmental Management Plan (EMP) and will include emergency spill response procedures for potential release of diesel fuel, hydraulic oil and all other types of synthetic oil, drill muds.

2.6.7.11 Marine Environment

- All marine-based work undertaken by Canadian-registered vessels will comply with the requirements of the *Canada Shipping Act*.
- In recognition that the discharge of ballast water from ships is viewed as a principle vector for the introduction and spread of harmful aquatic organisms and pathogens, all ballast water management activities will comply with the Ballast Water Control and Management Regulations (updated Oct 31, 2012), under the *Canada Shipping Act.*
- All marine-based work undertaken by foreign vessels must be undertaken pursuant to a Coasting Trade Permit issued under the *Coasting Trade Act*, and will comply with applicable regulations under the International Maritime Organization Conventions including the International Convention for the Prevention of Pollution from Ships (MARPOL).
- All marine Project activities will be conducted in accordance with the requirements of the Canadian Coast Guard Marine Communication and Traffic Services (CCG-MCTS).
- Silt curtains may be used during dredging of the grounding site and breakwater construction to minimize the transportation of suspended sediments.
- Scheduling of Project activities will be coordinated through consultation with local fish harvesters and other stakeholders and best-efforts will be made to schedule activities to minimize interference with fisheries and other activities.
- Due diligence audits of vessels will be completed prior to mobilization.
- Vessel maintenance, inspection and certifications will be required prior to mobilization.
- Shipboard personnel will be qualified, trained and competent prior to mobilization.
- If required, a fish capture and relocation plan will be developed to ensure the safe removal of any fish trapped within the saltwater pond created during construction of the grounding elements. This plan will be referenced as a mitigative measure and will be available to DFO for review.
- All marine equipment used during construction will be examined and cleaned to prevent and control marine biofouling. All anti-fouling activities will comply with the Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals (2012), under the *Canada Shipping Act*, as well as requirements set out by Health Canada and the Pest Management Regulatory Agency regarding approved anti-fouling substances.

2.7 OPERATION

The Maritime Link is designed as a 500 MW, +/- 200 kV HVdc bipole transmission system with the capability of monopole operations. The monopole mode of operation allows for the Maritime Link to operate at 50% capacity during times when one pole or circuit is out of service. During bipole operations, the system transmits power at a fixed voltage (+ or – 200 kV) and current (1250 Amps) with a capacity of 500 MW bulk transfer of power. The predominant mode of operations will be bipole; however, during scheduled (*e.g.,* maintenance) and unplanned (*e.g.,* malfunctions, weather events *etc.*) outages, the system will be designed to operate in a monopole mode at 50% capacity (250 MW). Based on conservative estimates of forced and scheduled outages as well as comparisons to other similar HVdc systems (*i.e.*, bipole systems with seawater return), monopole operation is expected to occur for only 40 to 120 hours per year. The metallic switch is a key design feature for monopole operation; one that enables the pole that is out of service (conductor and cable) to be used as the metallic return instead of using seawater. The exception is the unlikely scenario associated with a fault in the subsea cable.

The Project will adhere to standard engineering practices and industry controls to minimize the potential environmental effects from operation and maintenance activities, described below. Following commissioning, the Project is expected to operate continuously.

2.7.1 OVERLAND POWER TRANSMISSION

Emissions from overland transmission of both AC and DC power, including electromagnetic fields (EMFs), audible noise and radio noise, have been researched for decades by numerous scientific and human health research organizations. Although commonly referred to collectively as EMFs, for the purpose of describing the operational effects, magnetic and electric fields will be addressed separately. Electric fields are created in the environment from natural and anthropogenic sources. Natural sources include the charge separation between aarth and the upper atmosphere, charge separation under thunder clouds, and through naturally charged ions and aerosols. Anthropogenic sources include friction from carpet, cathode ray tube computer screens, transmission lines, *etc.* Similarly, magnetic fields exist naturally with the presence of the earth’s geomagnetic field and are also generated from numerous man-made sources such as MRI machines, battery operated appliances, escalators, *etc.* as shown in Table 2.7.1.

Table 2.7.1 Sources of static magnetic fields

Static magnetic field source	Average magnitude (μT)
MRI machine	1,500,000 - 4,000,000
Battery-operated appliances	300 - 1,000
Escalator at ~1 metre from treads	31-88
Earth's magnetic field (St. John's, NL)	51.3
Microwave Oven	0.1 - 30
Electric Range	0.2 - 20
Toaster	0.3 – 2.0
Colour Television	0.2 – 2.0

Source: NIEHS 2002; WHO 2007a; Exponent 2004; NRCan 2012a

In the context of potential environmental effects related to this Project, it is important to distinguish between electric and magnetic fields. Electric fields, unlike magnetic fields, are blocked by most physical objects. In relation to overland transmission lines, the corridor width is designed in consideration of EMF emissions. The primary source of electric field created by power transmission is that created by a charged conductor. Additional electric fields are also created, but to a much lesser degree, from the conductors, as well as space charges in the atmosphere. Space charges collectively refer to air ions and charged aerosols. Air ions are molecules with unbalanced proton to electron ratio that occur naturally, but are also formed by corona activity. Corona activity refers to the electrical breakdown in the insulating properties of air. Often, these charged air ions attach themselves to particles or aerosols in the atmosphere forming charged aerosols.

The current state of knowledge on the effects of EMFs associated with power transmission is based on a growing body of evidence related to the establishment of exposure thresholds for electric and magnetic fields. Numerous reviews have been conducted by reputable science and health research organizations including the World Health Organization (WHO), the International Agency for Research on Cancer (IARC) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP). The conclusions are that static EMFs, both magnetic and electric, at levels created by high voltage electricity transmission do not pose health risk to humans (IARC 2002, WHO 2007a, ICNIRP 2003).

In October 2005, the World Health Organization (WHO) assembled a Task Group of scientific experts to assess any risks to health that could be caused from exposure to Extremely Low Frequency (ELF) electric and magnetic fields (WHO 2007a). EMFs from all sources, including high voltage power transmission, fall within the category of ELF which is less than 300 Hz (Health Canada, 2012). Following a standard health risk assessment process, the Task Group concluded that there are no substantive health issues related to ELF electrical fields at levels encountered by the public.

With respect to magnetic fields there are biological effects from acute exposure at high levels (>100 μT) that are generally only an issue with respect to occupational health and safety for workers exposed to equipment generating high levels of magnetic radiation (*e.g.*, medical equipment). External ELF magnetic fields can induce electric fields and currents in the body which at very high field strengths can cause nerve and muscle stimulation and changes in nerve cell excitability in the central nervous system (WHO 2007b).

Most of the research concerning long term effects from ELF magnetic fields is focused around childhood leukemia. In 2002, the International Agency for Research on Cancer (IARC) published a monograph classifying ELF magnetic fields as “Possibly carcinogenic to humans.” This classification is used to denote an agent for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals (WHO 2007b). Also, there are no currently accepted biophysical mechanisms that suggest low-level exposures are involved in cancer development. As a result, if there were any effects from exposure to low level magnetic fields, it would be through a biological mechanism that is unknown.

A number of other adverse health effects have been studied in relation to ELF magnetic field exposure including: childhood cancers, adult cancers, depression, suicide, cardiovascular disorders, reproductive dysfunction, developmental disorders, immunological modifications, neurobehavioural effects, and neurodegenerative disease. The WHO Task Group concluded that scientific evidence supporting an association between ELF magnetic field exposure and all of these health effects is inconclusive.

Health Canada, along with the WHO, monitors scientific research on EMFs and human health. At present, there are no federal guidelines for exposure to EMFs at extremely low frequencies (< 300 Hz, which includes power transmission). Health Canada supports the WHO position on EMFs and does not consider that precautionary measures are needed regarding daily exposures of EMFs at ELFs. There is no conclusive evidence of any harm caused by exposures at levels found in Canadian schools and homes, including those located just outside the boundaries of power line corridors (Health Canada, 2012). From a mitigation perspective, transmission corridors are designed in the interest of public safety, for example with width determination considering such things as clearances for toppled tower structures and EMFs.

Adherence to the CSA energy and electricity standards and mitigation in the form of power line tower design (*e.g.,* height) and right of way distances will mitigate potential EMF effects on persons in the nearby vicinity of the Project. Audible and radio noise are other potential effects associated with overland power transmission. Audible noise in the form of hissing or crackling sounds can precipitate from corona discharge and typically varies with weather conditions. The sound power levels are expected to be less than 30 decibels (dBA) and, considering the remote setting for most of the proposed transmission line, audible noise from the transmission lines is not expected to result in adverse effects or annoyance to the public.

Broadband radio noise may occur as a result of corona activity. Radio noise (static) can interfere with radio reception in the AM broadcast band from 535 kilo hertz (kHz) to 1.605 megahertz (MHz). The important considerations for radio interference are signal strength, noise level and signal-to-noise ratio. FM reception (88-108 MHz) is rarely affected by corona generated radio noise. Industry Canada standard for radio noise for a 201-300 kV transmission line is 53 dB microvolts per metre (µV/m) at 15 m from the nearest conductor (Industry Canada 2001). As determined for the Maritime Link, the maximum calculated values for radio noise at 15 m from the nearest conductor is less than 37 dB µV/m which is significantly below the Industry Canada guideline.

2.7.2 POWER CONVERSION

Operational emissions and other potential effects associated with power conversion involved in this Project relate to the converter station, grounding line and grounding facility. These potential effects are related to the system configuration and associated modes of operation, as environmental emissions are a direct function of monopole or bipole operation. Noise has been identified as the only environmental emission associated with the converter station operation. Background sound pressure levels and predicted effects from converter equipment operations are discussed in Sections 4 and 5 and proposed mitigation measures through standard best practices are described in Section 2.6.7. Emissions associated with the grounding line are discussed with the overland transmission operations in Section 2.7.1. This section focuses on emissions associated with the grounding facility operations, including magnetic and electric fields as well as chemical and physical emissions (heat). Grounding facilities are predominantly associated with monopole operations (40-120 hrs/yr) and are described below. Potential effects from emissions are described below and further in Sections 6 to 8, where relevant.

The metallic switch is a key design feature that minimizes monopole operations and thereby mitigates potential adverse effects of associated emissions. Under certain scheduled or forced outage conditions when the ML operates in monopole mode, the pole that is out of service (conductor and cable) has the ability through this switching design option to be used as a metallic return instead of using the seawater. This eliminates the need for full current (1250 A) discharge and high capacity grounding facility operations.

Emissions and potential effects associated with operations of the grounding facility are described below:

1. Magnetic Fields: Static magnetic fields will be created in the marine environment at the terminating ends (grounding elements) of the grounding line located at the grounding facility. Magnetic fields diminish with distance and because of this the change to the natural geomagnetic fields are expected to be negligible outside the breakwater.

2. Electric Fields: Electric fields are generated as a result of the resistance encountered in the seawater and local surficial geology. During bipole operations, only minimal discharge of stray or imbalanced current (<1% of total current ~12.5A) will enter the water with no significant effects attributable to electric fields. During monopole operations, all or a large part of the HVdc circuit current (1250A) will enter the water resulting in larger, more pronounced electric fields having the potential to interfere with AC electrical systems, increase rate of corrosion of metallic structures and result in other electrolytic and thermal effects, the latter two of which are discussed separately below. The extent of monopole operations is mitigated through design with the addition of a metallic switch allowing an out-of-service pole to be used as a metallic return as opposed to the grounding facility seawater return. Both potential effects, *i.e.*, AC system interference and enhanced corrosion, can be mitigated. Proximity to AC system components (transformers, substations, *etc.*) and buried metallic infrastructure (municipal service piping, pipelines, buried tanks, *etc.*) were two of the criteria used in the evaluation of grounding sites described in Section 2.3.

   Enhanced corrosion of buried metallic infrastructure is a potential effect of electric fields due to the ground potential rise (voltage) that will dissociate electrons from the metal, leading to metal decay. Some of the factors that influence corrosion are the extent and physical connection of buried metal, type of metal and voltage potential of the metal. Mitigation involves distancing the grounding facility from as much buried metal as possible and where required providing mitigation, *e.g.*, installation of cathodic protection systems.

As a result of the measures taken in general siting of the grounding facilities and the availability of technology to mitigate potential effects at the receptor, electric fields are not expected to result in significant adverse effects.

3. Chemical Emissions: The process of electrolysis is expected in the grounding facilities with chemical reactions and product formation occurring at the anode. In the case where electricity is transmitted across the Maritime Link from Newfoundland to Nova Scotia, the Newfoundland grounding facility is the anode and the Nova Scotia facility the cathode.

   Oxidation reactions of ions or neutral molecules occur at the anode and reduction reactions occur at the cathode. Oxygen and chlorine are commonly formed as part of the primary oxidation reaction of saltwater at the anode. Secondary and tertiary reactions during monopole operation can lead to the formation of bromoform and chloroform within the grounding facility, however, the tidal influence and dilution effect outside the breakwater will mitigate any potential for significant adverse environmental effects. Post-construction effects monitoring will be conducted during bipole and monopole operations to establish new baseline water quality conditions within the facility and measure effects of operations against the pre-construction baseline on the sea side of the breakwater. Hydrogen is commonly formed as the primary reduction reaction at the cathode. Electrolysis results in disassociation of water molecules and release of hydrogen gas, which enters the atmosphere through gas exchange.

4. Physical Emission: The dissipation of energy in the form of heat will occur in the grounding facility. The heat produced at the grounding elements is directly proportional to the current and the resistivity of the surrounding medium. The grounding facility can be designed to disperse current over a large area through grounding element spacing. Other factors such as tidal influence, change in salinity (freshwater influence) and sediment build-up in the grounding facility all have the potential to affect the heat transfer. Post-construction effects monitoring will be conducted during bipole and monopole operations to establish new baseline water thermal properties within the facility and measure the thermal effects of operations against the pre-construction baseline on the sea side of the breakwater.

2.7.3 SUBSEA POWER TRANSMISSION

Subsea cables insulated and sheathed by metal for armouring, will transmit power across the Cabot Strait. The cables may be separated up to 200 m; the separation distance, increases with water depth to minimize risk of contact and to facilitate maintenance in the event of a fault on one of the poles. Subsea cables have the potential to alter the marine electrical environment by the following means:

1) electric field produced by the voltage applied to the cables;

2) magnetic fields produced by current flow through the conductor; and
3) electric fields induced through charged particles and marine organisms traveling through the static magnetic field.

Anthropogenic magnetic and electric fields are created in the ocean by many sources such as power cables, telecommunication cables, gas pipelines, cathodic protection on ships at surface, ship wrecks, *etc.*

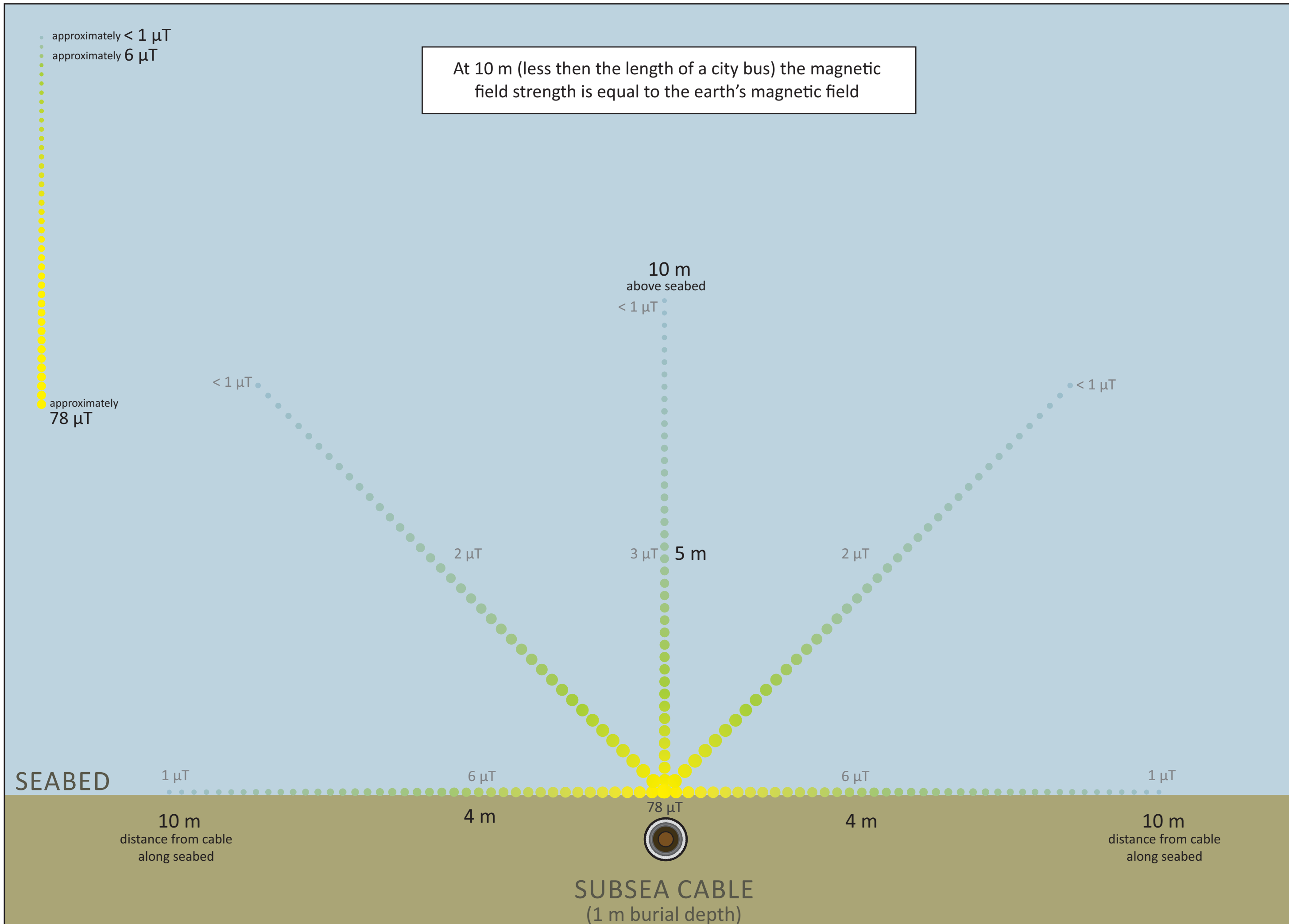
The electric field from the energized conductor inside the subsea cable is not considered a source of exposure since electric fields will not pass through the grounded metallic sheaths and armouring. For this reason, electric field effects from the subsea cables are not considered further.

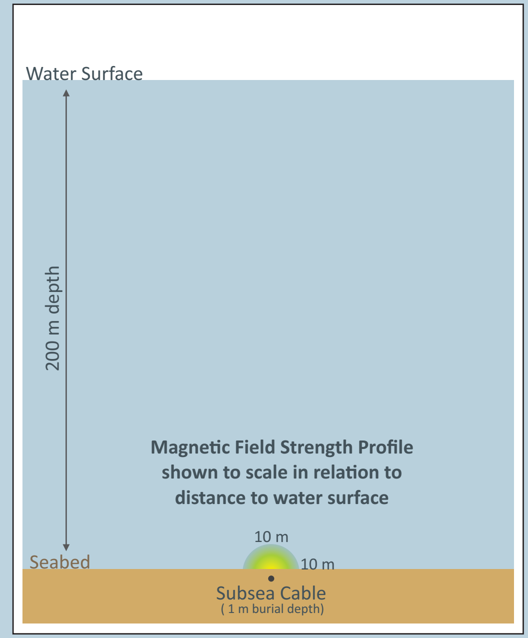
Static magnetic fields, however, will be generated and, unlike electric fields, are not blocked by most physical objects. The effect on the natural geomagnetic field from a static magnetic field created by cables will depend on the distance from the cables, magnitude and direction of current flow in each cable, proximity of the two cables to each other, and alignment of the cables with respect to the earth's geomagnetic field. The strength of the magnetic field is commonly expressed as magnetic flux density in units Tesla (μT). The natural geomagnetic field strength in the area of cable crossing the Cabot Strait is approximately 52 μT. Based on literature and modeling performed on other HVdc projects globally, an additional 140-160 μT in geomagnetic field strength may be expected, potentially exceeding 200 μT (Normandeau *et al*. 2011). Figure 2.7.1 provides a graphic representation of the magnetic field strength intensity profile reflecting averaged values from eight projects shown at intervals above and horizontally along the seabed assuming a 1 m burial (Normandeau *et al*. 2011).

An important characteristic of magnetic fields, not shared by other magnetic attributes of the environment, is that there are vector or directional components. As a result, magnetic fields have the potential to alter marine navigation by causing deviation in magnetic compass readings. Since magnetic fields dissipate with distance; both water depth and burial depth have significant influence on the extent of compass deviation. As horizontal drilling will be used to create conduits for burying the pipe in the nearshore environment to a depth of approximately 12 m, effects to compass-based marine navigation are not expected to be significant.

Static magnetic fields in the marine environment have also been studied from the perspective of effects on magnetosensitive fish species. Many species of fish, crustaceans and marine mammals are able to sense and use magnetic fields for migration, defense and foraging.

There are some species in the Project area that have the ability to detect the magnetic fields or alterations to the earth's natural geomagnetic field. Based on the current state of knowledge, however, there is no unequivocal evidence that the normal behavioural patterns of these species would be disrupted as a result of static magnetic fields emanating from the subsea cables. A follow-up program for monitoring potential effects will be developed and implemented and an adaptive management approach will be taken to refine and optimize mitigation if required.





- DC magnetic fields (µT) reflecting averaged values from 8 projects at intervals above and horizontally along the seabed assuming 1 m burial.
- Cable will be buried in water depths up to approximately 200 m.
- Actual buried depth of cable is yet to be determined.
- A magnetic field greater than the earth's geomagnetic field [i.e., 52 microtesla (µT) in the Cabot Strait] may extend up to 10 m from a HVdc cable.

GRAPHIC IS NOT TO SCALE

Distance (m) Above Seabed	Field Strength (µT)		
	Horizontal Distance (m) from Cable		
	0	**4**	**10**
0	78.27	5.97	1.02
5	2.73	1.92	.75
10	0.83	0.74	0.46

BOEMRE 2011

Emera Newfoundland & Labrador

Data Sources:
BOEMRE 2011

FIGURE 2.7.1

Graphic Representation of Magnetic Field Strength Intensity Profile for Subsea Cables

ENL011

Induced electric fields are created as a result of an increase to the natural geomagnetic field from the static magnetic field created by the cables. Charged particles and marine organisms swimming through this increased magnetic field will induce additional electric fields. Although minor in nature [modeled at 1.94 E-04 V/m for a 200 kV scenario directly at the cable (0 m horizontal and 0 m vertical distance)], it may still be detectable by species that are able to detect bioelectric potentials, such as elasmobranches. As with magnetic field effects, there is only limited research on the effects of induced electric fields on electro-sensitive marine species. The current state of knowledge indicates, however, that there is no unequivocal evidence of adverse effects.

The subsea cables associated with the Maritime Link will traverse active commercial fishing zones for snow crab and lobster in the Cabot Strait. Since these are bottom-dwelling and slow-moving species, potential adverse effects of EMF are discussed in Section 7. Furthermore, after Project commissioning, a monitoring program will be initiated to quantify any measurable effects.

2.8 MAINTENANCE

A transmission system must be maintained to ensure reliability of the system in meeting commercial agreements and maximizing equipment sustainability over the asset life. Maintenance generally conforms to manufacturer equipment specifications, industry best management practices and standard operating procedures. Prior to commissioning of the system, a comprehensive maintenance program specific to the Maritime Link will be developed. However, for the purpose of discussion in this EA report, the focus is on those maintenance activities that have the potential for interaction with the environment. These include:

- Vegetation management;
- Grounding facility maintenance; and
- Inspection of subsea cables.

Inspection of all aspects of a transmission system is a key component of a maintenance program. The nature and frequency of maintenance requirements will be determined following equipment procurement, installation and commissioning. The method and frequency of inspection will vary according to the facilities or infrastructure in question. For example, scheduled inspections of the land-based infrastructure may be undertaken using a combination of all-terrain vehicles (ATVs), and/or snowmobiles or, in the case of transmission lines, aerial patrols. In some cases, specifics of the nature and frequency of maintenance requirements will only be determined following equipment procurement, installation and commissioning. An example is the subsea cables, which may require inspections conducted annually for the first five years then semi-annually for the following 45 years. These inspections may involve a remotely operated vehicle (ROV) surveying the cable using multi-beam and side-scan sonar. As part of the subsea cable inspection, the HDD exit locations and cable splice joints may be inspected with a high resolution video.

The grounding facility will be inspected, at a frequency to be determined, for aspects that can influence grounding element functionality including, but not limited to, sediment build-up, electrolysis product formation and water temperature.

Vegetation management is an important part of an overall maintenance program since it contributes to the reliability of the system by maintaining the corridor. The corridor is cleared as part of initial construction to prevent high-canopy vegetation from becoming established and interfering with the sagging conductors. The initial clearing of high-canopy vegetation is followed on a cyclical basis by controlling the height of naturally occurring revegetation throughout the life of the asset. Vegetation management is performed typically on a cyclical basis every 5-10 years; however, the timing depends on site-specific conditions and will vary across the transmission line. Industry reliability best practices involve vegetation management which includes:

- removal of trees and shrubs which may impede the reliable operation of the transmission system;
- procedures for removal and control of vegetation will range from cutting to selective use of approved herbicides;
- herbicides will be applied by certified applicators, in accordance with standard industry practices and applicable regulations;
- work near wetlands and watercourses will adhere to the conditions of relevant permits;
- compliance with Section 36(3) of the *Fisheries Act* which states that "…no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water."
- the frequency of vegetation management will depend on the type of vegetation and the productivity of particular areas; and
- vegetation management will comply with industry practices and applicable regulations.

2.9 DECOMMISSIONING

The life of the Project is projected to be 50 years, at which time it can be decommissioned and remediated. However, it is more likely that the Project will be refurbished and will continue to operate on a similar basis in perpetuity. Any decommissioning activities determined to be necessary, will be completed in accordance with the applicable regulations at that time.

2.10 PROJECT SCHEDULE

Project construction will take place over several years commencing in 2013, with completion planned for late 2016 and site exit late 2017 when fully commissioned. Table 2.10.1 provides the estimated timing for each type of construction activity.

Table 2.10.1 Estimated Timing of Construction Activities

Construction Activity	Timing	Construction Period	Expected Start Date	Notes
Site Access	Any season	2013 – 2016	Q3/2013	
Site Preparation	Any season	2013 – 2016	Q3/2013	Targeting fall/ winter windows
Transmission Line and Grounding Line Infrastructure	Any season	2014 – 2016	Q1/2014	
Seabed Preparation, Cable Placement and Protection. Cable Landing (HDD)	April - November Any season	2014 – 2016	Q2/2014	24 hrs/day, 7 day/wk operation
Grounding Facility - Breakwater	Any season	2015	Q1/2015	
Grounding Facility - Impoundment Berm	Any season	2015	Q1/2015	

2.11 WORK FORCE REQUIREMENTS

This section provides a current estimate of the anticipated numbers and range of occupations that will be required for the Project during the Construction phase and the Operation and Maintenance phase, based upon the current stage of Project planning.

The Project will generate substantial employment and related socio-economic benefits, particularly during the Construction phase. There will be some additional work force requirements during Operation and Maintenance; however, employment will be minor compared to the Construction phase. Throughout the life of the Project, employment principles, policies, and procedures will be applied according to a Benefits Plan, and a Gender Equity and Diversity Plan, developed through benefits agreements with the Province of Newfoundland and Labrador and the Province of Nova Scotia, in accordance with the Memorandum of Agreement signed between the Provinces on November 28, 2011.

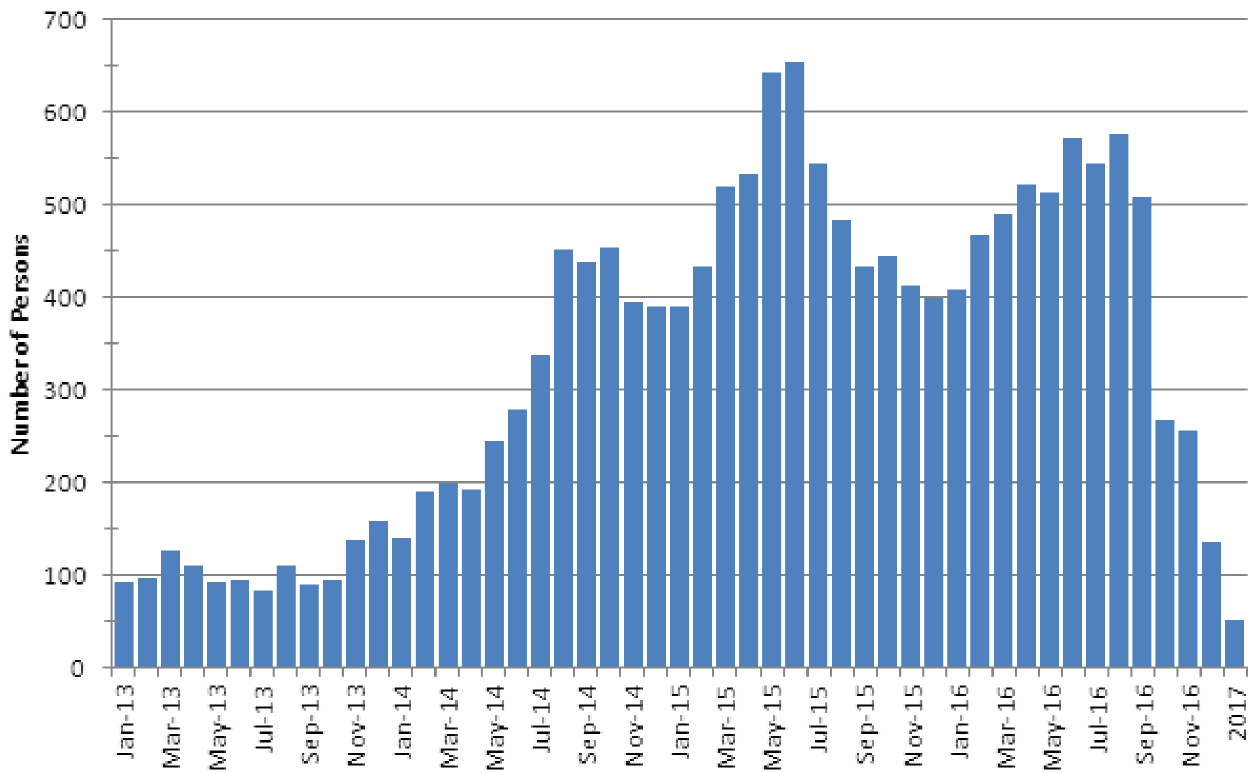
An overview of work force requirements for Construction and Operation and Maintenance is provided below. Human resources planning will continue to develop strategies and measures to address employment equity, apprenticeship, and other recruitment and hiring issues. Such issues will be addressed in consultation and collaboration with a variety of government departments and agencies, education and training institutions, labour organizations, and other stakeholders. Information on the general duties and training and experience requirements for the occupations listed in the following sections is provided by Human Resources and Skills Development Canada (HRSDC 2012).

2.11.1 CONSTRUCTION

Total employment during Construction, including employment in Newfoundland and Labrador, Nova Scotia, and currently unallocated labour requirements, is expected to be approximately 1,350 person-years. On average, the Maritime Link will employ approximately 330 persons per month during construction, with a brief period of peak employment in June 2015, when employment will reach approximately 655 persons. It is anticipated that 12 apprentices will be required over the life of the Project.

As described in Section 2.10, Construction is planned to commence in 2013, with completion planned for late 2016. The estimated size of the Construction work force is illustrated by month in Figure 2.11.1. Detailed monthly requirements for each position and associated NOC code during the Construction phase are provided in Appendix C.

As illustrated by Figure 2.11.1, work force requirements will vary considerably as Construction proceeds. Table 2.11.1 provides a summary of the estimated construction work force requirements by position and associated National Occupation Classification (NOC) code. Construction activities will require a range of occupations. The large majority of these positions is expected to be filled through full-time employment, and will be in construction trades and labour occupations, which will total approximately 679 person-years. This represents approximately 50 percent of total Construction phase employment.



Emera Newfoundland & Labrador

Data Sources:
ENL

FIGURE 2.11.1

Monthly Construction Work Force Requirements, 2013-2017

ENL010

Table 2.11.1 Estimated Construction Work Force Requirements

Position	NOC Code	Labour (Person-Years)
Construction Trades and Labour	**Total**	**679**
Surveyor	2154	20
Iron Workers	7236	3
Welders	7237	14
Utility Electrician	7242	68
Power Line Technician (Line Person)	7244	96
Communication Installer	7246	19
Pipe Fitters	7252	7
Carpenter (includes concrete forms and rebar)	7271	41
Mill Wrights	7311	9
Mechanic / Operator	7312	1
Equipment Operator - Crane, Boom Truck	7371	19
Special services (HDD drillers, other), Blaster - Compressor Operator	7372	11
Equipment Operator Earth Mover - Excavator, Dozer, Loader (Equipment Operator C); Equipment Operator General Equipment (General) - Dump truck, Screening equipment, *etc.* (With exception of Dump trucks, Equipment Operator D); Digger Operator	7521	120
Trades Helpers and Labourers - Grounds Person Truck Driver, Grounds Person, Mechanic Helper, Mixer Operator, Utility Person, Traffic Control Person, General Labourer (unskilled)	7612	32
Maintenance	7621	213
Arborist (tree cutter)	8421	6
Camp Staff	**Total**	**9**
Chef	6321	1
Cook	6322	2
Waiter / Waitress	6513	2
Accommodation Attendant (Personnel Interactions)	6721	3
Accommodation Utility (Facilities Maintenance)	6733	1
Construction Management	**Total**	**139**
Construction Manager	0711	15
Engineering Surveying and Completion Checks	2260	50
Construction Superintendent	7200	74

Table 2.11.1 Estimated Construction Work Force Requirements

Position	NOC Code	Labour (Person-Years)
Engineering and Project Management	**Total**	**523**
Senior Management	0016	13
Management	0210	9
Project Manager	0212	7
Finance / Accounting	1111	50
Administrative	1120	54
Procurement and Expediting	1225	20
Engineering	2130	150
Drafting and Geotechnical Work; Technicians (Electrical, Instrument, and Mechanical)	2230	184
Quality Control	2262	6
Safety	2263	19
Legal	4110	11
	Total	**1,350**

2.11.2 OPERATIONS AND MAINTENANCE

Operation and Maintenance will commence upon completion of Construction and continue for approximately 50 years, with potential for refurbishment and extension in perpetuity. As discussed above, work force requirements for Operation and Maintenance will be far less than the Construction phase. It is anticipated that Operation and Maintenance will generate an annual average of approximately 17 person-years of direct employment each year. The Operation and Maintenance work force will be approximately 17 employees annually, including managers, technologists, and tradespeople. Table 2.11.2 provides a summary of Operation and Maintenance work force requirements for each position and associated NOC.

Table 2.11.2 Estimated Operation and Maintenance Work Force Requirements

Position	NOC Code	Required Work Force (Person-Years)
	Total	**17**
Facilities Manager/ Maintenance Planner/Coordinator	0714	2
NL Technical Specialist (Engineer)	2130	1
NS Technical Specialist (Engineer)	2130	1
Financial Position	1111	1

Table 2.11.2 Estimated Operation and Maintenance Work Force Requirements

Position	NOC Code	Required Work Force (Person-Years)
Utility Person in NL	2243	1
Utility Person in NS	2243	1
Converter Operator in NL	9241	5
Converter Operator in NS	9241	5

In addition to operational work force requirements listed above, services will also be required for monthly and annual inspections, annual vegetation management, station service, air conditioning maintenance, general building maintenance, security, fire detection, and ROV and cable land inspections.

2.11.3 WORK FORCE POLICIES

The preceding sections have provided a current estimate of the anticipated numbers and range of occupations that will be required for each province during Construction and Operations and Maintenance. As discussed above, Project employment will follow principles, policies, and procedures developed in collaboration with the governments of Newfoundland and Labrador and Nova Scotia. In establishing a benefits agreement with each province, ENL is committed to developing and implementing a Project Benefits Plan and a Gender Equity and Diversity Plan. Additionally, ENL is committed to regularly monitoring and reporting on initiatives related to Project employment, benefits, gender equity, and diversity. This section provides an overview of Project policies on benefits, gender equity and diversity, and monitoring and reporting.

2.11.3.1 Benefits

ENL is committed to executing necessary benefits agreements with the governments of Newfoundland and Labrador and Nova Scotia, which will inform the scope of the Project Benefits Plan and Gender Equity and Diversity Plan. The scope of these plans will also be developed in collaboration with industry, academic and training institutions, community members, and other stakeholders to optimize Project benefits. The benefits agreements will align with commercial agreements between Emera and Nalcor Energy, as well as the Memorandum of Understanding between the Government of Newfoundland and Labrador and the Government of Nova Scotia, which contains gender and diversity provisions and various reporting requirements.

Through the development and implementation of a Project Benefits Plan, ENL is committed to supporting local employment and skills development, where economically feasible. ENL will continue to collaborate with government and other stakeholders in order to optimize Project employment benefits throughout the life of the Project.

2.11.3.2 Gender Equity and Diversity

The Gender Equity and Diversity Plan will describe the gender equity and diversity goals and initiatives that will be implemented through all Project phases, and the measures that will be taken through stakeholder consultation and collaboration to ensure that, where possible, there is fair and equal access to benefits arising from the Project. Throughout the life of the Project, the Gender Equity and Diversity Plan will be followed in the recruitment, selection, and retention of Project employees. The plan will include gender equity policies and initiatives to increase the employment of women and to identify the programs and processes required to facilitate the recruitment, training and retention of women during all Project phases. Similarly, diversity policies and initiatives will provide employment opportunities for and employment of qualified members of under-represented groups such as visible minorities, Aboriginal peoples, and persons with disabilities.

2.11.3.3 Monitoring and Reporting

ENL is committed to working with government and other stakeholders to ensure that benefits, gender equity, and diversity employment goals are met. Throughout the Project, ENL will follow a schedule of monitoring and reporting to share information on the progress of initiatives, goals, and targets related to benefits, gender equity, and diversity. Reporting frequency will be consistent with the benefits agreement. During the Construction phase, ENL will provide the provincial governments of Newfoundland and Labrador and Nova Scotia with reports including the following information:

- the number of persons employed, by 4-digit NOC code and by gender;
- the number of full-time and part-time employees;
- the number of apprentices (by level) and journeypersons; and,
- the source of the work force.

As the Project proceeds, ENL will continue to monitor and report on Project initiatives related to benefits, gender equity, and diversity. Government collaboration and stakeholder consultation will remain a priority for ENL throughout the life of the Project to further enhance these initiatives. Specific monitoring and reporting procedures and schedules related to the Benefits Plan and the Gender Equity and Diversity Plan will be provided within those documents.

2.12 ENVIRONMENTAL MANAGEMENT

An Environmental Management System (EMS) is a comprehensive program for managing the environmental risks of operations in a systematic manner. At Emera this has been achieved through the implementation of a Corporate EMS, with an associated EMS for each wholly owned subsidiary, under which company operations and maintenance activities are managed through a cycle of continual improvement. Components of the EMS include: Environmental Policy; Planning; Implementation and Operation (which includes responsibilities and training and awareness); Checking (which includes monitoring and review of incidents); and Management Review. Emera and its' subsidiaries maintain an EMS that is equivalent to the ISO 14001 EMS Standard. ENL's Environment Policy, which is established under the corporate EMS, demands full compliance with legal requirements and provides overall direction for ENL activities in the development of the Maritime Link Project.

2.12.1 ENL ENVIRONMENT POLICY

Emera Newfoundland and Labrador shares in the desires of our customers, shareholders, employees, and others to enjoy the benefits of a sound economy in a healthy and sustainable environment. We are committed to meeting our business objectives in a manner which is respectful and protective of the environment, and in full compliance with legal requirements and Company policy.

In promoting these principles, Emera Companies exposed to environmental risks in their daily business, business alliances, partnerships or prospective ventures, will:

- Make environmental considerations an integral part of decision making, as they pursue environmental performance, value to shareholders, and quality service to customers;
- Develop, verify, and continually improve the EMS through strong management leadership and employee commitment;
- Consider pollution prevention as the first option, in preference to control or clean-up;
- Work with employees and customers to promote the most efficient use of resources and products and services; and
- Communicate with all stakeholders on environmental performance in an open manner.

Emera requires all employees to fulfill the environmental responsibility of and requirements of their jobs at all times.

2.12.2 PROJECT ENVIRONMENTAL MANAGEMENT PLAN

The Project Environmental Management Plan (EMP) will be developed under the umbrella of the EMS and will encompass all environmental regulatory requirements and commitments made for the Project. This includes the formal conditions of the EA processes, as well as subsequent requirements of federal, provincial and/or municipal permitting (Authorizations, Approvals, Permits, Certificates, *etc.*) processes required for the Project. It also encompasses commitments made in this EA Report, which includes applicable compliance standards and/or industry best management practices. The EMP will focus on the construction phase of the Project and will be implemented as the EA process for the Maritime Link concludes. As the Project progresses through Commissioning to the Operations and Maintenance phase, the applicable aspects of the EMP will be incorporated directly into the EMS. This is consistent with other operations and maintenance activities across Emera companies.

Environmental assessment is designed to be applied during the design and planning phases of project scheduling. Mitigation through Project design is a key aspect of environmental assessment. The goal for the Maritime Link is to determine where Project components will be located, and how they will be constructed, by balancing the following: engineering design requirements, (*e.g.,* relevant CSA standards and National Standards of Canada such as CAN/CSA-C22.3 NO. 1-10 - Overhead Systems and CAN/CSA-C22.3 NO. 60826-10 - Design Criteria of Overhead Transmission Lines), topography; constructability considerations, (*e.g.,* access, transportation of materials); environmental protection, (*e.g.,* avoidance of sensitive features), mitigation; traditional use of lands and resources by Aboriginal persons; and the Project schedule. Specific environmental requirements and mitigation practices are identified in this assessment and will be refined in subsequent environmental regulatory permitting processes, and are applicable through the construction phase of the Project. The EMP will continue to evolve through the life of the Project as new requirements emerge from various permitting and other processes. ENL will develop and maintain a database for tracking environmental permits (Authorizations, Approvals, Permits, Certificates, *etc.*) associated with construction and operation of the Maritime Link.

The Table of Contents for an EMP typically includes the following sections:

- Introduction and Scope
- Environmental Policy
- Project Description and Purpose
- Environmental Requirements
  - Federal, provincial, municipal legislation
  - Required environmental approvals
  - Management of environmental commitments
  - Reporting procedures
- Resources, Roles, Responsibility, and Authority (including contractors)
- Competence, Training, and Awareness
- Communication
  - Key Contacts List
- Environmental Protection Plan
  - Purpose, structure, compliance, mitigation measures
- Emergency Response and Contingency Plans
  - Fuel and hazardous material response
  - Discovery of archaeological or heritage resources
  - Erosion control failure
  - Ground or surface water contamination
  - Others
- Monitoring and Measuring
  - Terms of reference
  - Terrestrial environment
  - Public health and safety
  - Erosion control
  - Fish and fish habitat
  - Current use of land and resources for traditional purposes by Aboriginal persons
  - Archaeological heritage resources
- Incident Reporting
- Control of Records

2.12.3 PROJECT ENVIRONMENTAL PROTECTION PLAN

An important component of the EMP is the Environmental Protection Plan (EPP). The EPP clearly sets out specific plans for implementation of protection procedures and mitigation measures associated with Project construction activities. It is the primary mechanism for ensuring that mitigation is implemented, as determined through the EA process to avoid or mitigate potential adverse environmental effects that might otherwise occur from construction activities, and as required by applicable agencies through permitting processes. The Project EPP will be developed in consideration of the broad spatial (> 500 km) and temporal (> 3 years) boundaries for Project construction activities, to ensure effective and efficient implementation and compliance with regulatory and other requirements set out in the EMP.

The EPP is a plan for all Project personnel, including contractors, and describes the responsibilities, expectations and methods for environmental protection associated with Project activities. The EPP will incorporate:

- means to comply with requirements of relevant legislation;
- environmental protection measures identified as part of the Environmental Assessment; and
- environmental commitments made as part of the Environmental Assessment.

The Table of Contents for an EPP typically includes the following sections:

- Introduction
  - Scope and Purpose
  - Responsibility
- Construction EPP Specifications
  - Limits of Construction
  - On-Site Administration Facilitates
  - Land Buffers
  - Areas Adjacent to Wetland
  - Clearing, Grubbing and Disposal of Vegetation
  - Disposal Off-Site
  - Erosion and Sedimentation Control
    - Guiding Principles
    - Sediment Barriers Including Silt Fencing
    - Location of Stockpile/Excavated Material
    - Surface Run-Off Measures
    - Re-vegetation
  - Blasting (Road Construction)
  - Waste Management
  - Storage and Handling of Hazardous Materials
  - Dust Control
  - Environmental Training
  - Environmental Monitoring

Prior to construction a workshop will be held to train appropriate personnel regarding the objectives, requirements and responsibilities of the EPP.

2.12.4 EMERGENCY RESPONSE PLANS

An Emergency Response Plan (ERP) for the Maritime Link Project is currently under development. The ERP will be based on the National Standard of Canada, CAN/CSA-Z731-03 (R2009): Emergency Preparedness and Response. This standard is directed primarily toward the development of effective tools and systems to support emergency preparedness and response. Emergency management, which incorporates the principles of prevention, preparedness, response and recovery, involves a wide range of preventive measures in regard to preparing for incidents that cannot be completely prevented, and responding in an organized fashion once an incident occurs. Emergency management will also include activities related to continuation of business functions and recovery from an incident. The ERP will be closely linked to the HSSMP, which is described in further detail in Section 10 Accidents and Malfunctions.

As the Project progresses the ERP will be expanded to include plans for specific Project-related activities. The Table of Contents for the ERP includes the following sections:

1.0 SCOPE
- 1.1 Project Overview
- 1.2 Integration with Nalcor Emergency Response Plans
- 1.3 Canadian Standards for Emergency Response

2.0 SPECIFIC ROLES AND RESPONSIBILITIES
- 2.1 Emergency Response Organization Overview
- 2.2 EMERA / ENL Notifications and Reporting Structure
- 2.3 Specific Role Assignments

3.0 RESPONSE ACTIVITIES
- 3.1 Response Framework
- 3.2 ENL Response Process Guide
- 3.2.1 Situation Assessment and Activation
- 3.2.2 Notification and Reporting Notifications – verbal
- 3.2.3 Critical Incident Stress Management
- 3.2.4 Incident Investigation Process
- 3.2.5 Review and Debriefing
- 3.3 Record Retention

4.0 CONTACTS
- 4.1 Internal Notifications - Contact Information
- 4.2 Agency Notifications Contact Information

5.0 COMMUNICATIONS
- 5.1 Communications
- 5.2 Public and Employee Relations

Prior to construction a workshop will be held to train appropriate personnel regarding the objectives, requirements and responsibilities of the ERP.

3.0 CONSULTATION AND ENGAGEMENT

3.1 PUBLIC AND STAKEHOLDER CONSULTATION

Public and stakeholder consultation for the Maritime Link Project began in the spring of 2011, in advance of the formal initiation of the EA process on November 30, 2011. Early consultation represents an opportunity for meeting and cultivating new stakeholders as well as developing and strengthening long-term relationships in Newfoundland and Labrador and Nova Scotia. ENL is committed to gaining the trust of stakeholders representing different sectors of the communities in which ENL operates. ENL views stakeholder consultation as an essential activity to facilitate a two-way sharing of information about the Project, to listen to concerns, and to demonstrate ways in which concerns have been considered in the design and implementation of the Project.

Both strategic and operational principles have been developed for public and stakeholder consultation. Strategic principles relating to the structure of the engagement process involve identification of stakeholders, issues and expectations. Operational principles concern the manner of dealing with all stakeholders to ensure that communication is open, effective, transparent and collaborative, and that a feedback process is in place.

The objectives of the stakeholder consultation program are to:

- be the first and best source of information about the Maritime Link Project by providing timely and accurate information;
- identify and inform stakeholders;
- conduct a variety of consultation activities to engage stakeholders;
- listen and respond to stakeholders' concerns;
- mitigate concerns before they become major issues;
- meaningfully engage stakeholders in the EA process; and
- promote a positive presence in the communities in and near where the Project will be constructed and maintained.

Issues and concerns identified throughout the consultation process are being recorded and managed in an issues database. The database is used to:

- have accurate and up-to-date contact details for all stakeholders in a centralized location;
- collate and report on the issues identified by stakeholders;
- collate and report on the input from various government agencies; and
- verify that any actions or commitments made to stakeholders are managed, tracked and carried throughout the various Project stages (design, construction, operation).

3.1.1 STAKEHOLDER IDENTIFICATION

ENL is committed to developing and maintaining its relationships with stakeholders representing different groups (*i.e., landowners, businesses, special interests)* in the communities in which we operate. The Project will provide positive economic and business opportunities during construction and ongoing operations. This process requires the identification of stakeholders that may be affected by, or may influence, the planning and operations of the Project to varying degrees.

Stakeholders were identified based on the anticipated level of effect that the Project may have on them, or their anticipated level of interest in the Project. Project authorities and stakeholders have been identified as follows:

- government regulators;
- municipal officials;
- Aboriginal groups;
- local residents/communities;
- landowners;
- commercial fishing interests;
- special interests; and
- economic development associations.

3.1.1.1 Government Authorities

During the course of planning for the EA, ENL consulted with federal and provincial regulators. The designated Responsible Authorities (RAs) for the EA at the federal level and provincial regulators advise on overall Project approval and issue permits for Project-specific activities.

Municipal officials are stakeholders as they represent the local community - its residents, industry and business interests. They have a mandate to promote the local economy and development opportunities. As stakeholders, they will be interested in employment opportunities, support for local businesses and socio-economic implications.

ENL has engaged several municipal representatives in Newfoundland and Labrador and Nova Scotia. Representatives were also invited to attend the Open Houses held in June 2012. ENL will continue to engage and consult with municipal government as the Project progresses including engagement with respect to the development and implementation of Community Liaison Committees (Section 3.1.5).

Tables 3.1.1 to 3.1.5 list the identified federal, provincial, and municipal authorities.

Table 3.1.1 Federal Government Authorities

Department	Contact
CEA Agency	Joanne Weiss Reid, Project Manager
MPMO	Eric Advokaat, Director Martin Anderson, Senior Policy Advisor
Environment Canada	Jerry Pulchan, Environmental Assessment Steve Zwicker, Senior Environmental Assessment Advisor
Fisheries and Oceans Canada	Donald Humphrey, Senior Environmental Assessment Analyst
Natural Resources Canada	John Clarke, Director Environmental Assessment
Public Works and Government Services	Don Maynard, Manager, Environmental Assessment, Atlantic
Transport Canada	Kevin LeBlanc, Senior Environmental Assessment Officer
Enterprise Cape Breton Corporation	Marlene Usher, Executive Director

Table 3.1.2 Government of Newfoundland and Labrador Authorities

Department	Contact
Department of Environment and Conservation – Environmental Assessment	Bas Cleary, Director Milt Crewe, Environmental Scientist
Department of Environment and Conservation – Parks and Natural Areas	Sian French, Director Tina Leonard, Environmental Scientist
Department of Environment and Conservation – Land Management	Peter Hearns, Manager, Resource Evaluation and Policy Integration
Department of Environment and Conservation – Crown Lands	Damien Morrissey, Land Management Specialist
Department of Environment and Conservation – Sustainable Development and Strategic Science	Shane Mahoney, Executive Director Rob Otto, Director
Department of Environment and Conservation – Water Resources Management	Clyde McLean, Manager, Investigation Section Susan George, Water Resources Technician
Department of Environment and Conservation – Wildlife	John Blake, Director Kirsten Miller, Senior Wildlife Biologist
Department of Natural Resources	Tanya Noseworthy, Executive Director
Department of Natural Resources – Agrifoods	Richard Carey, Director Land Resource Stewardship Division
Department of Natural Resources – Forestry Ecosystem Management	Basil English, Supervisor, Silviculture and Research Section Jamie Kennedy, District Ecosystem Manager Forestry and Wildlife
Department of Tourism, Culture and Recreation – Provincial Archaeology Office	Martha Drake, Provincial Archaeologist
Department of Tourism Culture and Recreation – Strategic Tourism Product Development	John Angelopoulos, Industry Development Officer Derek Stewart, Tourism Development Officer Carl Simms, Tourism Development Officer

Table 3.1.2 Government of Newfoundland and Labrador Authorities

Department	Contact
Department of Advanced Education and Skills	Stephen Dale, Manager of Labour Market Research and Analysis Richard Hodder, Program Consultant
Women's Policy Office	Heather MacLellan, Assistant Deputy Minister

Table 3.1.3 Government of Nova Scotia Authorities

Department	Contact
Department of Energy	Michael Johnson, Executive Director Kim Himmelman, Manager, Regulatory/Strategic Policy
Department of Environment – Environmental Assessment Services Branch	Peter Geddes, Manager, Environmental Assessment Steve Sanford, Environmental Assessment Officer Lorrie Roberts, Nova Scotia Manager
Department of Environment – Protected Areas and Wetlands Branch	John Brazner, Wetland Program Coordinator
Department of Natural Resources – Wildlife / Biodiversity	Bob Petrie, Director Mark Elderkin, Species at Risk Biologist Randy Milton, Manager Wildlife Resources Shawn Basquill, Biologist
Department of Natural Resources – Crown Land	Gretchen Pohlkamp, Executive Director, Land Services Marie Louise Vieira, Director Land Administration Melanie Cameron, Manager Crown Lands Disposals
Department of Tourism, Culture, and Heritage	Laura Bennett, Coordinator, Special Places Katie Cottreau-Robins, Curator of Archaeology
Department of Labour and Advanced Education	Lynn Hartwell, Executive Director
Department of Agriculture	Alan Grant, Executive Director
Office of Aboriginal Affairs	Laurent Jonart, Policy Analyst/Consultation Advisor

Table 3.1.4 Municipal Government Authorities - Newfoundland and Labrador

Jurisdiction/Electoral Division	Contact
Town of Port aux Basques	Brian Button, Mayor
Town of St. George's	Fintan Alexander, Mayor
Town of Stephenville Crossing	Leona Webb, Mayor
Town of Stephenville	Tom O'Brien, Mayor
City of Corner Brook	Neville Greeley, Mayor
MP Random-Burin-St. George's Riding	Judy Foote
MLA St. George's – Stephenville East	Joan Burke
MLA Burgeo-LaPoile	Andrew Parsons
MLA Fortune Bay – Cape La Hune	Tracey Perry

Table 3.1.4 Municipal Government Authorities - Newfoundland and Labrador

Jurisdiction/Electoral Division	Contact
MLA Port Au Port	Tony Cornect
Cape Ray Service District	Anne Osmond

Table 3.1.5 Municipal Government Authorities – Nova Scotia

Jurisdiction/Electoral Division	Contact
Cape Breton Regional Municipality	Cecil Clarke, Mayor
MP Sydney-Victoria	Mark Eyking
MLA Victoria-The Lakes	Keith Bain

3.1.1.2 Local Residents/Communities

ENL believes that engaging local residents is a key component to the success of the Maritime Link Project. It is important that those living in communities adjacent to or near the Project understand the potential benefits and are supportive. Communities are interested in the potential effects of the Project on the environment, as well as socio-economic effects and benefits. Of equal importance to ENL is the opportunity to build long-term collaborative relationships with communities in relation to this Project.

Local residents were invited to attend the Open Houses held in June 2012. ENL will continue to engage and consult with local residents as the Project progresses.

3.1.1.3 Landowners

Like other stakeholders, landowners have an interest in the potential effects of the Project on the environment and the socio-economic effects and benefits. However, those landowners adjacent to the Project route can be expected to have a specific interest in how the Project may directly affect them and their land. Landowners in Newfoundland and Nova Scotia were invited to attend the Open Houses held in June 2012. Landowner Information Sessions were held in Port Aux Basques, Cape Ray, Doyles, St. George's and Stephenville Crossing, NL in July and August 2012. Meetings with landowners in the Little Bras d'or area of Cape Breton, NS were held in November and December 2012. ENL will continue to engage and consult with landowners as the Project progresses.

3.1.1.4 Commercial Fishing Interests

Commercial fish harvesters are interested in the potential effects of the Project on the commercial fishery, including maintaining accessibility to fishing grounds; potential for gear damage/loss; and the effects on fish stocks. Several commercial fishing organizations and individuals/groups have been consulted since April 2011, as listed in Tables 3.1.6 and 3.1.7. On the island of Newfoundland and in Nova Scotia, commercial fish harvesters were engaged to provide input on the selection of sites for the grounding facility sites. Engagement included discussions and participation in marine-based site visits to identify suitable locations.

Table 3.1.6 Commercial Fishing Interests (NL)

Association	Contact
Fisheries, Food and Allied Workers Union	Robyn Saunders, Petroleum Industry Liaison Jason Spingle, Staff Representative Monty Way, Staff Representative
Port aux Basques Harbour Authority	Richard Hardy, Harbour Master
Port Harmon Authority Ltd.	Cecil Stein, President and Board Member

Table 3.1.7 Commercial Fishing Interests (NS)

Commercial Fishing Interests
Association
Big Bras d'Or Fishermen's Association
North of Smokey Fishermen's Association
Glace Bay Inshore Fishermen's Association
Maritime Fishermen's Union, Local 6
Point Aconi Fishermen's Association
Northside Fishermen's Association
Cape Breton East Fishermen's Association
Little River Fishermen's Association
LFA District 27 Advisory Committee
Area 19 Crab Fishermen's Association
N-ENS Snow Crab Association
Crab Association Representative
Temporary Snow Crab Entrants
4Vn Hook and Line Association
Contact
Jackie Allen
Osbourne Burke
Kevin Nash
Kevin Squires
Willy Capstick
Joe Burk
Dennis Smith
David Ferguson
Brian Adams
Curtis Fraser

Table 3.1.7 Commercial Fishing Interests (NS)

Commercial Fishing Interests
Greg Organ
Josephine Kennedy
George Whalen
Winston Burke
Bill Erickson
Neil MacMullin

ENL has engaged several commercial fishing groups, and at their request, individual commercial fish harvesters. Engagement has included discussions with individuals, group meetings, telephone calls and email correspondence to provide information and answer questions regarding the Project. Although there has been, and will continue to be, focused engagement with commercial fishing interests, they were also invited to attend the Open Houses held in June 2012. Open houses are not intended to preclude focused ongoing communications that will continue with commercial fish harvesters.

As the Project progresses, ENL will continue to engage commercial fish harvesters to identify, track, and address the concerns of the local commercial fishing industry. One method of engagement will be the implementation of a Fisheries Advisory Committee. This Committee will be developed in consultation with local fish harvesters and DFO, and in NL with the Fisheries, Food and Allied Workers Union. This Committee will assist in maintaining ongoing consultation with fish harvesters during all Project phases to avoid and/or minimize conflict with fishing activities and to communicate Project activities. Details regarding the Committee will be developed as the Project progresses.

The Fisheries Advisory Committee is not intended to preclude ongoing discussions that will continue with the Mi'kmaq. Representation from the Nova Scotia Mi'kmaq will be invited through the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO) and the Native Council of Nova Scotia. Representation from the Newfoundland Mi'kmaq will be invited through the leadership of the Qalipu Mi'kmaq First Nation Band.

3.1.1.5 Special Interests

Outfitters, hunters, anglers and others who enjoy recreational and tourism-related activities are considered stakeholders, as they use areas and sites along or adjacent to the Project route. As recreational users of the land and waters potentially affected, it is important that they understand the Project and are able to voice their issues and concerns. Conservation associations are particularly interested in the conservation, protection and restoration of Atlantic salmon (*Salmon salar*). Table 3.1.8 lists the recreation groups that have been engaged to date.

Special interest groups were invited to attend the Open Houses in June 2012. ENL will continue to engage and consult with these groups as the Project progresses.

Table 3.1.8 Conservation and Recreation Interest Groups

Association	Contact
The Newfoundland and Labrador Outfitters Association	Keith Payne, Executive Director
Salmonid Association of Eastern Newfoundland (SAEN)	Don Hutchins, Office Manager Trevor Davis, President
Atlantic Salmon Federation	Don Ivany, NL Regional Director
Salmon Preservation Association for the Waters of Newfoundland	Keith Cormier, Vice President

3.1.1.6 Economic Development Associations

Economic development associations promote and support economic opportunities in communities. As stakeholders in this Project, they are interested in employment opportunities and socio-economic effects and opportunities. Tables 3.1.9 and 3.1.10 list the economic development interest groups.

Table 3.1.9 Economic Interest Groups (NL)

Association	Contact
Long Range Economic Development Board	John MacPherson, Executive Director Debra Coughlin, Economic Development Officer
Maritime and Mountain Zone Corporation	Lynn MacArthur, Executive Director
Town of Chanel-Port Aux Basques	Shauna Strickland, Economic Development Strategist
Chamber of Commerce Port Aux Basques and Area	William Bailey, President
Chamber of Commerce of Bay St. George	Debbie Brake-Patten, President
St. John’s Board of Trade	Nancy Healey, Chief Executive Officer (CEO)

Table 3.1.10 Economic Interest Groups (NS)

Department	Contact
Enterprise Cape Breton Corporation	Marlene Usher, Executive Director Kevin Elworthy, Manager Development
Sydney and Area Chamber of Commerce	Adrian White, Executive Director
Cape Breton Partnership	Keith MacDonald, Executive Director
Cape Breton County Economic Development Authority	Eileen Lannon Oldford, CEO

Economic interest groups were invited to attend the Open Houses in June 2012. ENL will continue to engage and consult with these groups as the Project progresses.

3.1.2 METHOD OF ENGAGEMENT

Project stakeholders have been, and will continue to be, engaged using various methods including:

- one-on-one meetings;
- technical workshops;
- supplier information sessions;
- speaking engagements at industry associations;
- Open Houses; and
- information sessions.

As public participation is an important part of the EA process, ENL has created a variety of opportunities for stakeholders to be meaningfully engaged. Engagement activities with regulators have focused on introducing the Project, providing information on Project activities and components and gaining an understanding of available data, as well as relevant regulatory/policy/permitting triggers. Technical workshops, intended to share information and knowledge, have been particularly useful with the agencies that have existing data such as the NLDEC (*e.g.*, Wildlife Division, Sustainable Development and Strategic Science Division).

Presentations and maps have been used to facilitate the exchange of Project information during meetings and speaking engagements.

Supplier information sessions were held in March 2012 to engage the business communities in Newfoundland and Labrador and Nova Scotia. The sessions provided local business interests with information on contracting opportunities and procurement processes for the Project. Sessions were advertised in local newspapers and through stakeholder contact lists.

During June, 2012 public Open Houses were held in Port Aux Basques, Cape Ray, and Stephenville in NL and Millville and Sydney in NS.

The objectives of the Open Houses were to:

- provide general information to the public about the Project;
- respond to questions about the Project;
- provide information on the regulatory approval process required for the development of the Project and to address specific regulatory milestones (*i.e.*, pre-EA submission, public review period);
- explain the intent/outcome of the environmental studies; and
- provide an opportunity for the public to comment on these and other issues.

Open Houses were advertised in local newspapers, notices in local communities and through stakeholder contact lists. Storyboards, Project information handouts (Section 3.1.3) and cable samples were made available at the Open Houses. A video was also available for viewing; providing a visual 3-D overview of the Project (available on the Project website). Six ENL representatives attended the Open Houses to provide information and answer questions. Feedback from the public was provided verbally during the Open Houses and was also solicited through an exit questionnaire.

Landowner information sessions were held in Port Aux Basques, Cape Ray, Doyles, St. George's and Stephenville Crossing, NL in July and August 2012. These sessions invited landowners who may have property that intersects with the Project to learn more about the Project. The same information used at the Open Houses was made available at these information sessions. Three ENL representatives attended the landowner information sessions to provide information and answer questions. Feedback from the public was provided verbally during the sessions. Meetings were held with Cape Breton landowners in November and December 2012..

Section 3.1.5 provides information on ongoing engagement and consultation activities.

3.1.3 INFORMATION PROVIDED TO STAKEHOLDERS

In addition to the information discussed in Section 3.1.2, the following informational handouts have been made available to the public and stakeholders:

- Maritime Link – Clean, renewable, and reliable electricity from Newfoundland and Labrador, to Nova Scotia and beyond;
- Maritime Link – Landowner Information Handout;
- Maritime Link – EA Process;
- Maritime Link – Procurement; and
- Emera Progress Report 2011.

These handouts provide information on Project components, activities and timelines; the EA process, schedule and support studies; opportunities for ongoing public engagement and comment; ENL's procurement process and evaluation criteria; and employment and business opportunities. These handouts are available on ENL's website (www.EmeraNL.com).

The website has been developed to provide the public and stakeholders with ongoing Project information. The public and stakeholders are encouraged to visit the website for Project updates, contact ENL's toll free number (1-855-722-3373) or email info_MaritimeLink@emera.com if they have any questions regarding the Project or would like to be included in ongoing communications. ENL will provide additional information, as required, to keep the public and stakeholders informed as the Project progresses.

3.1.4 CONCERNS RAISED THROUGH CONSULTATION ACTIVITIES

Issues and concerns raised through the engagement and consultation process have been tracked since April, 2011 and have been taken into consideration during the environmental assessment and Project design phases. Throughout the consultations several of the same issues were raised; Table 3.1.11 provides a summary of these issues. Further engagement regarding outstanding and future issues the Project progresses is ongoing.

Table 3.1.11 Summary of Issues and Concerns

Issue or Concern	Response to Issue or Concern	EA Report Reference
How is the subsea cable installed? What is the size of the cable? How many cables will be installed?	The subsea cable and installation process are described in the Project Description.	2.5, 2.6
How long will it take for the subsea cable to be installed? What time of year will it be installed?	The schedule is provided in the Project Description	2.10
What will be the impact of construction activities related to laying the subsea cable on the local commercial fishery?	This is assessed in the Commercial Fisheries VEC	7.2
What is the timing and duration of cable laying activities?	The schedule is provided in the Project Description.	2.10
What will be the impact of the operation of the subsea cable on the local commercial fishery?	This is assessed in the Commercial Fisheries VEC	7.2
Is there a potential for damage or loss to fishing gear during construction and/or operation?	This is assessed in the Commercial Fisheries VEC	7.2
Concern that the rock berm will impede movement of species.	This is assessed in the Marine Environment VEC	7.3
Concern regarding accidents and malfunctions related to the operation of the subsea cable.	This is assessed in Accidents and Malfunctions	10
Will the operation of the grounding facilities have an impact on the local commercial fishery?	This is assessed in the Commercial Fisheries VEC	7.2
Concern that fish harvesters will be displaced from current fishing grounds.	This is assessed in the Commercial Fisheries VEC	7.2
Will a buffer zone be required which prevents fishing in certain areas?	Potential interactions with fishing vessels are discussed in the Commercial Fisheries VEC	7.2
Will electromagnetic fields (EMFs) from the subsea cables have an effect on commercial fisheries and the marine environment?	Potential interactions with EMFs are discussed in the Project Description, Commercial Fisheries and Marine Environment VECs	7.3
Are there other possible environmental effects related to the operation of the grounding facilities?	Operation of the grounding facilities is described in the Project Description, and assessed in the Marine Environment VEC	2.5, 7.3
Concern regarding accidents and malfunctions related to the grounding facilities.	This is assessed in Accidents and Malfunctions	10
Concern regarding notification and communication about Project activities (construction and operation) to fish harvesters.	ENL has committed to ongoing notification and communication of Project activities.	7.2
What will be the involvement of commercial fishery	ENL has committed to ongoing notification	7.2

Table 3.1.11 Summary of Issues and Concerns

Issue or Concern	Response to Issue or Concern	EA Report Reference
stakeholders throughout the Project?	and communication of Project activities.	
Will the cable route appear on navigational charts once it is installed?	ENL has committed to providing locational information so that the cable location can be added to nautical charts.	7.2
What are the potential effects on marine archaeological resources?	Potential Project interactions with marine archaeological resources are assessed in the Archaeological and Heritage Resources VEC	6.4, 8.3
Will environmental effects monitoring programs be implemented (marine environment)? For how many years will environmental monitoring continue?	ENL has committed to monitoring environmental effects for the Marine Environment VEC; additional monitoring requirements may be developed through the EA review process, and in consultation with regulatory authorities and stakeholders.	7.3
When will construction activities occur on land?	The schedule is provided in the Project Description	2.10
Concern that the access roads required for construction and operational maintenance will increase accessibility in remote areas for anglers and hunters, effecting stocks.	Temporary and permanent access road development is described in the Project Description. Potential environmental effects of increased access are discussed in the Socio-economic Environment VEC	2.6; 6.3; 8.2
During construction what method will be used for stream crossings?	Stream crossings are discussed in the Project Description.	2.6
Concern that salmon spawning will be impacted during construction.	No disturbance to fish habitat is anticipated in freshwater, where salmon spawning occurs. Potential Project interactions with the marine environment, including fish species, are considered in the Marine Environment VEC. Potential Project interactions with recreational fishing are assessed in the Socio-economic VEC.	6.3, 7.3
What impact will the cable construction and operation have on salmon migration to the marine environment?	Potential Project interactions with the marine environment, including fish species, are considered in the Marine Environment VEC.	7.3
Will herbicides be used for vegetation control?	As part of an integrated vegetation management approach, herbicides may be used. The use of herbicides will follow the protocols described in the Project Description.	2.6.7
Will environmental effects monitoring programs be implemented (land and fresh water)?	Where recommended, monitoring is described for each VEC. Additional monitoring may be developed through the EA Review process and/or in consultation with regulatory authorities and stakeholders.	Various
Will the Project have an impact on property values?	A significant majority of the transmission route will be constructed along existing transmission lines. In areas where transmissions lines converge ENL will continue to engage landowners to identify routing alternatives.	N/A
Will electromagnetic fields be produced by the overhead transmission lines?	EMFs produced by overhead transmission lines are discussed in the Project Description.	2.7

Table 3.1.11 Summary of Issues and Concerns

Issue or Concern	Response to Issue or Concern	EA Report Reference
Concern regarding effect of EMFs from overhead transmission lines on behaviour of bees.	EMFs produced by overhead transmission lines are discussed in the Project Description.	2.7
What type of overhead transmission cable will be used?	Various transmission cables will be used, depending on the location of the cable; these are described in the Project Description.	2.5
What employment benefits and opportunities will be created by the Project?	The Project is at an early stage of development; current information relating to employment requirements is provided in the Project Description.	2.11
What is the procurement process?	ENL is committed to ethical and fair business practices. We seek to build long-term business partnerships that are mutually beneficial and leverage local or regional content where feasible. All contractors, sub-contractors and suppliers, interested in supplying goods and services to the Project, must complete and return a Vendor/Contractor Registration Questionnaire (www.emeranl.com) which will be reviewed in order to determine whether the contractor, sub-contractor or supplier can support the requirements of the Project.	2.11
What will be the required skill sets?	The Project is at an early stage of development; current information relating to employment requirements is provided in the Project Description.	2.11
How many people will be required for the construction and operation phases?	The Project is at an early stage of development; current information relating to employment requirements is provided in the Project Description.	2.11
From which provinces will the work force be hired?	Based on a Memorandum of Understanding signed between NL and NS, residents in both provinces will have equal and fair opportunity to work on Maritime Link, regardless of the province in which they reside.	2.11

3.1.5 ONGOING CONSULTATION

ENL will continue to engage and consult with the public and stakeholders as the Project progresses. One of the ongoing methods of engagement will be the development of Community Liaison Committees (CLCs). The establishment of CLCs is another way in which ENL intends to build constructive working relationships within communities and promote community engagement. It is anticipated that there will be one CLC in Nova Scotia and, due to the geography of the Project, two on the island of Newfoundland.

The role of the CLCs is to provide an on-going forum for discussion between ENL, community members, municipal government, landowners and other stakeholders on issues related to the

Project. The CLCs will facilitate a two-way sharing of information between ENL and the Project communities. The CLCs' mandate will also include keeping the community informed on the Project as it progresses from the regulatory approval process through construction and operation. The CLCs are viewed by ENL as a valuable resource in defining critical issues; shaping aspects of the Project; and identifying, designing and executing other community engagement opportunities.

Each CLC will consist of local stakeholders, including the general public, representatives of municipal government and representatives of ENL. While separate engagement activities have been initiated for special interest and conservation groups and commercial fish harvesters, their participation in the CLCs is encouraged. The formation of the CLCs is not intended to preclude ongoing communications that will continue with specific interest groups, such as commercial fish harvesters or outfitters. Prior to the formation of the CLCs, terms of reference and a mandate will be developed. It is anticipated that the CLCs will be implemented in Q1 2013.

CLC members will be identified through recommendations made by local organizations such as, but not limited to, economic development organizations, municipal officials, regulators, businesses, commercial fish harvesters, and special interest groups. Once members are identified, they will be invited by an ENL representative to participate in the CLC. Representation from the Nova Scotia Mi'kmaq will be invited through KMKNO and the Native Council of Nova Scotia. Representation from the Newfoundland Mi'kmaq will be invited through the leadership of the Qalipu Mi'kmaq First Nation Band.

Another series of Open Houses will be held during the public comment period for the EA. The purpose of these Open Houses will be to provide Project updates, results of the EA and answer any questions related to the EA report and process.

While stakeholders will have been engaged on a regular basis throughout the EA process, they will continue to be engaged throughout the life of the Project. Focused engagement will continue with special interest groups such as commercial fish harvesters and outfitters.

3.2 ABORIGINAL ENGAGEMENT

ENL places a priority on fostering positive long-term relationships with First Nations, building upon positive experiences through our activities within Atlantic Canada. The ENL team has met with First Nations groups and is committed to meaningful and productive collaboration on this and future projects. Since 2011, ENL has had more than 50 exchanges related to this Project, including meetings, workshops, conversations, collaborative reviews, *etc*., with Mi'kmaq leadership, organizations and businesses. We intend to continue engaging with First Nations for the duration of the Project, promoting opportunities for mutual benefit, like training and employment, and building on this relationship for future projects.

Nova Scotia has 13 First Nations communities, all of which are Mi'kmaq (Figure 3.2.1). On the island of Newfoundland, members of the recently established Qalipu First Nation, also Mi'kmaq, live near the Study Area.

Emera Newfoundland & Labrador

Coordinate System: UTM NAD 83 Zone 20

Data Sources: Office of Aboriginal Affairs, 2011

Scale: 1:2,500,000

Date: 22/11/2012

FIGURE 3.2.1

Mi'kmaq First Nations Communities in Nova Scotia

ENL129

3.2.1 MI'KMAQ OF NOVA SCOTIA

The 13 First Nations communities or bands in Nova Scotia are legal entities with democratically elected governments. The chiefs of the bands have chosen to organize themselves and engage with a common voice on major projects through the Assembly of Nova Scotia Mi'kmaq Chiefs. In addition, there are a variety of other Mi'kmaq service delivery and advocacy organizations that may have an interest in the Project.

3.2.1.1 Proponent Engagement with Mi'kmaq of Nova Scotia

In this initial stage of the Project, ENL has contributed to building capacity to cultivate meaningful engagement during the EA process. The ENL team is working with the Assembly of Nova Scotia Mi'kmaq Chiefs towards a Memorandum of Understanding to enter into a Benefits Agreement. Engagement with the Mi'kmaq of Nova Scotia has been a priority of ENL and has taken place through meetings with representatives of the following Mi'kmaq leadership organizations and businesses since May, 2011:

- Assembly of Nova Scotia Mi'kmaq Chiefs – Chair, Energy Committee;
- Assembly of Nova Scotia Mi'kmaq Chiefs – Co-chairs, Benefits Committee;
- Chief and Council of Eskasoni;
- Chief and Council of Membertou
- Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO);
- Unama'ki Economic Benefits Office;
- Unama'ki Institute of Natural Resources (UINR); and
- Membertou Geomatics Solutions (MGS).

Following direction from the Assembly of Nova Scotia Mi'kmaq Chiefs (the Assembly), engagement with the Mi'kmaq of Nova Scotia on the Project has been initiated through KMKNO, on behalf of the Assembly. Formal written direction on engagement with the Mi'kmaq has also been provided by the Nova Scotia Department of Energy on June 2, 2011, and the CEA Agency on June 27, 2011.

The nature of the engagement activities to date has been to introduce the Project, provide information on Project activities and components, consider concerns and discuss potential benefits to the Mi'kmaq of Nova Scotia. In addition to presentations introducing the Maritime Link, the following materials have been sent to the Mi'kmaq of Nova Scotia through KMKNO:

- Maritime Link Project Brief;
- request for proposals for baseline studies;
- Draft Project Description;

- Project Description;
- Draft EA Report; and
- study reports.

Key studies were initiated to support engagement and develop an understanding of potential effects on Mi’kmaq rights and title. The Mi’kmaq Ecological Knowledge Study (MEKS), the Mi’kmaq Fisheries Study, and the archaeological resources studies provide further insight into the current and historic use of the land by the Nova Scotia Mi’kmaq, which is further described and assessed in Sections 7.4 and 8.4.

The Native Council of Nova Scotia (NCNS) represents Mi’kmaq and other Aboriginal people living off-reserve in Nova Scotia. Chief Grace Conrad is the chief and president of NCNS. The main office of NCNS is located in Truro, with other offices situated throughout the province to support a variety of programs, services and initiatives.

A meeting was held with NCNS in January 2012 during which NCNS described their organization and ENL introduced the Maritime Link. NCNS was invited to participate in the Open Houses held in June, 2012 and ENL has committed to ongoing meetings to discuss concerns and economic opportunities for their membership.

ENL is planning information sessions specifically for the Mi’kmaq in Nova Scotia, which are scheduled to take place in early 2013.

The effects of Project on the current use of lands and resources for traditional purposes by NS Mi’kmaq are assessed in Sections 7.4 and 8.4.

3.2.1.2 Crown Consultation with the Mi’kmaq of Nova Scotia

The Supreme Court of Canada recognized in Haida Nation v. British Columbia (Minister of Forests), [2004] 3 S.C.R. 511, Taku River Tlingit First Nation v. British Columbia (Project Assessment Director), [2004] 3 S.C.R. 550, and Mikisew Cree First Nation v. Canada (Minister of Canadian Heritage, [2005] 3 S.C.R. 388, that the Crown owes a duty to consult affected Aboriginal communities whenever it contemplates actions that could impact upon an established or claimed Aboriginal or treaty right.

On August 31, 2010, the Assembly of Nova Scotia Mi’kmaq Chiefs (the Assembly) signed a historic agreement with the governments of Canada and NS under the Made-in-Nova Scotia Process. The resultant *Terms of Reference for a Mi’kmaq-Nova Scotia-Canada Consultation Process* outlines a consultation process for the parties to follow when governments are making decisions that have the potential to adversely affect asserted Mi'kmaq Aboriginal and treaty rights (NSOAA 2011b).

The Made-in-Nova Scotia Process is the forum for the Mi'kmaq, NS, and Canada to resolve issues related to Mi'kmaq treaty rights; Aboriginal rights, including Aboriginal title; and Mi'kmaq governance. The Process involves the Mi'kmaq of Nova Scotia, as represented by the Assembly, and representatives of the provincial and federal governments (NSOAA 2011c).

The Assembly acts on behalf of the Councils and communities of all 13 Mi'kmaq First Nations in the Province. It is comprised of the 13 NS Mi'kmaq Chiefs as well as two ex-officio members. The Assembly is responsible for consultation and negotiation decisions and directions as laid out in the consultation Terms of Reference. The KMKNO, also known as the Mi'kmaq Rights Initiative, supports the ability of the Assembly to guide negotiations and exercise constitutionally protected Mi'kmaq rights. Its activities include undertaking research, developing consensus positions on identified issues, and creating public and community awareness (KMKNO n.d.).

With respect to the Maritime Link Project, the federal and provincial governments will undertake consultation activities directly with the Mi'kmaq according to the Terms of Reference. Canada and NS will coordinate their respective consultation procedures, where appropriate.

In June 2009, the Province released a *Proponents' Guide: Engagement with the Mi'kmaq of Nova Scotia*, which was subsequently revised and republished in November 2011 as the *Proponents' Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia* (NSOAA 2011a). The Guide outlines how proponents such as ENL can fulfill the important role they play in consultation with the Mi'kmaq of Nova Scotia. Although third parties (*e.g.,* proponents) have no legal duty to consult, governments may delegate procedural aspects of consultation to them; the Guide outlines those procedural aspects (NSOAA 2011b).

To further assist the federal and provincial governments with First Nation consultation processes, this EA report describes how ENL has engaged the Mi'kmaq, considered concerns raised by the Mi'kmaq pertaining to the Project, and how these concerns may be addressed through the EA, where applicable. Refer to Section 3 of this report for more information regarding the outcome of Mi'kmaq engagement efforts.

3.2.2 MI'KMAQ OF NEWFOUNDLAND

In Newfoundland and Labrador, the Qalipu Mi'kmaq First Nation Band ("Qalipu") was formed on September 26, 2011, the members of which are recognized as status Indians under the *Indian Act*. The band has offices in St. George's, Grand Falls-Windsor and Corner Brook. The membership enrollment process continued until November 30, 2012. On October 23, 2012, Chief Brendan Sheppard was elected the first chief of the band.

A meeting was held with the Qalipu in May, 2012 during which they described their organization and ENL introduced the Maritime Link. At that meeting, the Qalipu were invited to the Open House sessions held on the island of Newfoundland in June, 2012. Subsequent meetings were held in November and December, 2012 where updates were provided and future opportunities discussed. ENL is committed to ongoing meetings with the Qalipu to discuss concerns and economic opportunities for their membership, including community information sessions planned for the winter of 2013.

The Qalipu Mi’kmaq First Nation Band does not have any recognized Aboriginal or treaty rights. ENL has been informed that the Crown in right of Newfoundland and the Crown in right of Canada do not have a duty to consult the Qalipu in respect of the Project. ENL will continue to engage the Qalipu to assess whether the Project will affect its members’ current use of lands and resources for traditional purposes.

ENL recognizes that the requirement to describe uses of land and resources in the Project area for traditional purposes by Aboriginal persons and to assess Project impacts on such uses is a statutory obligation under *CEAA*, and that this is incorporated into s. 23 of the EA Report Guidelines.

Section 3.2.2.1 is a summary of information on current uses of lands and resources for traditional purposes within the Study Area based on information provided by the Qalipu First Nation (AMEC 2002). ENL has committed to working with the Qalipu to address any information gaps identified through the ongoing engagement.

3.2.2.1 Current Use of Land and Resources for Traditional Purposes

In 1999, the Qalipu Mi’kmaq First Nation Band, formerly the Federation of Newfoundland Indians, conducted a Traditional Use Study which involved 1800 interviews with members from ten Mi’kmaq bands in three regions of Newfoundland. The information from the study was summarized in a report to the Federation of Newfoundland Indians entitled “Tradition Use Study: Final Report—Phase Three” (AMEC 2002). Findings of the study on current use of land and resources for traditional purposes were summarized in the report as follows:

- Mi’kmaq continue to harvest traditional resources for subsistence purposes and to maintain cabins and camps in the country for subsistence activities, for recreation and for cultural purposes such as visiting sacred grounds, collecting specialty woods and plants for crafts or healing purposes. To do this they continue to utilize extensive areas of land, sea and water.

- Rivers and waterways are important for travel, resource use, communal and spiritual activities and recreation.

- Tilts, tents and lean-tos are used as overnight shelter for trappers or for hunters and gatherers who travel to the highlands or far from home.

- Moose, caribou, partridge, snowshoe hares, salmon, trout, eels, shellfish and a variety of wild berries are important sources of traditional food. Migratory birds, seals, and ground fish are of lesser importance, but continue to be harvested. Ground fish, pelagic fish, shellfish and seals are important to the Mi’kmaq of the west coast.

- The study suggests a widespread knowledge, and continued use, of plants and animal parts for medicinal purposes.

- Specialty woods are gathered for making of craft items, snowshoes, sleds, boats, axe handles, baskets, *etc.*
- Harvesting firewood is a widespread activity amongst the Qalipu and makes up an important component of the subsistence economy of the Mi'kmaq. These harvests are for the most part located close to their communities.
- Members identify sacred and spiritual places, which continue to be visited by families and groups.

3.2.3 CONCERNS RAISED THROUGH ENGAGEMENT ACTIVITIES

Table 3.2.1 outlines how ENL has responded to concerns raised to date by the Mi'kmaq of Nova Scotia and Newfoundland who have been engaged in the EA process. Ongoing engagement will address outstanding issues and any additional concerns that are identified as the Project progresses.

Table 3.2.1 ENL Responses to Issues or Concerns Raised by the Mi'kmaq

Issue or Concern	Response to Issue or Concern	EA Report Reference
Potential confusion around communication	Agree to Nova Scotia Mi'kmaq Chiefs' request to engage through KMKNO.	N/A
Aboriginal involvement in related studies	All RFPs of relevant studies were copied to KMKNO for consideration. As a result of KMKNO's response to a Commercial Fisheries Study, a separate Mi'kmaq Fisheries Study was initiated.	N/A
Concern that all 13 communities should be identified in the Mi'kmaq Fisheries Study	Beginning with five communities in Cape Breton, as an initial approach; these communities are assumed to be indicative of Mi'kmaq fisheries in and near the Study Area.	7.4
Concern about underwater (marine) archaeology	Archaeological study expanded to include a marine archaeological component.	8.3
Potential for a community liaison person associated with the Project	ENL worked with KMKNO, Nova Scotia Office of Aboriginal Affairs (NSOAA) and the Nova Scotia Department of Energy to support liaison through a funding agreement to provide capacity. Eric Christmas works in this capacity with the ENL team to facilitate engagement with the Mi'kmaq of NS.	N/A
Benefits to Mi'kmaq First Nation	ENL working with KMKNO to explore opportunities, in particular training and employment.	N/A
Employment and contract bidding process	KMKNO advised of Supplier Information Sessions. Ongoing discussions with KMKNO and the Qalipu.	N/A
Potential effects of Project on Mi'kmaq commercial fisheries	Invited to information session focused on commercial fisheries interests, to describe the Project and current geophysical studies. Also offered to contact Mi'kmaq fisheries coordinators separately, if preferred. Mi'kmaq fisheries study conducted.	7.2, 7.4
Potential for introduction of invasive species due to Project activities in the area –	Vessels associated with Project will adhere to ballast	2.6.7

Table 3.2.1 ENL Responses to Issues or Concerns Raised by the Mi'kmaq

Issue or Concern	Response to Issue or Concern	EA Report Reference
monitoring in Bras d'Or Lakes	water protocols.	
Marine archaeology - how high potential marine archaeology areas will be considered	Archaeological study expanded to include a marine archaeological component.	8.3
Concern over of the benefits to Nova Scotia – Project rationale	The Project will greatly assist Nova Scotia in meeting the proposed amendments to the Nova Scotia Renewable Electricity Regulations.	2.2
Concern from the Native Council of Nova Scotia regarding the characterization of Mi'kmaq peoples, specifically the exclusion of known Aboriginal organizations.	Efforts were made to engage all Mi'kmaq groups that potentially have an interest in the Project.	3.2
Communication and notification of Project-related activities with Aboriginal commercial fish harvesters	Notification protocols are recommended as mitigation, and will be included in the Environmental Protection Plan.	7.2
Mi'kmaq concern about effects of the Project on SAR and critical habitats	MEKS conducted and species of Mi'kmaq interest discussed. SAR and important habitats are assessed in the SOCI VECs.	7.1, 8.1 8.4
Insurance or Bond in case of accident	Regulatory determination.	N/A
An expectation to see Mi'kmaq communities included in consideration of the broader socio-economic environment.	Mi'kmaq communities are included in the assessment of the Socio-economic Environment VEC.	8.2

3.2.4 ONGOING ENGAGEMENT

Proactive engagement with the Mi'kmaq of Nova Scotia and Newfoundland will continue throughout the EA process and during the permitting, construction and operation phases of the Project. This level of engagement will help to build and strengthen relationships, meet regulatory requirements, and provide opportunities for the Mi'kmaq of Nova Scotia and Newfoundland to bring forward questions and concerns. ENL is committed to working with the Mi'kmaq to identify opportunities for employment, training and capacity-building.