LABRADOR – ISLAND TRANSMISSION LINK ENVIRONMENTAL ASSESSMENT

Historic and Heritage Resources Component Study

May 2011

nalcor energy
LOWER CHURCHILL PROJECT

LABRADOR – ISLAND TRANSMISSION LINK ENVIRONMENTAL ASSESSMENT
Environmental Component Studies: Introduction and Overview

Nalcor Energy is proposing to develop the *Labrador – Island Transmission Link* (the Project), a High Voltage Direct Current (HVdc) electrical transmission system extending from Central Labrador to the Avalon Peninsula on the Island of Newfoundland.

The Project was registered under the Newfoundland and Labrador *Environmental Protection Act* (*NLEPA*) and the *Canadian Environmental Assessment Act* (*CEAA*) in January 2009 (with subsequent amendments and updates), in order to initiate the provincial and federal environmental assessment (EA) processes. Following public and governmental review of that submission, an Environmental Impact Statement (EIS) was required for the Project. The EIS is being developed by Nalcor Energy, in accordance with the requirements of both *NLEPA* and *CEAA* and the *EIS Guidelines and Scoping Document* issued by the provincial and federal governments.

In support of the Project's EIS, Nalcor Energy has undertaken a series of environmental studies to collect and/or compile information on the existing biophysical and socioeconomic environments and to identify and assess potential Project-environment interactions. This environmental study program has included field surveys, associated mapping and analysis, environmental modeling, and the compilation and analysis of existing and available information and datasets on key environmental components. This report comprises one of these supporting environmental studies.

A general guide to these Environmental Component Studies, some of which are comprised of multiple associated reports, is provided on the opposite page.

The information reported herein will be incorporated into the Project's EIS, along with any additional available information, to describe the existing (baseline) environmental conditions and/or for use in the assessment and evaluation of the Project's potential environmental effects and in the identification and development of mitigation.

This study focuses on the relevant aspects of the proposed Project – including the proposed and alternative HVdc transmission corridors, marine cable crossings, and/or other Project components and activities – as known and defined at the time that the EA process was initiated and/or when the study commenced. Project planning and design are ongoing, and as is the case for any proposed development, the Project description has and will continue to evolve as engineering and EA work continue. The EIS itself will describe and assess the specific Project components and activities for which EA approval is being sought, and will also identify and evaluate other, alternative means of carrying out the Project that are technically and economically feasible as is required by EA legislation.

The EIS and these Component Studies will be subject to review by governments, Aboriginal and stakeholder groups and the public as part of the EA process.

Nalcor Energy – Lower Churchill Project

LABRADOR-ISLAND TRANSMISSION LINK: ENVIRONMENTAL COMPONENT STUDIES (CSs)		
1) Vegetation CS	**Report 1a** **Ecological Land Classification**	**Report 1b** **Wetlands Inventory & Classification**
	Report 1c **Regionally Uncommon Plants Model**	**Report 1d** **Timber Resources**
	Report 1e **Vegetation Supplementary Report**	
2) Avifauna CS		
3) Caribou & Other Large Mammals CS	**Report 3a** **Caribou & Their Predators**	**Report 3b** **Moose & Black Bear**
4) Furbearers & Small Mammals CS		
5) Marine Environment: **Fish & Fish Habitat, Water Resources CS**	**Report 5a** **Marine Fish: Information Review**	**Report 5b** **Marine Flora, Fauna & Habitat Survey**
	Report 5c **Marine Habitats (Geophysical) Survey**	**Report 5d** **Water, Sediment & Benthic Surveys**
	Report 5e **Marine Surveys: Electrode Sites**	**Report 5f** **Marine Surveys: Supplementary**
6) Freshwater Environment: **Fish & Fish Habitat, Water Resources CS**		
7) Marine Environment: **Marine Mammals, Sea Turtles & Seabirds CS**	**Report 7a** **Marine Mammals, Sea Turtles & Seabirds: Information Review**	**Report 7b** **Marine Mammal & Seabird Surveys**
	Report 7c **Ambient Noise & Marine Mammal Surveys**	
8) Species of Special Conservation Concern CS		
9) Marine Environment & Effects Modelling CS	**Report 9a** **Strait of Belle Isle: Oceanographic Environment & Sediment Modelling**	**Report 9b** **Strait of Belle Isle: Marine Sound Modelling - Cable Construction**
	Report 9c **Electrodes: Environmental Modelling**	
10) Historic & Heritage Resources CS		
11) Socioeconomic Environment: **Communities, Land & Resource Use, Tourism & Recreation CS**	**Report 11a** **Communities, Land & Resource Use, Tourism & Recreation**	**Report 11b** **Current Levels of Accessibility Along the Transmission Corridor**
12) Socioeconomic Environment: **Aboriginal Communities & Land Use CS**		
13) Socioeconomic Environment: **Marine Fisheries in the Strait of Belle Isle CS**		
14) Viewscapes CS		

Environmental Component Study Required Under the EIS Guidelines: Comprising Reports (Shaded cells above)	
Avifauna: 2, 7a, 7b	Furbearers: 4
Caribou (and Predators): 3a	Timber Resources: 1d
Water (Quality and Quantity): 5a, 5d, 5e, 5f, 6	Marine and Freshwater Fish and Fish Habitat: 5, 6, 7, 13
Species at Risk: 8	Historic Resources: 10
Viewscapes: 14	Socioeconomics: 11, 12, 13
Environmental study reports submitted as additional background information: 1a, 1b, 1c, 1e, 3b, 9	

Labrador – Island Transmission Link

Historic and Heritage Resources Component Study

Preface

This *Historic and Heritage Resources Component Study* has been prepared and submitted as part of the Environmental Assessment (EA) of the proposed **Labrador-Island Transmission Link** (the Project).

Historic and Heritage Resources include sites and objects of historic, archaeological, cultural, spiritual or palaeontological importance. The purpose of the study is to identify and assess known and potential historic and heritage resources in and near the Project area, for use in the EA and ongoing Project planning and design. It involved extensive background research and several phases of fieldwork carried out over 12 years, as well as archaeological potential modeling and mapping along the proposed and various alternative transmission corridors and adjacent regions.

The initial report (July 2010) presents information on historic and heritage resources for the originally defined transmission corridors from Gull Island (Labrador) to Soldiers Pond (Newfoundland), with an attached supplement (February 2011) providing similar information for an additional transmission corridor option from Muskrat Falls in Labrador. The report also includes information on historic and heritage resources for the originally identified Labrador electrode line corridor alternatives from the lower Churchill River to the north and south sides of Lake Melville, which were being considered when the Project's EA and this study were initiated. Although these electrode lines are no longer under consideration by Nalcor Energy, this information has been retained in the report as it provides additional and relevant background information, and because the study's *Archaeological Research Permit* and its associated reporting requirements pertain to this work as well.

The environmental information presented in this *Component Study* will be incorporated and used in the Project's eventual Environmental Impact Statement (EIS), which will provide a summary description of the existing environment and an environmental effects assessment for the Project.

Labrador – Island Transmission Link

Historic and Heritage Resources Component Study

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July 15, 2010

EXECUTIVE SUMMARY

Nalcor Energy is proposing to develop the Labrador - Island Transmission Link, a High Voltage Direct Current (HVdc) transmission system extending from central Labrador to the Island of Newfoundland's Avalon Peninsula (the Project).

Project planning and design are (as of the time at which this Component Study was completed) at a stage of having identified a 2 km-wide corridor for the on-land portion of the proposed transmission line, regional study areas on either side of the Strait of Belle Isle, and 500 m wide corridors for the proposed Strait of Belle Isle cable crossings, as well as various alternative corridor segments in particular areas.

In anticipation of an eventual Environmental Assessment (EA), Nalcor Energy carried out Historic and Heritage Resources research for the Project over several years. For the purposes of this Component Study, and in accordance with current regulatory policy and guidelines (Government of Newfoundland and Labrador 1992), Historic and Heritage Resources include sites and objects of historic and archaeological, cultural, spiritual and paleontological importance.

The Historic and Heritage Resources research includes various study components and activities carried out by Nalcor Energy and its predecessors between 1998 and 2010, involving personnel and field teams from Jacques Whitford Environment Limited, Innu Economic Development Enterprises Inc. (IEDE), Innu Environmental Limited Partnership (IELP), Minaskuat Limited Partnership (Minaskuat) and Stantec Consulting Ltd. Research has been undertaken in relation to the Project by the proponent over this 12 year period, including work focused on the proposed Labrador - Island Transmission Link itself (for which the proposed components and corridors have evolved somewhat over time), as well as in relation to the proposed Lower Churchill Hydroelectric Generation Project in Labrador, for which much of the associated archaeological assessment and results are applicable for the current Project and study. All of these relevant studies and results are incorporated into this Component Study.

Overall, the 1998 to 2009 field research involved investigation at 457 testing locations relevant to the transmission Project's EA, of which 436 were assessed on the ground. Of those assessed on the ground, 119 were investigated by visual inspection only, while 15,095 testpits were excavated at the remaining 317 testing locations, for an average of 48 testpits per sub-surface testing location. Of this total, 7,496 testpits and 292 ground testing locations lie within the currently defined Study Area.

As a result of this effort, 54 sites containing Historic and Heritage Resources or evidence of land-use were recorded. It was confirmed that 12 sites date to the Pre-contact Period, three to the Historic Period, and 39 include recent/contemporary components (campsites, cabins, tilts and trapping locations). The Pre-contact Period sites are concentrated on the Labrador side of the Strait of Belle Isle, but are also found at major interior waterway crossings, including at the Churchill River, Torrent River, Portland Creek Pond, Birchy Lake and the Exploits River. This adds to the 112 sites (106 archaeological and 6 ethnographic) previously recorded within the Study Area, the vast majority of which are concentrated on the Labrador side of the Strait of Belle Isle, with others are located on the west coast of the Northern Peninsula and in the Deer Lake area. No sites of cultural or spiritual importance to Aboriginal or non-Aboriginal people are known to exist in the Study Area.

This Component Study contributes to, and concludes with, the mapping of archaeological potential along the proposed and alternative transmission corridors and associated Project sites. Empirical data on archaeological

testing effort and site frequency were employed to map defined zones of High, Medium and Low potential within the Study Area. Potential mapping will be used in the Project's EA, as well as in ongoing Project planning and design, including the eventual selection of a specific route for the proposed transmission line. Maps of archaeological potential are presented in Appendix F of this report.

A review of the geological mapping for the Study Area and relevant literature indicates that, due to the age and type of rock formations, the potential for Paleontological Resources is low along most of the Study Area. As a result of the analysis, three areas of potential importance have been highlighted, including one at L'Anse Amour in southern Labrador, one at Flower's Cove on the Northern Peninsula and another at Chapel Arm in eastern Newfoundland.

The type and level of information provided on archaeological and paleontological sites and resources through this Historic and Heritage Resources Study is considered adequate for the Project's EA and for informing the ongoing planning and design, and eventual transmission line routing.

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1.0 INTRODUCTION

Nalcor Energy is proposing to develop the *Labrador – Island Transmission Link* (the Project), a High Voltage Direct Current (HVdc) transmission system extending from central Labrador to the Island of Newfoundland's Avalon Peninsula.

In preparation for an eventual Environmental Assessment (EA) for the Project, Jacques Whitford Environment Limited (Jacques Whitford), Innu Economic Development Enterprises Inc. (IEDE), Innu Environment Limited Partnership (IELP), Minaskuat Limited Partnership (Minaskuat) and Stantec Consulting Ltd. were contracted by Nalcor Energy and its predecessor to undertake a Historic and Heritage Resources Study. Carried out in 1998, 2006, 2008, 2009 and 2010, the study involved extensive background research, several phases of fieldwork, research and analysis of data, report preparation and archaeological potential mapping. The primary purpose of the study was to identify and assess the Historic and Heritage Resources potential of the Study Area for use in the Project's EA and ongoing design and planning.

For the purposes of this Component Study, and in accordance with current regulatory policy and guidelines (Government of Newfoundland and Labrador 1992), Historic and Heritage Resources include sites and objects of historic, archaeological, cultural, spiritual and palaeontological (i.e., fossils) importance.

1.1 Project Overview

The proposed Project involves the construction and operation of transmission infrastructure within and between Labrador and the Island of Newfoundland. The proposed HVdc transmission system, as currently planned, will include the following key components:

- an ac-dc converter station at Gull Island in central Labrador, on the north side of the Churchill River adjacent to the switchyard for the Lower Churchill Hydroelectric Generation Project;
- an HVdc transmission line extending from Gull Island across southeast Labrador to the Strait of Belle Isle. This overhead transmission line will be approximately 407 km in length, with a cleared right-of-way averaging 60 m-wide, and consist of single galvanized steel lattice towers;
- cable crossings of the Strait of Belle Isle with associated infrastructure, including three to five cables placed within corridors under the seafloor across the Strait through various means to provide the required cable protection;
- an HVdc transmission line (similar to that described above) extending from the Strait of Belle Isle across the Island of Newfoundland to the Avalon Peninsula, for a distance of approximately 688 km;
- a dc-ac converter station at Soldiers Pond on the Island of Newfoundland's Avalon Peninsula; and
- electrodes in Labrador and on the Island of Newfoundland, with overhead lines connecting them to their respective converter stations.

Project planning and design are currently at a stage of having identified a 2 km-wide corridor for the on-land portion of the proposed transmission corridor and 500 m-wide corridors for the proposed Strait of Belle Isle cable crossings, as well as various alternative corridor segments in particular areas. Potential on-land corridors and Study Areas have also been identified for various potential (alternative) locations for the proposed

electrodes, although the nature, type, and location of these electrodes are the subject of ongoing analysis and engineering (Figure 1-1).

Also, at the time at which this Component Study was completed, Nalcor Energy's Project design and planning included consideration of a number of potential concepts and options for the Strait of Belle Isle submarine cable crossings. In order to ensure adequate and appropriate Historic and Heritage Resources baseline "coverage" of any proposed and potential project sites and disturbances in this region, in 2010, the Study Area was expanded to include relatively large regional areas on both sides of the Strait. The EA environmental effects analysis will focus on the eventual Project and its "footprint", as defined at that time.

It is these proposed and potential transmission and electrode corridors, and regional areas on either side of the Strait of Belle Isle - hereinafter referred to as the Study Area - that were the subject of Nalcor Energy's environmental baseline study program. Project planning is in progress, and it is anticipated that the Project description will continue to evolve as engineering and design work continue. The EA of the Project will also identify and evaluate alternative means of carrying out the Project that are technically and economically feasible.

Concurrent with the EA process, Nalcor Energy will be continuing with its technical and environmental analyses of the transmission corridors, in order to identify a specific routing for the Project. The eventual transmission routes and locations will be selected with consideration of technical, environmental and socioeconomic factors.

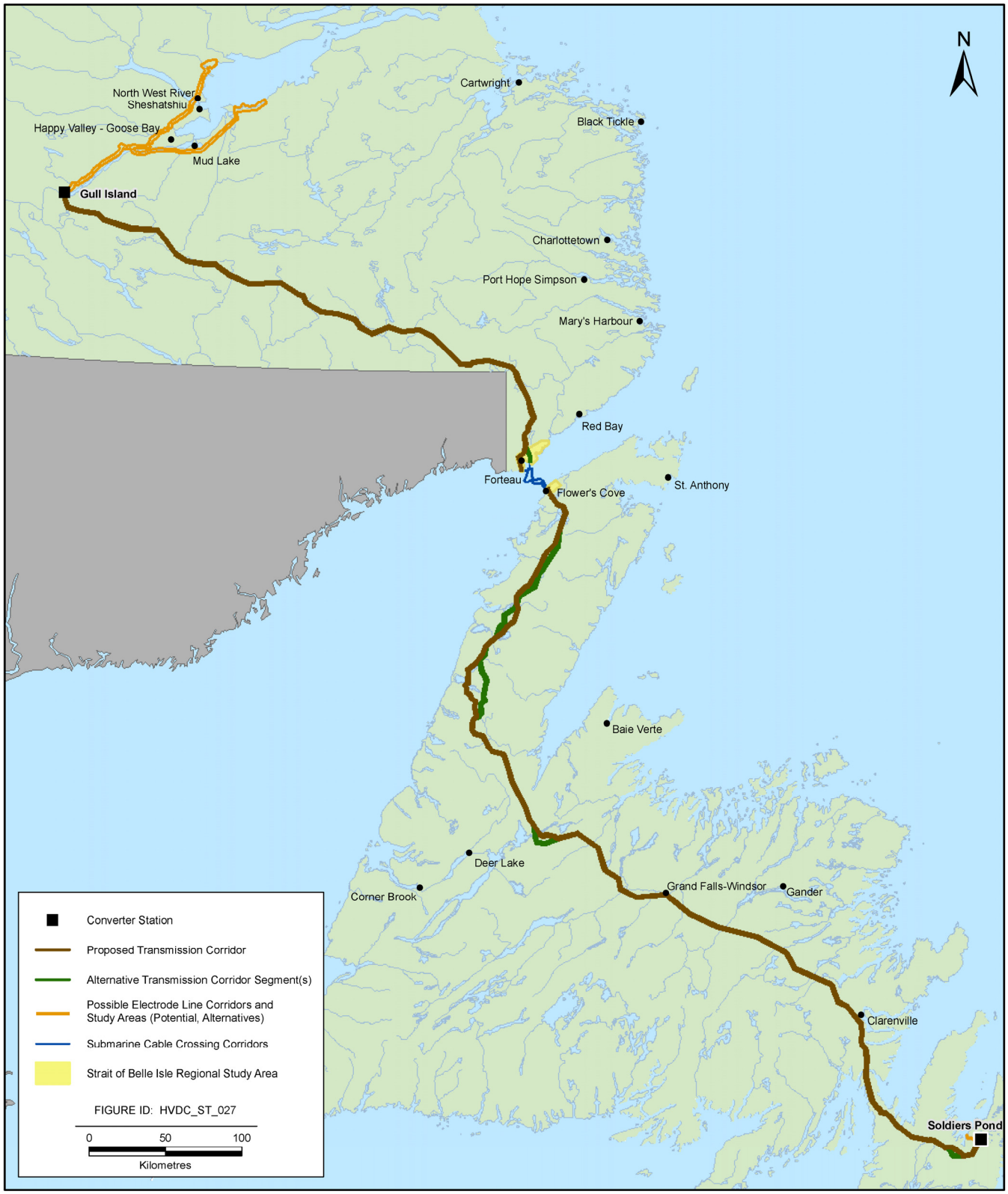
1.2 Overview of Historic and Heritage Resources Research (1998-2010)

1.2.1 Previous Historic and Heritage Resources Research (to 2006)

Archaeological research related to the proposed development began in the 1970s, with a number of brief field surveys and a general overview of the Historic and Heritage Resources potential of a proposed transmission line corridor from Gull Island in Labrador to Soldiers Pond on the Island of Newfoundland (Tuck 1979; 1981).

Subsequent to a period of delay, the Lower Churchill Hydroelectric Generation Project was revived and Historic and Heritage Resources research recommenced. Research in Labrador in 1998 (IEDE/Jacques Whitford 2000) was broad in scope and encompassed various components of the Lower Churchill Hydroelectric Generation Project (Gull Island and Muskrat Falls), extending downstream as far as upper Lake Melville, as well as transmission lines linking Gull Island and Churchill Falls, west to Quebec and south to the Strait of Belle Isle. The Gull Island to the Strait of Belle Isle transmission line routing was essentially the same as that reviewed in the 1970s, although three alternative departure points were considered for the beginning of the submarine transmission cables (Forteau Point, L'Anse au Clair and Point Amour). The three Strait of Belle Isle options were the focus of Historic and Heritage Resources research along the proposed 1998 transmission line.

Figure 1-1 Labrador – Island Transmission Link: Project Overview



Concurrent with the 1998 field studies in Labrador, an initial overview of Historic and Heritage Resources was also undertaken on the Island of Newfoundland, investigating the transmission line corridor from the Strait of Belle Isle to Soldiers Pond (Gerald Penney and Associates Ltd. 2002).

Further research for the Lower Churchill Hydroelectric Generation Project in Labrador in 1999 and 2000 (Jacques Whitford/IELP 2001a, 2001b) focused more specifically on the Gull Island area, although limited work was also undertaken along the Churchill River between Gull Island and Muskrat Falls, and below Muskrat Falls as far east as Sandy Point. Work in 2000 culminated with archaeological potential mapping, which mapped potential along the entire course of the lower Churchill River (Jacques Whitford/IELP 2001c). A synopsis of the research results between 1998 and 2000 was prepared in 2001 (Jacques Whitford/IELP 2001d).

Field research resumed in 2006 with a two-part program that focused on completing field studies of the Muskrat Falls component of the Lower Churchill Hydroelectric Generation Project, including field research and mapping of a proposed transmission line corridor north of the Churchill River, linking Muskrat Falls and Gull Island. In addition, fieldwork was carried out on the Gull Island to the Strait of Belle Isle transmission line corridor, focusing on upland zones and major interior waterways traversed by the interior portions of the corridor. The 2006 Historic and Heritage Resources research concluded with the mapping of archaeological potential along the corridor.

1.2.2 2008 Historic and Heritage Resources Research

The 2008 research activities for the Project included preparation of a Pre-Fieldwork Overview Assessment (Jacques Whitford 2008) to identify and assess the Historic and Heritage Resources potential of the Study Area (as defined at that time), and to help plan fieldwork activities scheduled for that year. Preparation of the overview assessment report involved a review of archaeological, ethnographic, ethnohistoric, historic, theoretical literature and topographic mapping.

Based on the results of the research, which included a review of relevant data gathered as part of the Lower Churchill Hydroelectric Generation Project, it was determined that little new fieldwork would be required for the current Project in Labrador, other than limited field research at the eastern extremes of the potential Lake Melville electrode line corridors. The 2008 field study therefore focused on the portions of the HVdc transmission line corridor traversing the Island of Newfoundland (from the Northern Peninsula to Soldiers Pond), and on a number of electrode line testing locations in Labrador and on the Island of Newfoundland.

In addition, a study of the palaeontological potential of the Study Area in Labrador and on the Island of Newfoundland was completed in 2008.

1.2.3 2009 and 2010 Historic and Heritage Resources Research

In 2009, further Historic and Heritage Resources field research was completed within the regional study areas on either side of the Strait of Belle Isle pertaining to a Project-related drilling and seismic program. Following completion of a review of background information (Stantec 2009), six near-shore locations where geotechnical field studies could occur were assessed, including Pointe Amour and Fox Cove on the Labrador side, and Green Island Cove, Shoal Cove, Savage Cove and Yankee Point on the Island of Newfoundland's Northern Peninsula (Stantec 2010).

Historic and Heritage Resources research in 2010 involved the mapping of archaeological potential of the regional study areas at the Strait of Belle Isle and revising the Component Study report to include the results of the 2009 fieldwork and 2010 archaeological potential mapping.

1.2.4 Historic and Heritage Resources Component Study Report

This Component Study Report summarizes the methods and results of the 2008 field program, synthesizes and integrates all results from the 1998 to 2009 research relevant to the current Project, and presents archaeological potential mapping of all components and options of the proposed transmission and electrode line corridors in Labrador and on the Island of Newfoundland as they are currently defined. As well, the palaeontological potential of the Study Area in Labrador and Island of Newfoundland is presented in this report.

1.3 Historic and Heritage Resources Regulatory Requirements

Historic and Heritage Resources are protected under the *Historic Resources Act* (1985) administered by the Provincial Archaeology Office (PAO) of the Newfoundland and Labrador Department of Tourism, Culture and Recreation. Historic and Heritage Resources assessment and impact management in the province is typically a three-stage process:

- Stage 1: Historic Resources Overview Assessment (HROA);
- Stage 2: Historic Resources Impact Assessment (HRIA); and
- Stage 3: Impact Management and Mitigation.

An HROA is normally the initial step in the provincial Historic and Heritage Resources assessment process. The HROA is intended to serve as the basis for determining if any additional research is required under the *Historic Resources Act* (1985).

For many proposed development projects, detailed HRIA is the standard procedure following the HROA. The detailed impact assessment is designed to gain a thorough understanding of the Historic and Heritage Resources within a defined area and any interactions that may result from the proposed development.

Impact management and mitigation in Stage 3 follows directly from previous assessment studies and may include a broad range of activities. By acting upon results and recommendations of detailed impact assessment, Stage 3 involves the effective, professional management of any Historic and Heritage Resources that may be affected within a project area.

Cultural resource management activities are designed to achieve a mutually acceptable balance between project development and provincial Historic and Heritage Resource management goals. Regarding the latter, emphasis should normally be placed on efforts to conserve or protect the resource.

1.4 Study Area

The natural landscape and resource distribution of a region are important determinants of past and present human subsistence and settlement patterns. Previous research in Newfoundland and Labrador and northern Quebec has shown that archaeological and ethnographic sites tend to be situated on specific landforms and sediment types, such as river terraces, raised shoreline features and, in certain instances, beaches. Thus,

understanding an area's physiography, wildlife and other natural resources can be useful for identifying Historic and Heritage Resources potential (Jacques Whitford 1998a).

1.4.1 Labrador

In Labrador, the Study Area includes the 2 km-wide transmission corridor from Gull Island to the Strait of Belle Isle, the potential (alternative) electrode line corridors to Lake Melville from Gull Island, the site of the proposed Gull Island converter station, and the regional area extending along the coastal strip of the Strait of Belle Isle from approximately Forteau Point to West St. Modeste (Figure 1-2).

Geographical position, altitude and coastal exposure influence the climate of central and southeast Labrador. Its northern location and combination of inland and maritime characteristics place the Study Area within the Inner Lake Melville/Interior Labrador, Southeast Labrador Interior and Coastal Labrador zones. The climatic characteristics of the area range from a continental regime in the low-lying interior characterized by warm, brief summers, and long, cold winters, to warmer winters and cooler summers with abundant precipitation on the coast (Banfield 1981).

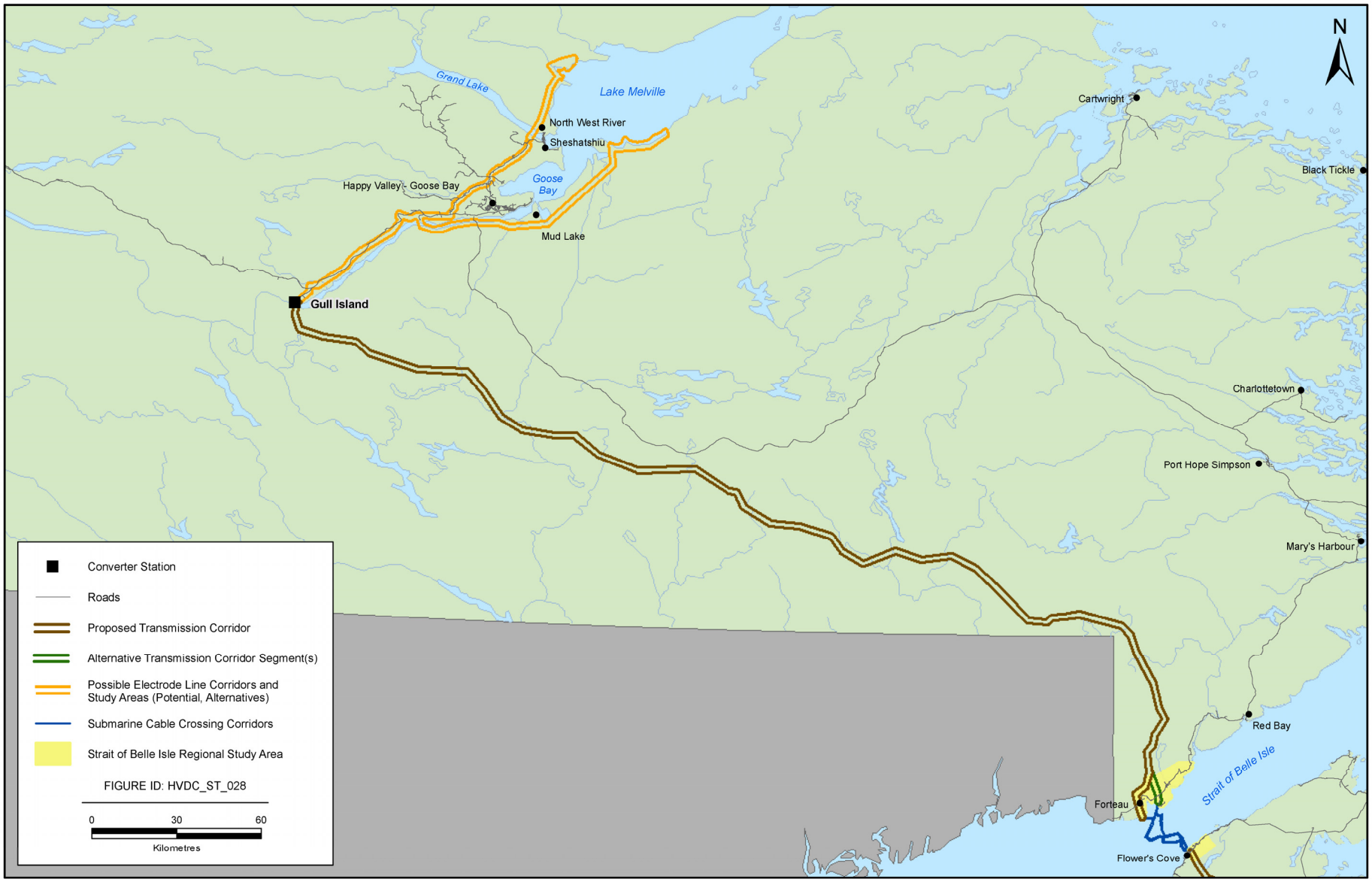
The region lies on the eastern edge of the Canadian Shield, which forms the central core of the North American continent. The Study Area is situated within the Grenville Province, which extends in a band along the southern edge of the Shield and is comprised mainly of felsic metamorphic rocks. Topographically, much of southeast Labrador consists of a large plateau, with hilly and rugged terrain. Inland, the landscape is predominantly of thin ground moraine draped over a rugged bedrock-controlled topography characterized by numerous exposed outcrops. Most of the larger river valleys in the region contain small glacio-fluvial deposits such as deltas, outwash plains, terraces and eskers. The coastal region is comprised mostly of bare rock outcrops and exposed headlands, with small areas containing till and other surficial materials (Greene 1974).

Most of Labrador has experienced a net drop in relative sea levels through the Holocene period, with former marine limits reaching as high as 140 m above sea level (asl) in localized areas along the Goose River west of upper Lake Melville; however, the dating of the Holocene marine limit has not yet been conclusively established (Jacques Whitford 2000a).

Lake Melville is a large tidal estuary in east-central Labrador, which extends from Hamilton Inlet on the Labrador coast, inland to Goose Bay. The lake covers an area of approximately 3,000 km^2 and is approximately 170 km long, with a maximum width of 35 km and an average depth of 86 m (Cardoso and deYoung 2002). A number of large watersheds drain into Lake Melville, with an annual average of 3,000 m^3/s of freshwater discharge entering Lake Melville from its major rivers: the Churchill, Goose, Naskaupi and Kenamu (Syvitski and Lee 1997). Because of its location and low salinity, winter freeze-up is early and often continuous from December to mid-June. The lake's bottom sediment is primarily glacio-marine mud, while the post-glacial basin sediment consists mainly of silt and clay, with occasional layers of fine sandy and/or silt (Vilks and Mudie 1983; AMEC 2001).

Groundfish and pelagic fish species that occur in Lake Melville include cod, salmon, trout and smelt, while shellfish species include mussels and whelk (DFO 2007a). Seals, particularly ringed but also harp, are also found in Lake Melville (Sikumiut 2007).

Figure 1-2 Labrador Portion of the Study Area



The area immediately surrounding the lower Churchill River and Lake Melville consists primarily of undulating upland topography and coastal plain, with flat river terraces. The lower Churchill River valley is located at elevations less than 400 m, and exhibits microclimatic conditions that allow boreal species to dominate over sub-Arctic species, especially on south-facing slopes. The area is highly productive, with boreal plant species assemblages, including large conifers such as white and black spruce and balsam fir, and associated deciduous species and understory vegetation typical of a boreal forest.

The lower Churchill River valley supports a wide variety of wildlife species important to the traditional economies of past and present peoples. Some species reside in the region on a year-round basis while others use it only seasonally. Wildlife species that use the river and valley include beaver, porcupine, muskrat, mink and otter. Large mammals that use the valley for shelter and/or as a travel corridor include caribou, black bear and moose (whose range is presently expanding in Labrador). Waterfowl species include the Common Loon, Canada Goose and Black Duck.

Moving southeast from the Churchill River, the landscape is characterized by rolling terrain and broad river valleys covered by shallow till and glacial landforms such as drumlins and eskers. Vegetation consists mostly of open black spruce forests, with extensive ribbed fen and string bog complexes, and sporadic hardwoods and lichen woodlands on drier sites. Further inland, the Eagle River Plateau occupies much of the area between Lake Melville and the south Labrador coast. This flat to rolling upland area contains large peatlands, interrupted by glacial landforms and shallow river valleys. Extensive string bogs with much open water are surrounded by fen vegetation dominated by sedge grasses and moss. Patches of scrub black spruce and associated plants and mosses are commonly interspersed throughout.

The interior of southeast Labrador, with its open, stunted forests and extensive wetlands, also provides habitats for a range of wildlife species. Caribou numbers are generally low in the region, and other large mammals such as moose and black bear are found in low to moderate densities, particularly in association with forested river valleys. The area supports furbearer and small mammal species such as marten, snowshoe hare, porcupine and voles, as well as ptarmigan and grouse. Raptors are found in the region, particularly in the spring breeding season, and waterfowl often inhabit the large water-bodies and extensive wetlands throughout this area. A number of passerine birds are also present, many of them migrants that travel to Labrador to breed.

The Labrador section of the proposed transmission corridor will cross and/or be located adjacent to a number of large watersheds, including the Churchill, Kenamu, Mecatina, St. Augustine, St. Paul, Pinware and Forteau Rivers. Watercourse crossings range in size from small, intermittent streams to the main stem of the Churchill River, and are known to support a wide variety of fish species. There are three scheduled salmon rivers in this general area (DFO 2008).

Along the coastal strip of the Strait of Belle Isle, low hills throughout the area are covered primarily with barren vegetation and pockets of scrub spruce and bog. The coast along the Labrador side is steep granite, which rises to flat-topped ridges and summits that range from 300 to 390 m asl.

1.4.2 Strait of Belle Isle (Marine Environment)

The Strait of Belle Isle is a marine channel that separates the southeast coast of Labrador from the northwest portion of the Island of Newfoundland's Northern Peninsula. The Strait extends for approximately 118 km in a

northeast-southwest direction and at its narrowest point (between Point Amour and Yankee Point near the southwest end), is approximately 17 km wide (Figure 1-3).

Water depths within the Strait vary considerably over its length, and in places reach over 120 m. A deep central trough shallows towards narrow, bedrock-controlled coastal platforms on both sides of the Strait. In the general Study Area, water depths are greater on the Labrador side and the coastal zone on the Island side is relatively shallow, with depths increasing more gradually.

The Strait of Belle Isle is underlain by Precambrian gneisse deposits that belong to the Grenville Province, which consist of a complex of metamorphic and granitic rocks. The Strait of Belle Isle is topographically complex, with seabed sediments consisting of thin, discontinuous glacial and marine sediments overlying bedrock. The seabed comprises coarse-grained armour of pebbles, cobbles and boulders overlying glacial till and localized glaciomarine deposits across most of the strait. Marine sands form a discontinuous surficial veneer in shallow water areas and thicken locally in some coastal embayments. Bedrock is exposed in places on the seabed and consists of sandstone, dolomite and limestone, with some interbedded shale. Water movement within the Strait is primarily through strong tidal currents. Typically, sea ice and icebergs occur between December and June.

A variety of fish species are present in the Strait of Belle Isle, including shellfish (such as scallop, lobster, whelk and toad crab), groundfish (including cod, lumpfish, flounder and halibut) and pelagic species (such as capelin, squid, herring, salmon and mackerel) (DFO 2007a). Marine mammals, including whales, porpoises, dolphins and seals, are present in the Strait of Belle Isle at certain times of the year (DFO 2007a; 2007b), particularly from May to August. Polar bears also occasionally drift south to the Strait of Belle Isle and beyond on spring ice. The Strait of Belle Isle is also used by a variety of avifauna for breeding, over-wintering and/or for feeding and resting during migration through the area.

1.4.3 Island of Newfoundland

On the Island of Newfoundland, the Study Area includes the regional area extending along the coast of the Strait of Belle Isle from Mistaken Cove to just northeast of Shoal Cove, the 2 km-wide proposed transmission corridor and alternative sections extending from the shore of the Strait of Belle Isle to the terminus at Soldiers Pond, the potential electrode line corridor to Conception Bay, and the proposed converter station site at Soldiers Pond (Figure 1-4).

Given that the Island portion of the HVdc Study Area crosses several different environmental zones with varied conditions and resources, the brief discussion that follows is a general presentation of information for three principal zones - Northern Peninsula, Central and Eastern Interior, and the Avalon Peninsula.

Northern Peninsula

The extreme northwestern edge of the Peninsula, along the Strait of Belle Isle, is a rocky, flat coastal stretch. Calcareous bedrock is common and the area is covered by shallow soils with extensive exposed bedrock. The Newfoundland coast in this area is much lower than on the Labrador side, with shorelines rising to only approximately 30 m asl.

Figure 1-3 Strait of Belle Isle Portion of the Study Area

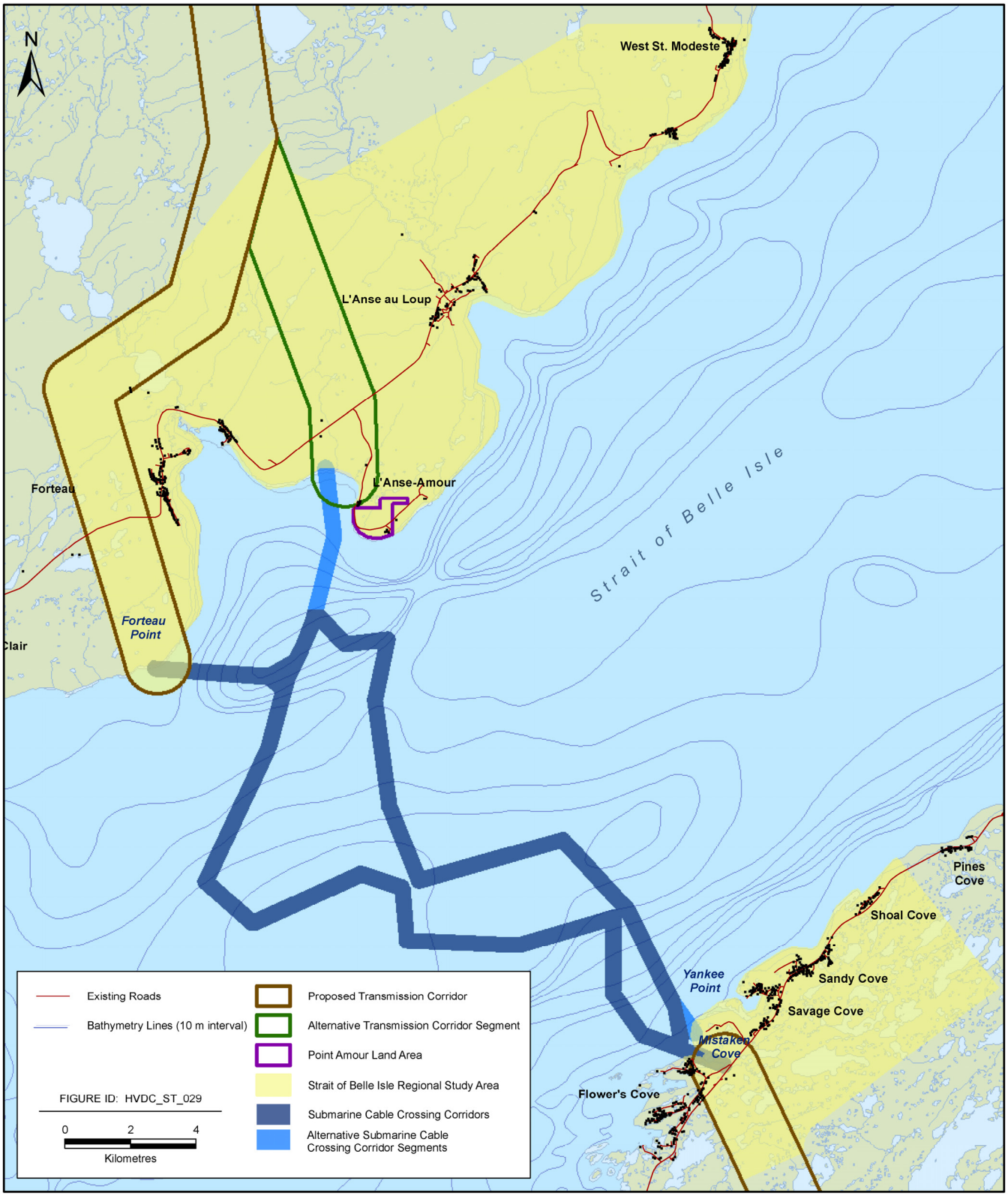
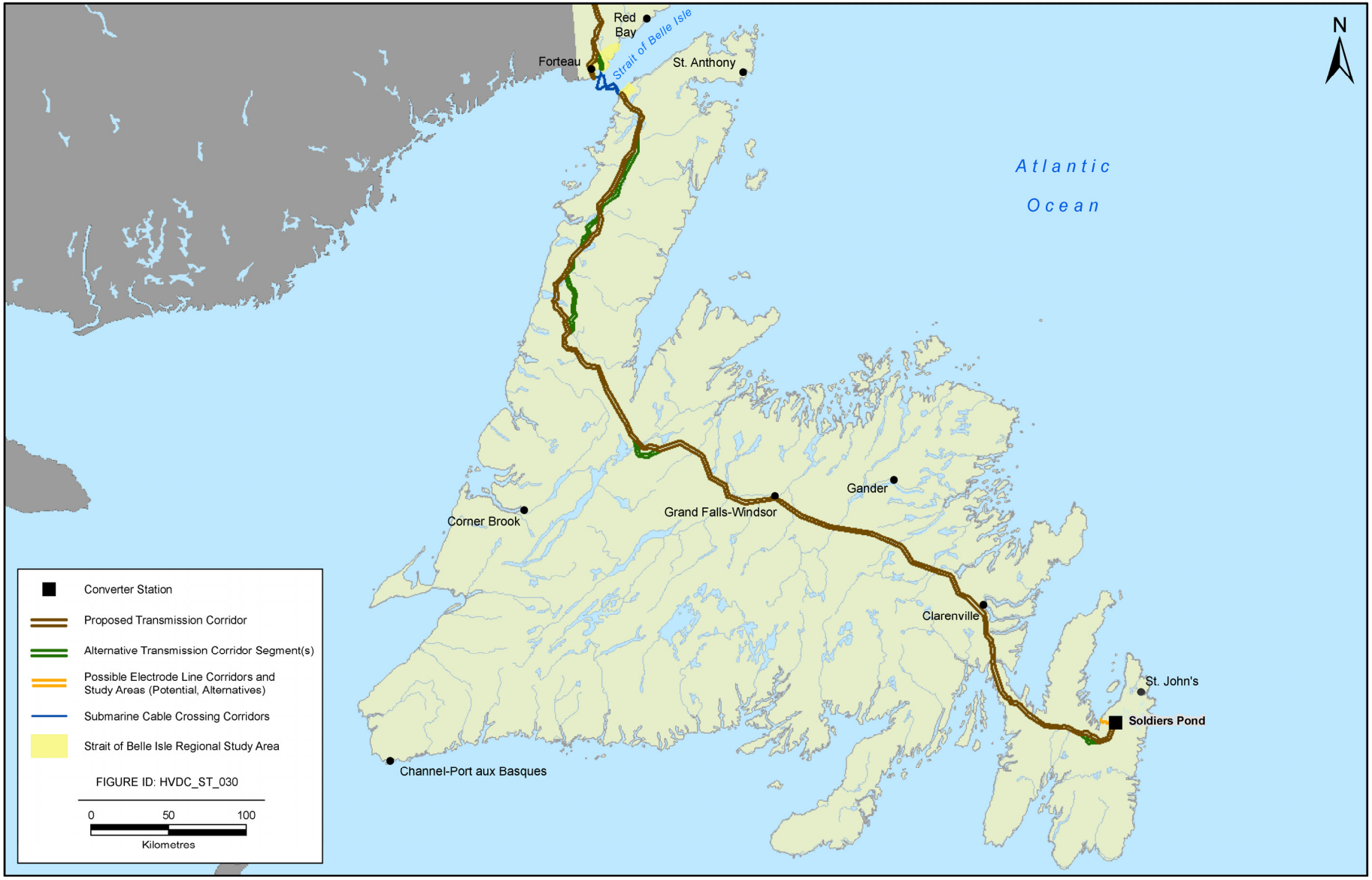


Figure 1-4 Island of Newfoundland Portion of the Study Area



The climate is characterized by long, cold, snowy winters and short, cool summers (Banfield 1981). The vegetation cover is comprised almost exclusively of barren and tundra-like assemblages, with alternating dry barrens and shallow fens. The calcareous barrens are home to a rich and unique mixture of endemic, Arctic and calciphillic plant species. Coastal, forested and barren areas are representative along the western side and interior portions of the Northern Peninsula. Much of the interior is dominated by mountainous highland areas and plateau associated with the Long Range Mountains, with mostly barren vegetation and shallow ribbed fen and tuckamoor dominating the landscape. Along the western edge of the peninsula, the lower portions of the Long Range Mountains are characterized by forested areas along the slopes, with a flat coastal plain of bogs and scrub vegetation. Relatively productive forested areas of balsam fir-black spruce mixtures are found along the eastern lower slopes of the Long Range Mountains.

As in Labrador, post-glacial isostatic rebound has led to a net fall in relative sea levels through the Holocene (Bell and Renouf 2003) and, as in Labrador, early archaeological sites on the Northern Peninsula are therefore associated with elevated former marine terraces.

The areas along the northwest portion of the Northern Peninsula, across the Long Range Mountains and south to Gros Morne National Park, are home to a number of caribou populations. Other large and small mammals such as moose (not native but historically introduced, as is the case elsewhere on the Island), black bear, lynx, fox and hare also occupy the forest, scrub and aquatic habitats throughout the peninsula. Raptors, waterfowl and other avifauna are also present in forested areas, barrens, scrublands and wetlands along the coast.

This section of the proposed transmission corridor will similarly cross and/or be located adjacent to a number of watersheds (Eastern Blue Pond, Western Blue Pond and Portland Creek Pond), which are known to support a variety of fish species.

Central and Eastern Interior

This Central and Eastern Interior of Newfoundland exhibits the most continental climate on the Island, with relatively high summer temperatures, low rainfall and harsh winters. The topography is predominantly low and undulating. The area is also heavily forested and more distinctly boreal than any other part of Newfoundland, with large stands of black spruce, white birch and aspen, as well as dwarf shrub heath.

Wildlife in the region are typical of the boreal forest and include moose, snowshoe hare, muskrat, otter, mink, black bear, beaver and lynx, as well as small mammals such as voles and shrews. Caribou populations are found in the general area, as are birds (that typically live in forested areas) and various waterfowl species.

Major rivers systems such as the Exploits, Gander, Gambo and Terra Nova Rivers are located in this general area, many of which are designated as scheduled salmon rivers (DFO 2008). Fish species that are common in water bodies and watercourses in the region include Atlantic salmon, brook trout, rainbow smelt, sticklebacks, American eel and Arctic char, with rainbow trout, alefish and sea lamprey occurring less commonly.

Avalon Peninsula

The Isthmus and western and northern portions of the Avalon Peninsula are characterized by undulating terrain with extensive areas of barren heath, small pockets of forest in sheltered valleys (particularly in the north), and bogs and shallow fens interspersed throughout.

The sheltered, central portion of the Avalon Peninsula is characterized by low elevations and relatively hilly terrain, with numerous lakes and bogs within. It is exposed to cool summers and mild winters, high precipitation and frequent fog (Banfield 1981). The region is relatively heavily forested with distinctive vegetation patterns, which include pure stands of balsam fir-fern forests with a mixture of yellow birch, scrub forests with peatmoss understory, and ericaceous shrubs and convex raised bogs. Lichens are abundant on tree stems and branches.

The barrens, wetland and bog areas, marine habitat, and forested pockets on and adjacent to the Avalon Peninsula are home to a number of large and small mammals such as moose, black bear, lynx, fox, hare, mink, beaver, otter, voles and shrews, as well as raptors, waterfowl and other avifauna. The barrens are also home to a number of caribou populations, particularly the northern and southern portions of the peninsula.

Fish species that are known to commonly occur in water bodies and watercourses in the region include Atlantic salmon, stickleback, brook and brown trout, rainbow smelt and American eel, with rainbow trout, Arctic char and other species found less commonly.

2.0 APPROACH AND METHODS

The Historic and Heritage Resources research of the Study Area presented in this report was conducted as a series of separate studies in 1998, 2006, 2008, 2009 and 2010, which together provide a complete and comprehensive study of the Labrador - Island Transmission Link.

2.1 Archaeological Resources

Throughout the 12-year period from 1998 to 2010, the Historic and Heritage Resources research strategy followed a three-stage approach, beginning with background research, followed by field assessment, and culminating in archaeological potential mapping.

The relationship between background research, field assessment and potential mapping over the 12-year period was complex and iterative (a brief Project overview is provided in Section 1.1), with background research and archaeological potential mapping results from Labrador between 1998 and 2006 feeding back into the design of the field research program in insular Newfoundland in 2008. Equally, the information and approach used to target testing locations during the field research completed on either side of the Strait of Belle Isle in 2009 was derived, in part, through a review of background information. As well, the 2010 mapping of archaeological potential within the regional Study Areas on either side of the Strait of Belle Isle employed methods developed for previous mapping projects and drew from the results of the 2009 and earlier field studies.

The basic relationship between the various research elements may be summarized as follows.

Background research serves to identify:

- known, geo-referenced archaeological sites (e.g., sites or materials pre-dating 1960 and registered in the Provincial Archaeology Office (PAO) Archaeological Site Record Inventory or referenced in historical documents);
- proxy indicators of high archaeological potential (e.g., known ethnographic/contemporary sites post-dating 1960, which have potential to include archaeologically-significant materials or features);
- settlement patterns, as indicated by existing archaeological data and also topographic and hydrographic attributes predicted to correlate with high archaeological potential (e.g., waterfalls and rapids, which are likely to enforce travel stops and thus lead to the formation of archaeological sites); and
- locations in which high potential topographic attributes and landforms may once have been present (e.g., marine terraces representing former coastal locations).

Field research follows from background research, serving to verify predicted potential by assessing:

- specific locations identified as known historic and/or ethnographic sites;
- specific locations (“testing locations“) in order to sample broader topographic features and landforms (‘testing zones”) of predicted high potential; and
- a range of other topographic and hydrographic settings to verify that they are of lesser potential.

Archaeological potential mapping follows from field research results and proceeds by:

- mapping topographic and hydrographic features ("potential zones") of varying archaeological potential within the Study Area;
- comparing field assessment effort and results to verify and rate archaeological potential for each Zone Type and thus to define Zone Types of "high", "medium" and "low" archaeological potential within the Study Area; and
- producing maps of relative archaeological potential for the Study Area for use in the Project's EA, and eventually, in detailed routing and design.

2.1.1 Background Research

Background research for the various components of field research completed over the 12 year period, from 1998 to 2009, had the following general objectives:

- to identify gaps in existing knowledge about regional archaeology and archaeological potential;
- to assist in pre-selection of testing locations by identifying specific locations of known high potential (known archaeological sites and traditional land-use locations);
- to assist in pre-selection of testing locations by identifying locations which may be predicted to have high potential; and
- to assist in the interpretation of archaeological fieldwork results.

The principal background research effort was undertaken in 1998 in Labrador. The 1998 research (reported in detail in IEDE/Jacques Whitford 2000) covered both the Labrador - Island Transmission Link corridor and the Lower Churchill Hydroelectric Generation Project, with a widely-defined study region that encompassed all of southern and central Labrador and portions of adjacent Quebec. Research included reviews of archaeological, historic, ethnographic and ethnohistoric literature and data, as well as data on geomorphology and aboriginal land-use where available. The 1998 background research was sufficiently comprehensive and did not need to be repeated when field assessment of the Labrador - Island Transmission Link resumed in Labrador in 2006.

When study work for the Labrador - Island Transmission Link corridor in insular Newfoundland was undertaken in 2008, field assessment was preceded by background research, as it had been in Labrador. Review of archaeological, historic, ethnohistoric and geomorphological research for the Island built on an earlier general overview of the archaeological potential along the transmission line commissioned in 1979 (Tuck 1979; Gerald Penney and Associates Ltd. 2002) and the results were summarized in a Pre-Fieldwork Overview Assessment Report (Jacques Whitford 2008) prior to initiation of fieldwork in 2008.

Because the Historic and Heritage Resources research completed on either side of the Strait of Belle Isle in 2009 was site-specific, and therefore limited in nature and extent, the review of information undertaken prior to fieldwork did, nevertheless, employ several of the key methods described below.

Background research methodology is summarized for each of the following research activities:

- review of previous archaeological research undertaken within the Study Area;
- review of archival sources (e.g., the Hudson's Bay Company (HBC) records) for the early historic period, as well as other existing historic, ethnohistoric and ethnographic literature;

- review of contemporary and historic land-use (principally Innu land-use data, previously compiled and digitized by Innu Nation and made available to the study team under license in 1998); and
- landform analysis, including air photo analysis and review of relevant geomorphological research.

Review of Archaeological Data

Review of existing archaeological data included two elements:

- culture-historical review; and
- site inventory analysis.

Culture-historical review consisted of reviewing evidence from previous archaeological research in Labrador and adjacent Quebec in order to determine the nature and range of archaeological remains that might be anticipated within the Study Area. This was derived largely from consideration of published archaeological literature related to the broader region. Archaeological literature was reviewed, as were archaeological site record inventory data available from the PAO in St. John's, particularly literature and data pertaining to research undertaken in close proximity to the 2008 Study Area. Consulted sources included major published sources on the archaeology of Newfoundland and Labrador (e.g., Fitzhugh 1972; McGhee and Tuck 1975; Schwarz 1994a, 1997a; Holly 1997; Renouf 1999a; IELP 2002), as well as reports on research and assessment work directly relevant to the Study Area (e.g., Fitzhugh 1972; Carignan 1975; McGhee and Tuck 1975; Tuck 1976a, 1976b; Northland 1980; Gilbert and Reynolds 1989; Schwarz 1992, 1993; Reader 1993; LeBlanc and Tuck 1997; Renouf 1999b; IEDE/Jacques Whitford 2000; Jacques Whitford/IELP 2001d; IELP 2002; Erwin and Holly 2006; Hartery 2007; Minaskuat 2007a).

Because of the then-limited amount of field research completed in the interior, site inventory analysis was undertaken in 1998 in order to identify strategic, high-potential locations. While it is coastal strategic landforms that are most clearly understood, most archaeologists working in the interior also share impressions that certain interior locations also tend to yield archaeological sites.

Consequently, as part of the background research for the 1998 assessment in Labrador, an inventory of known pre-contact interior sites (i.e., sites pre-dating the arrival of Europeans in North America and contact with Aboriginal people) was compiled and analyzed in an attempt to verify these impressions. In order to increase the sample size, the inventory was expanded to include sites not only from Labrador but also from adjacent interior regions in Quebec, primarily from the Caniapiscau region and from the Mushuau-Nipi (Lac de la Hutte Sauvage, or Indian House Lake) area. Site inventory analysis was achieved using data archived at the PAO in St. John's, and the Ministère de la Culture et des Communications in Quebec. In order to ensure evenness of the database, analysis was kept simple and focused on a few variables, which could be readily recorded for all sites, regardless of their province of origin or the level of detail in the records. Since virtually the only data consistently available for sites were locational, analysis became restricted to those variables, which could be determined from point locations on 1:50,000 topographic mapping.

The objective was to test the following informal but widely-held impressions of interior site location: that sites are more strongly associated with lakeshores than with riverbanks, and that when found on lakes they tend to lie at the inflows or outflows of rivers; that when found on rivers they are particularly associated with falls, rapids and portage routes; that on both rivers and lakes, sites are commonly associated with brook mouths and/or points of land and/or islands and/or major constrictions in waterways.

Ethnographic and Historical Literature and Archival Sources

Ethnographic, ethnohistoric and historic literature and published land-use data are readily available for Labrador (e.g., Tanner 1947; Brice-Bennett 1977; Tanner 1978; Armitage 1990; Kennedy 1995; Mailhot 1997) and were consulted. Land-use data from the Quebec north shore (e.g., Deschênes 1983) are similarly rich but less readily available. For the Island, ethnohistoric literature bearing on Beothuk (e.g., Howley 1915; Marshall 1996) and Mi'kmaq (Pastore 1978a, 1978b) settlement were reviewed in 2008, as were relevant sources on historic European settlement (Tuck 1996; Gilbert 2000). In addition, primary documentary sources bearing on Labrador were identified and consulted by the background research team in 1998. These included explorers' accounts and HBC post journals. These were searched for location references to potential historic resources, as well as for descriptive and anecdotal accounts to assist in interpreting historic resources encountered in the field.

There were two principal research objectives in reviewing these data and sources. The first was to identify any specific geographic references to campsite locations and travel routes, which field research teams could verify or investigate in the field. The second was to derive interpretive materials to facilitate recognizing, interpreting, and explaining archaeological patterns, such as site distributions, observed in the field.

Finally, general theoretical literature on hunter-gatherer settlement patterns, and archaeological potential and predictive modelling (e.g., Jochim 1976), where directly relevant or applicable to the Study Area, were also reviewed. These assisted in predicting landforms and topographic features with high potential to yield archaeological sites.

Contemporary Land-use

In the Labrador portion of the Study Area, digitized geo-referenced Innu land-use data compiled by Innu Nation were accessed for the assessment under license from Innu Nation in 1998. These data are based on informant interviews and primarily attest to recent land-use activities occurring over the past 10 to 70 years (Innu Nation 1998). The methodology consisted of deriving browser and graphical outputs on documented land-use features, such as campsites and travel routes, and making these available to the field research teams to ground-check and investigate for possible earlier archaeological components. Also completed as part of this study component was a review of available sources on contemporary land-use of Labrador Innu, including information related to harvesting locations within the Mealy Mountains and Eagle River Plateau, and various locations along highway and road corridors within and adjacent to the Study Area (Armitage and Stopp 2003). As well, sources discussing changes that occurred to traditional Innu land-use and harvesting patterns as a result of settlement in the 1960s were examined, as several of these reports showed areas of contemporary land-use (Tanner 1978; Armitage 1989; Stopp 2002; Armitage and Stopp 2003), while others highlighted the lands and waterways where various species were taken (MacLaren Plansearch 1994). Informant interview data (Armitage 1989) provided similar useful information, and a report related to the seasonality of Innu harvesting during the contemporary period was also reviewed (Innu Nation 1997).

While information regarding contemporary land use of south / central Labrador by Québec Innu has been collected (e.g., Deschênes 1983), the details of such research are generally not publicly available. Therefore, for the current study, the review of information focused on a report of existing and publicly available sources compiled in a report commissioned by Nalcor Energy (Paul F. Wilkinson & Associates Inc. 2008). Details of the report were useful from a Historic and Heritage Resources perspective as they outlined items such as times, locations and types of Quebec Innu harvesting activities (e.g., hunting, fishing, trapping, gathering), species

harvested, camp and/or cabin locations, travel routes and any other activities and socio-cultural sites known to be of importance (e.g., birth and burial sites, areas of spiritual significance).

The principal information sources for Settler land-use (Settler was the term used until recently for people of mixed, Aboriginal and European descent), and for contemporary land-use on the Island of Newfoundland, consisted of published literature (e.g., Kennedy 1995).

Landform Analysis

Landform analysis was undertaken by the various field teams on an ongoing basis throughout fieldwork. The objective was to identify landforms known to have high potential for archaeological remains. Two principal methods were used: air photo analysis; and geomorphology review.

Aerial photographs, augmented by satellite imagery, were the most important data source for landform analysis in the Study Area. Images were searched for several types of landforms, including stable (non-eroding) stretches of riverfront with potential for preservation of historic remains, and level habitable areas in strategic locations such as tributary mouths, islands and along rapids. Air photo analysis was especially important for identifying preserved ancient landforms, many of which are set back from the present waterways and shorelines, and not readily visible from ground level. The landforms of primary interest are terrace edges, especially those that represent preserved former rivermouths, points of land or islands, landforms that emerge from the site inventory analysis as strategic settlement locations. These strategic terrace edges are important because they combine high potential for past settlement with high potential for the preservation of remains.

In coastal portions of the Study Area (i.e., the Strait of Belle Isle), an understanding of terrace formation is directly relevant to archaeological assessment, since on the coast, the elevation of terraces and their edges is directly related to their age. Although the absolute dating of the sequence remains ambiguous, at least for the earliest stages in central Labrador, an understanding of the sequence can allow a broad search for sites dating to particular time periods. Identifying landforms with high archaeological potential thus requires review of geomorphological literature, particularly that bearing on post-glacial changes in relative sea level. Relevant sources that were consulted included geomorphological studies (e.g., Liverman 1994), research by geomorphologists and archaeologists in collaboration (e.g., Clark and Fitzhugh 1992; Bell and Renouf 2003) and the sea level history and geomorphology study undertaken for the Labrador portion of the Project in 1998 (Jacques Whitford 2000a).

2.1.2 Field Studies

Field assessment began following completion of background research. Methods varied little year to year or between the Island and Labrador, and involved the following elements:

- training;
- selection of testing zones;
- aerial inspection;
- visual surface inspection;
- sub-surface testing; and
- field recording.

Training

As part of the 1998 and 2006 workplans for Labrador, a training program in archaeological field techniques was developed and delivered to Innu field research participants. An initial two-week training program was held in Sheshatshiu in June 1998. This was followed by refresher courses in subsequent years, which served to refresh the assistants' knowledge of:

- basic methods and techniques required for the 2006 archaeological field program;
- Labrador pre-history and history;
- identification and classification of archaeological materials and preparation of records;
- individual attitudes and aptitudes (e.g., observation, working as a team member); and
- responsibility towards the preservation of archaeological heritage

Selection of Testing Locations

Field assessment in all field seasons, from 1998 to 2009, was in essence a two-stage process. The first stage, which emerged directly from the results of background research, consisted of pre-selecting locations within the Study Area for closer assessment.

Two objectives can guide the selection of testing locations. The first is the objective of sampling the range of potential Zone Types along the corridor, and the second is the objective of identifying as many archaeological and ethnographic sites as possible by investigating locations where the potential for locating sites is highest. In either case, a specific testing location may be regarded as an effort to sample a particular mapped zone, and by extension, an effort to sample, and test the archaeological potential of a particular Zone Type.

Virtually all testing locations were selected because they lay within the defined Study Area. However, it should be noted that many of these testing locations investigated in previous years no longer lie within the presently-defined corridors. This is largely because of changes in the position and/or width of the transmission line corridors since 1998. Data from testing locations outside the present corridors do not directly identify Historic and Heritage Resources present within the Study Area, but they provide useful regional context, and these data were employed in rating the archaeological potential of Zone Types mapped within the corridors.

A large sample of testing locations has been investigated in the context of the Lower Churchill Hydroelectric Generation Project (see Jacques Whitford/IELP 2001a, 2001b, 2001c, 2001d; Minaskuat 2007a) and previous assessment of the transmission line corridors in 1998 and 2006 (IEDE/Jacques Whitford 2000; Minaskuat 2007b). As a result of this work, high-potential Zone Types have already been empirically defined. Consequently, most testing locations along the transmission line corridors, particularly those selected during the 2008 assessment, were targeted because they lie within Zone Types of predictably high potential. While the 2009 field assessments focused primarily on coordinates provided for drill sites, the extent of sampling conducted at any given location reflected the topography of the area and the perceived potential - that is, areas considered of low potential were inspected visually only, while areas of moderate or high potential were tested accordingly.

Within the present Study Area, high potential locations selected for testing consist of locations where the transmission line tracks or crosses major waterways. These include coastal shoreline, marine terrace systems, and major freshwater waterbodies and waterways, operationally-defined as lakes greater than 2 km in surface area, and rivers wide enough for their opposing banks to be distinguished on 1:50,000 mapping. Within these zones, testing was generally focused on specific locations with strategic attributes known from previous

assessment results to correlate with high archaeological potential. These include points of land and other constrictions in waterways, confluences and rivermouths, and areas of riverbank situated above or below falls and rapids.

The second stage consisted of closer inspection of pre-selected testing locations in the field, along with assessment of any additional testing locations, which appeared during helicopter overflight to have higher potential than previously anticipated. Field assessment in 1998, 2006 and 2008 included aerial inspection, visual inspection on the ground and sub-surface testing.

Aerial Inspection

Helicopter overflight of various parts of the Study Area was undertaken during the 1998 to 2008 studies by all field teams (no overflight was conducted in 2009), both as a distinct background research activity and on a daily basis during the deployment of field teams. Overflight provided an opportunity to further refine and confirm the assigned historic resources ratings, and to target any additional locations not selected for testing during background research. Conversely, where overflight indicated that archaeological potential was lower than predicted (for example, where habitable locations were found to be lacking due to poor drainage), aerial inspection was occasionally the sole assessment method used.

Visual Surface Inspection

Visual surface inspection was used primarily when background research indicated a testing location was likely to yield evidence of recent or historic land-use with potential for surface-visible remains. It was also used when surface exposures were present in the testing location (e.g., along an eroding riverbank or an active beach). Visual surface inspection generally proceeded with field teams walking informal transects, with, for instance, one team member walking the riverbank, another the beach, and a third in woods behind. The objective was to locate deflated cultural material in exposures, along with other surface-visible remains.

Photo 1: Archaeological Testing, Birchy Lake, Newfoundland

Sub-surface Testing

Sub-surface testing from 1998 to 2009 was used when background research indicated a testing location had potential for buried pre-contact cultural remains, when specific historic or contemporary sites were anticipated but no surface-visible remains were evident, and in testing locations under forest cover with no surface exposures. Sub-surface testing was generally conducted along linear features, such as lake and marine shorelines and riverbanks, and along preserved ancient terrace edges. The objective of sub-surface testing was to test areas lacking surface exposures by sampling sub-surface deposits at close and regular intervals, to a depth of several centimetres below the A horizon, below which no cultural remains were anticipated. This rarely required test excavation deeper than 30 cm below the surface, and in most instances testing required depths of no more than 20 cm below surface. Testpits were excavated by shovel and trowel (Photo 1).

Where possible, the excavation of testpits was systematic and intensive. Testpits were excavated along pre-selected linear features in one to three rows, approximately 5 m apart and at 5 to 10 m intervals, according to the degree of forest cover. Testing at close and regular intervals was easiest in open lichen woodland, in burnt-over areas and along deforested terrace edges. In denser forest, testpit spacing was somewhat wider and less regular. The principal sampling method used in all testing locations was sub-surface testing. The results of previous assessment along the Churchill River, which compared the results of excavating large (50 x 50 cm) testpits at wider intervals and smaller testpits at closer intervals, indicated that the latter approach was the more effective at recovering localized pre-contact sites (IEDE/JWEL 2000). Smaller testpits also allowed archaeological resources to be identified with less adverse impact to the resources themselves. Consequently, testpitting employed 20 to 30 cm square shovel-tests excavated through the A horizon. This testing strategy was intended to recover any site in excess of 10 m in diameter, with a high probability of recovering sites 5 m in diameter. The probability of locating even smaller sites is relatively low, although on a regional scale, this strategy will occasionally yield small sites and stray finds (Photo 2).

Photo 2: Archaeological Testing, Mistaken Cove, Newfoundland

When cultural remains were encountered, a record was made of the unit profile and the nature of deposits. In some cases, the initial positive testpit was expanded to 50 x 50 cm in an effort to recover diagnostic materials. In addition, test pits were excavated at intervals around the first positive test pit in order to define site size. Otherwise, the testing strategy was by intent a "low-impact" one, aimed at excavating the minimum required to identify the time period and define site deposits, then moving on. Site locations were recorded using hand-held GPS units and marked on the ground. Previous experience suggests that many interior pre-contact sites consist of one or more very small loci (artifact scatters) often focused on a hearth. The approach used was suitable for identifying multiple-locus sites and delineating overall site size, but not necessarily for identifying all the loci present.

Field Recording

In the field during all years of research (1998 to 2009), records were kept in the form of fieldnotes, which recorded, among other things, the number, location and contents of testpits. Sites and testing locations were recorded with hand-held GPS units, with estimated horizontal error not exceeding 10 m. Readings to this degree of accuracy are sufficient to relocate the sites and testing locations in the field, allowing them to be compiled into a database that could map site distributions as a GIS layer. Fieldnotes were transcribed into a digital format on an ongoing basis and any sites and cultural materials recorded were catalogued on standard PAO site and artifact record forms. All archaeological and ethnographic sites, testing locations and important natural and cultural features were photographed and photo catalogues were maintained. Testing locations and the locations of archaeological and ethnographic sites were also recorded on 1:50,000 topographic maps. Where necessary,

plans and sketch maps were prepared for sites showing the extent of sub-surface deposits, the location of testpits and the distribution of any surface-visible features.

Contemporary Versus Archaeological Sites

Although, strictly-speaking, they are not archaeological sites and are not typically subject to mitigation under the *Historic Resources Act* 1985, contemporary land-use features (material remains of human activity occurring after 1960) may have considerable relevance to archaeological research, as noted below.

- As archaeological sites represent a (or in some cases, the) record of land-use in the distant past, contemporary sites are intrinsically interesting as a record of land-use in the more recent past.
- Evidence of contemporary land-use can be a useful indirect indicator of land-use in the distant past. For example, ancient portage trails may leave few if any archaeological remains, but contemporary trails may indicate where earlier portage routes once led. Moreover, contemporary campsites may indicate strategic locations where earlier historic sites, or even pre-contact sites, may be found.
- Similarly, the density and distribution of contemporary sites may indirectly indicate the archaeological potential of an otherwise archaeologically-unknown area.
- Recording contemporary sites can serve to ground-truth the results of background research on contemporary land-use, allowing assessment of the accuracy of these data and their utility for indicating potential archaeological site locations.
- As contemporary sites have proven value and relevance to archaeological research, it is common practice to document and report contemporary sites, as well as archaeological sites, to the PAO. The PAO does not record contemporary sites as archaeological sites, assigning them distinct ethnographic codes, but it does maintain records of contemporary sites to assist future archaeological research and Cultural Resource Management (CRM).

Methodologically at least, no distinction was drawn during fieldwork between archaeological sites and sites of contemporary land-use. Archaeological and contemporary sites were both recorded using the same methods and both reported to the PAO. Archaeological sites are assigned Borden numbers (e.g., "FhCe-1") in accordance with the Canadian Registry for archaeological sites, and contemporary sites are designated by ethnographic codes (e.g., "13F/07 Ethno-03").

It should be noted that recording of ethnographic sites is routine only in Labrador, where there is abundant evidence for contemporary Aboriginal and Settler land-use that may reflect long-standing historic or even pre-contact land-use patterns. In insular Newfoundland, contemporary land-use is less likely to reflect traditional patterns, and ethnographic sites are therefore typically not recorded.

2.1.3 Archaeological Potential Mapping

The methodology for archaeological potential mapping was initially developed for assessment of the Lower Churchill Hydroelectric Generation Project in 2000 (Jacques Whitford/IELP 2001c). In the 2000 study, mapping in the reservoir areas was based on detailed 1:5,000 mapping and high-quality aerial photographic coverage, while mapping of upland transmission lines between Gull Island and Churchill Falls was based on 1:50,000 scale, black and white air photos and 1:50,000 scale maps (and limited colour 1:12,500 scale photo coverage). The methodology for 1:50,000 mapping was applied in 2006, with some minor modifications, to interim potential

mapping of the then defined Gull Island-Strait of Belle Isle transmission corridor, and again in 2008 and 2010 to complete the present study.

Following the methodology developed in 2000, archaeological potential mapping involved three stages:

- mapping of topographically- and hydrographically-defined Zone Types across the Study Area;
- incorporation into GIS and data analysis; and
- assessing and mapping archaeological potential for each defined Zone Type.

Stage 1: Zone Mapping

Zone mapping for the Project followed the approach used in the 2000 mapping of the upland portions of the Lower Churchill Hydroelectric Generation Project, but with some modifications. The 11 archaeological potential Zone Types defined in the 2000 study (Jacques Whitford/IELP 2001c) represent landforms with distinctive vegetation and topographic features that are readily identifiable in aerial photography and, in some cases, on topographic maps. Most zones are distinguished by topographic features, principally their slope and edge characteristics, and their relation to major waterways. The use of simple presence/absence attributes recognizable in aerial photography and delineated on topographic mapping is intended to reduce ambiguity and enhance consistency throughout the mapping process. The 2008 final mapping of the Labrador and Newfoundland corridors was done at 1:50,000, as was the mapping of the Strait of Belle Isle regional study areas completed in 2010. Zone mapping followed the same methods, and achieved the same level of resolution, as that of the 2000 mapping of the Gull Island-Churchill Falls transmission line (Jacques Whitford/IELP 2001c).

Zone maps were produced by manually delineating zones based on contour spacing and features visible in air photos onto 1:50,000-scale map sheets. Concurrently with mapping, the attributes of each individual zone were recorded on a separate database. Attributes recorded include zone number and type, elevation and strategic location criteria. Backup copies were made of maps and record forms, and originals were forwarded to the GIS specialist in St. John's.

The 2000 zone mapping methodology was modified in 2008 in that Zone Types were redefined, added, or removed from analysis as appropriate. The Zone Type definitions used in 2008 (and again in 2010), which thus differ from those in 2000 in some respects, may be summarized as follows:

- **Zone Type 01 (Contemporary Strategic Shoreline)** includes all shorelines along major waterways that display strategic attributes attractive to human settlement. Major waterways are defined to include the coast, inland lakes greater than approximately 2 km^2 in area, and inland rivers wide enough for both banks to be distinguished on 1:50,000 mapping. Strategic attributes are defined to include points of land, confluences, constrictions in waterways and locations above or below falls and rapids. The strategic significance of these attributes was tested and verified during potential mapping in 2000 and 2006. Because of the demonstrably high potential of coastal shorelines, all marine shorelines were assigned to this category whether or not they displayed strategic attributes;
- **Zone Type 02 (Contemporary Generic Shoreline)** includes shorelines along major inland waterways that lack strategic attributes;
- **Zone Types 03 and 04**, employed in areas covered by 1:5,000 mapping in the 2000 Study, are defined on the basis of erosional attributes not readily discernable or practically mappable at 1:50,000 and were not employed in the 2008 transmission line mapping;

- **Zone Type 05 (Former Strategic Shoreline)** consists of ancient Type 01 locations, now preserved as riverine or marine terrace edges visible on aerial or satellite imagery and mappable at 1:50,000 scale;
- **Zone Type 06 (Former Generic Shoreline)** consists of ancient Type 02 shorelines: preserved riverine or marine terrace edges that are visible on aerial or satellite imagery and mappable at 1:50,000 scale but which lack identifiable strategic attributes;
- **Zone Type 07 (Coastal Plain)** represents gradually aggrading deposits that at one time have all lain at the shoreline, but where specific terrace edges either cannot be observed in aerial imagery, or cannot practically be mapped at 1:50,000 scale. Since relative sea level curves vary widely across the Study Area, the operational definition of former coastline varies as well. In upper Lake Melville and the Strait of Belle Isle, Zone Type 07 was defined to include all coastal lowland extending to elevations of approximately 100 m above modern sea level; on the west coast of the Northern Peninsula, Zone Type 07 was defined to include all coastal lowland extending to elevations of approximately 30 m. This Zone Type was not mapped in central or eastern Newfoundland;
- **Zone Type 08 (Terrace Interior)** consists of level terrain belonging to marine or riverine terraces but lying behind the defined terrace edge;
- **Zone Type 09 (Upland)** consists of areas of moderate or steep slope. In 1:50,000 mapping, it effectively represents interfluvial upland, encompassing large areas of steep or moderate slope, hilltops and minor streamcourses lying between the major waterways;
- **Zone Type 10 (Wetland)** consists of permanently poorly-drained organic deposits large enough to be mapped on 1:50,000 base-mapping;
- **Zone Type 11 (Steep Slope)** was mapped as a separate Zone Type in 2000. However, because the 2008 base-mapping included variable contour intervals, it was not practical to develop and map an operational definition of "steep slope". For the 2008 potential mapping, areas of steep slope were collapsed into Zone Type 09.
- **Zone Type 12 (Esker)** consists of eskers discernable in aerial imagery, though they did not appear on the 2008 base-mapping. This Zone Type is uncommon across the Study Area. It has potential archaeological significance (see for instance McCaffrey et al. 2006), but its archaeological potential has not been verified in Newfoundland and Labrador.

Stage 2: Incorporation into GIS and Data Analysis

The maps and associated zone attributes were digitized and incorporated into a GIS. ESRI's ArcGIS Version 9.2 was used to assist in the data management, analysis and cartographic display of the spatial and tabular data collected for the assessment mapping component. Field-collected information in the form of GPS and tabular data was imported into ArcGIS and stored in geo-database format. Historic and Heritage Resources potential mapping was digitized from hardcopy transparency overlays and the attribute tables populated via unique IDs that were linked to external MS Excel spreadsheets. Final output for potential mapping was in the form of polygons stored as a feature class in a personal geo-database. Spatial queries were run to relate fieldwork to the Historic and Heritage Resources potential mapping.

Historic and Heritage Resources zone mapping was then correlated with geo-referenced data on testing locations and archaeological sites. Analysis of these correlations allowed sampling quality and the probability of recovering archaeological sites to be determined for each Zone Type.

Stage 3: Mapping Archaeological Potential

The final stage consisted of the reduction of the zone mapping to a final, simple archaeological potential rating. Each Zone Type was assigned a rating of High, Moderate, or Low archaeological potential. Ratings were determined by comparing the frequency of recorded sites (including both archaeological sites with Borden numbers and ethnographic sites) with the number of testing locations for each Zone Type, thereby deriving a probability of recovering sites within each Zone Type. For the purposes of deriving potential ratings, this study considered not only those testing locations and sites lying within the present Study Area, but all sites and testing locations investigated in the vicinity of the corridor since 1998.

Ratings were developed for the initial potential mapping program in 2000, based on fieldwork conducted between 1998 and 2000 (Jacques Whitford/IELP 2001b), and reassessed following further fieldwork in Labrador in 2006, and on the Island of Newfoundland in 2008. Archaeological potential rating has thus been an iterative process, in which the potential of each Zone Type may be continually tested and verified or amended as field data are collected. As a result, potential ratings for certain Zone Types have been amended since 2000, and the ratings employed in 2008 and 2010 are summarized in Table 2-1 (a detailed discussion of how multi-year assessment data, including 2008 and 2009 results, were used to derive the potential ratings, is found in Section 3.3). It should be noted that a small number of individual zones have been assigned potential ratings higher or lower than normal for their Zone Type, based on field observations. For instance, a coastal shoreline may receive a "low" potential rating if it has suffered considerable industrial disturbance or flooding, or if it is in fact an artificial shoreline.

Table 2-1 Zone Types, Descriptions and Historic Resources Potential Ratings

Zone Type	Description	Archaeological Potential Rating
00	Unclassified Shoreline	n/a
01	Contemporary Strategic Shoreline	High
02	Contemporary Generic Shoreline	Moderate
03	Eroding Contemporary Strategic Shoreline	n/a
04	Eroding Contemporary Generic Shoreline	n/a
05	Preserved Former, Ancient Strategic Shoreline	High
06	Preserved Former, Ancient Generic Shoreline	Moderate
07	Coastal Plain	Moderate/High
08	Terrace Interior	Low
09	Upland	Low
10	Wetland	Low
11	Steep Slope	n/a
12	Esker	Moderate
n/a = Not applicable		

One Zone Type assigned variable ratings is Zone Type 07 (Coastal Plain). In the Strait of Belle Isle and on the Northern Peninsula of Newfoundland, where coastal areas below the marine limit are relatively localized and terraces lie close together, zones of this type are rated uniformly high. However, in upper Lake Melville, the "coastal plain" is extensive, relatively level, and encompasses virtually all of the Study Area. Here, coastal plain has been rated as Moderate except where well-defined terrace systems can be discerned in aerial or satellite imagery.

2.2 Palaeontological Resources

Under the current regulatory framework, no fieldwork is required for Palaeontological Resources, although they are protected under the *Historic Resources Act* (1985) administered by the PAO. Therefore, to assess the likelihood of Project interactions with any resources that might be present within the Study Area, a review of published and unpublished sources and the relevant geological mapping (superimposed over 1:50,000-scale Project mapping) was completed to help establish the paleaoantological (i.e., fossils) potential of the transmission and potential electrode line corridors, and the regional areas on either side of the Strait of Belle Isle. The results of the Paleaoantological Resources research are presented in Section 3.4 of this report.

2.3 Strait of Belle Isle (Marine Environment)

Engineering and environmental survey work in the Strait of Belle Isle for the Project has involved detailed sub-sea surveys of the general crossing area and identified cable corridors, as well as desktop analysis and mapping, side-scan sonar, multi-beam and sub-bottom profile surveys in 2007 and an underwater drop-video program in 2008 and 2009.

2.3.1 Desktop Analysis, Constraints Mapping, and Sonar Surveys - 2007

In 2007, Fugro Jacques Geosurveys Inc. conducted a detailed bathymetric survey of the Strait of Belle Isle on behalf of Nalcor Energy to verify the seabed conditions and aid in the eventual planning and design of the submarine cable corridors.

Prior to survey operations, information on the natural and human environments in and around the Strait of Belle Isle was identified and compiled. The objective was to bring together all known existing information concerning the geology, bathymetry, oceanography, ecology, fisheries, archaeology and other aspects of the Strait. This study also involved mapping these and other environmental phenomena and constraints, including known and suspected historic resources and shipwrecks in the Strait.

Following completion of the desktop analyses, detailed sub-sea sonar surveys of the general crossing area and identified corridors were undertaken in the fall of 2007, including side-scan sonar, multi-beam and sub-bottom profile surveys. The 2007 sonar surveys provided detailed information on the two proposed 500 m-wide submarine cable corridors (Figure 1-3).

The survey operation was carried out by an offshore vessel travelling over a pre-selected survey grid with appropriate line spacing. A total of 840 km of geophysical survey lines were surveyed. The geophysical data collected through the survey is outlined in Table 2-2.

Side-scan mosaics were generated at 1 m (nearshore) and 2 m (offshore) spatial resolutions for interpretation and corridor analysis. Interpretations were validated against original side-scan data at full resolution using Caris SIPS software so that, on average, objects of approximately 0.5 m in size and greater could be identified. All survey results were analyzed and processed, and geologists formulated a description of the corridor conditions by interpreting the findings of all three different survey results.

In addition to the above, registered archaeological remains situated along the shoreline within the Study Area were plotted on Project constraints mapping, as were the general locations of a number of shipwrecks reported for the Strait of Belle Isle.

Table 2-2 2007 Data Collection in the Strait of Belle Isle

Data	Deep Water	Nearshore
Sub-bottom data	Acquired by a Huntec boomer Deep Tow System (DTS) operating at 240/135 Joules with a frequency range between 0.5 to 6 kHz (centre frequency 2.5 kHz) and 0.5 second firing rate	Acquired by a surface-towed IKB Seistec system operating at 200 Joules with a frequency range between 0.5 to 6 kHz and 0.5 second firing rate
Multi-beam bathymetry	Acquired by a Reson SeaBat 8111 system operating at a frequency of 240 kHz	Acquired by a Reson SeaBat 8101 system operating at a frequency of 455 kHz
Side-scan data	Acquired by an Edgetech DF-1000 digital side-scan sonar operating at both 100 and 380 kHz at 150 m slant range on both channels	Acquired by a Klein 3000 digital side-scan sonar operating at both 100 and 500 kHz at 150 m slant range on both channels

2.3.2 Underwater Video Surveys (2008 and 2009)

In 2008, Nalcor Energy contracted AMEC Earth & Environmental to conduct a marine field study to collect information on the seafloor characteristics along the two proposed Strait of Belle Isle submarine cable crossing corridors. The 2008 marine survey was completed in October, using a 55' longliner vessel from which a drop video system was deployed. The drop video was lowered and raised off the stern of the boat using an electromechanical winch in order to collect video footage of the seafloor along pre-determined transects within each of the two submarine cable corridors. In total, 28.5 hours of high-quality underwater video were recorded, covering approximately 52 km (or 84 percent) of the two submarine corridors.

Due to the shallow depths of the nearshore area on the Newfoundland side, the drop video system was not able to be used in this area in 2008. For this shallow (< 30 m depth) nearshore area, a 2009 underwater video survey was performed with a smaller vessel and a team of surface-supply divers covering an additional 2.8 km within the two corridors on the Newfoundland side of the Strait.

The underwater video resulting from the 2008 and 2009 marine surveys was subsequently reviewed and analyzed in detail for the purpose of assessing and quantifying marine fauna, flora and fish habitat characteristics along the proposed submarine cable corridors, as well as to determine if any objects of anthropogenic origin and significance were detectable within the corridors.

2.4 Project Personnel

From 1998 to 2010, a number of specialists and assistants were involved in various aspects of the Historic and Heritage Resources research in Labrador and on the Island. Cameos for the two principal researchers are provided below. Tables listing the involvement of other researchers and assistants are included in Appendix A of this report.

Fred Schwarz, Ph.D. (Archaeologist), holds a B.A. in Anthropology from Memorial University, an M.A. in Archaeology from the University of Calgary and a Ph.D. in Archaeology from the University of Cambridge. He specializes in the archaeology and pre-history of the Newfoundland and Labrador interior. His research interests include predictive modelling and field investigation of pre-contact interior settlement in Newfoundland and Labrador, settlement patterns, and the interpretation of interior adaptations and culture history in the region. Dr. Schwarz, of Black Spruce Heritage, has been directing field research projects in Newfoundland and Labrador,

Nova Scotia, and Latin America for 22 years. His work in Labrador has included scientific management of the Stage 1 HROA of the Churchill River Power Project from 1998 to 2000, which included a series of three training programs for Innu researchers. In addition, he has worked on numerous projects with and for Innu organizations and companies. In 1996, he directed the Regional Context Component of the Voisey's Bay HRIA for the Mushuau Innu Band Council (in conjunction with the Labrador Inuit Association (LIA) and Jacques Whitford). In 1997, he served as field consultant to the Innu History Commemoration Project for the Department of Canadian Heritage and directed the Archaeological Resource Inventory of Akamiuapishku Proposed National Park for Innu Nation and Parks Canada, eventually preparing the Human History Study of the proposed park in 2001. Since that time, he has also completed major assessments for IELP, including the Historic Resources Study of Phase III of the Trans Labrador Highway, as well as assessments and research in the town of Sheshatshiu for the Sheshatshiu Innu Band Council. More recently in 2006, he has undertaken several projects with Minaskuat, including archaeological potential mapping and field assessment of the LabMag Iron Ore project in western Labrador, and scientific management of ongoing historic resources assessment of the Lower Churchill Hydroelectric Generation Project.

Dr. Schwarz co-authored this Historic and Heritage Resources Component Study Report. Other roles and responsibilities for the Project since 1998 are detailed in the tables contained in Appendix A of this report.

Roy Skanes, B.A., M.Phil (Archaeologist), has worked as a Consulting Archaeologist with Stantec Consulting Ltd. for the past 19 years and has been involved in archaeological and archival research since 1978. His research focus has been primarily on historical archaeology, with a large majority of his work directed toward study of habitation sites and fortifications dating to the 18th and 19th centuries. Mr. Skanes holds a B.A. in Anthropology (Archaeology and French) from Memorial University and a Masters degree with a specialization in archaeology from the University of St. Andrews, Scotland. He has worked extensively in Newfoundland and Labrador, Nova Scotia, Prince Edward Island, New Brunswick, Quebec, Ontario and Alberta. Over the past 10 years, he has directed and/or acted as Team Leader for a number of Historic and Heritage Resources assessments for various projects on the Island and in Labrador, including assessments and excavations at Voisey's Bay, Labrador, along the corridor of the Trans Labrador Highway from Red Bay to Cartwright and from Cartwright Junction to Goose Bay, at five locations proposed for construction of short range radar sites in central and northern Labrador, and at a number of locations in the Churchill River valley and west and southwest Labrador for the proposed development of the lower Churchill for hydroelectric purposes. He also completed several Stage 1 Historic Resources Assessments in the Labrador Straits region for road and land development projects, and provided archaeological services during the relocation of a power lines at Red Bay. More recently, he directed assessments in northwest Labrador for a proposed mining project. He has also worked extensively with Aboriginal groups carrying out field research in Labrador.

Mr. Skanes co-authored this Historic and Heritage Resources Component Study Report. Other roles and responsibilities for the Project since 1998 are detailed in tables contained in Appendix A of this report.

3.0 RESULTS AND ANALYSIS

From the lower Churchill River in the north to the Avalon Peninsula in the south, the extensive Study Area traverses many of the environmental regions in the province, which exhibit diversity in the natural environment and human history. Thus, for purposes of presenting the results of the Historic and Heritage Resources research, the Study Area is divided into a number of distinct sub-areas, including:

- Churchill River Estuary and Upper Lake Melville (Labrador);
- Churchill Valley, from Muskrat Falls to Gull Island (Labrador);
- Gull Island to the Strait of Belle Isle (Labrador);
- Strait of Belle Isle (Marine Environment);
- Northern Peninsula (Newfoundland);
- Central and Eastern Interior (Newfoundland); and
- Avalon Peninsula (Newfoundland) (Figure 3-1).

For archaeological resources, both background research and field results begin with general overviews, followed by more detailed discussions for each sub-area. Palaeontological resources are discussed separately in Section 3.4.

3.1 Archaeological Resources: Background Research Results

For broad contextual purposes, the area of interest for Historic and Heritage Resources encompasses most of Labrador. However, for the purpose of the Project and its EA, the Study Area for Stage 1 Assessment is restricted to the proposed transmission line corridor and potential (alternative) electrode corridors from Gull Island on the Churchill River to Lake Melville, and from Gull Island to the regional area on the Strait of Belle Isle.

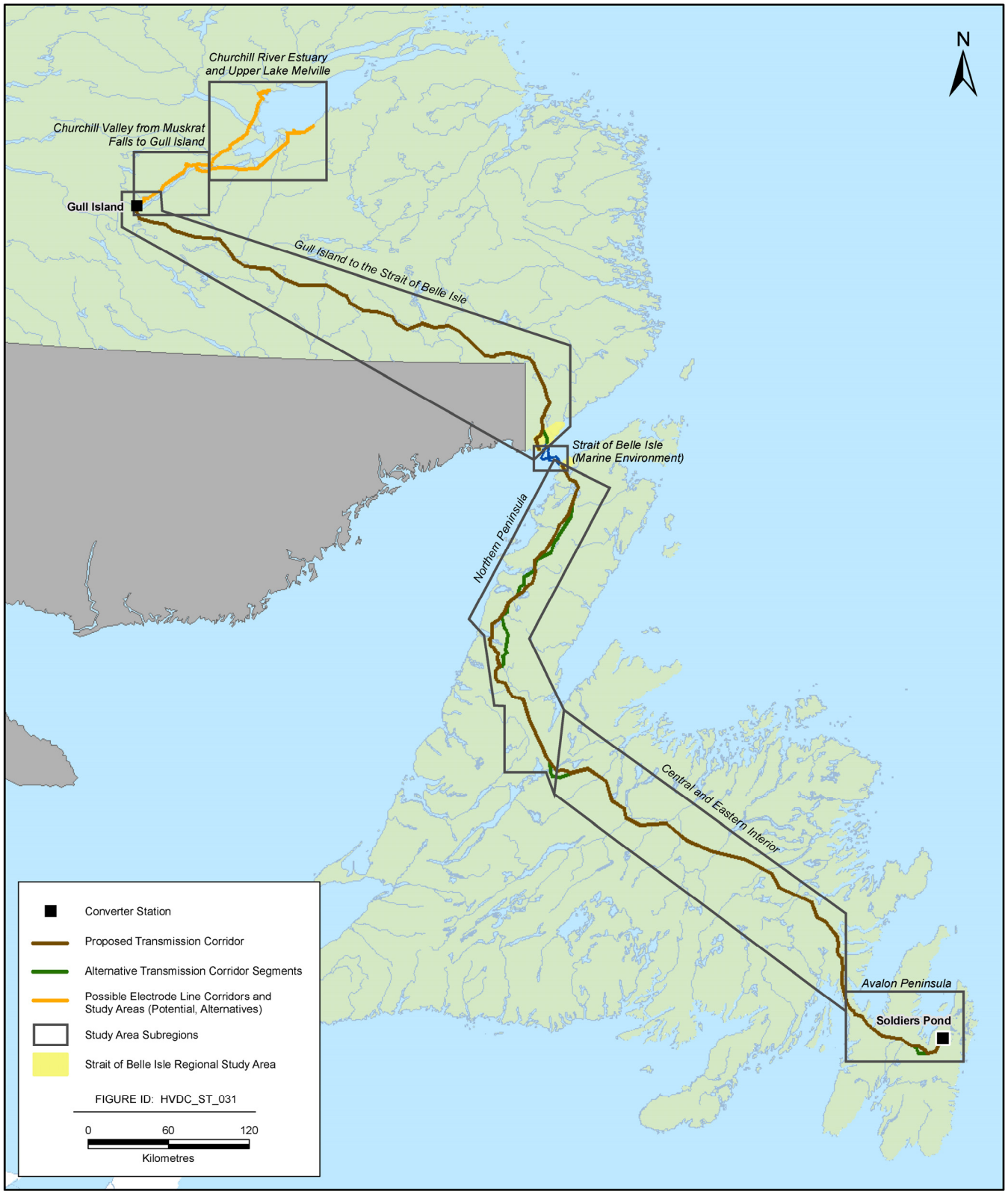
Following a submarine corridor across the Strait, the Study Area extends from a regional area on the Northern Peninsula, south and southeast across the Island of Newfoundland, through the central and eastern interior, to the terminus at Soldiers Pond on the Avalon Peninsula. From there, the Study Area extends along a potential electrode line corridor to Conception Bay.

3.1.1 Labrador Cultural-Historical Overview

Until recently, archaeology in Labrador and northern Quebec has focused primarily on the coast, where research has established that sites are rich and abundant, and the culture-historical sequence long and complex, extending back at least 8,000 years.

The sequence begins with an initial late Palaeo-Indian/early Maritime Archaic Amerindian occupation in the Strait of Belle Isle (McGhee and Tuck 1975). The early Maritime Archaic people gradually spread north along the coast to central and then northern Labrador by 7,500 years before present (BP) (Fitzhugh 1972, 1978a).

Figure 3-1 Study Area Sub-Regions (Labrador and Newfoundland)



After 4,000 BP, coastal Labrador was also populated by Arctic-adapted peoples from the north (Cox 1978), and thereafter, the pre-contact period in Labrador (i.e., the period prior to the arrival of Europeans in North America and contact with Aboriginal people) is characterized by Intermediate Amerindian (Nagle 1978) and Late Pre-contact Amerindian occupations - a people demonstrably ancestral to the modern-day Innu (Fitzhugh 1978b), along with Palaeo-Eskimo peoples (Pre-Dorset, Groswater, Dorset), culminating with the arrival of the Thule, ancestors of the modern Labrador Inuit, approximately 700 BP (Kaplan 1983; Fitzhugh 1994).

After approximately 500 BP, Labrador and the Lower North Shore of Quebec also became the focus for European activities, initially whaling by Basque in the 16th century (Tuck and Grenier 1989), and fishing, sealing and fur-trading by people from other European countries (McAleese 1991; Kennedy 1995).

While the coast has seen detailed investigation, less work has been undertaken in the Labrador interior. Following early research at North West River (Fitzhugh 1972), subsequent surveys and historic resources assessments in Labrador, and extensive surveys in Quebec, have confirmed a series of deep interior occupations, beginning in the Archaic and continuing through the Intermediate and Late Pre-contact periods to the historic Innu occupation of interior Labrador (Denton 1989; McCaffrey 2006; Loring et al. 2003; Schwarz 2004; Nielsen 2005; Loring 2001). Intermediate period occupations are particularly well-represented in the Labrador interior (see Schwarz 2007).

3.1.2 Newfoundland Culture-Historical Overview

Archaeological investigations in Newfoundland, particularly over the last 25 years, have provided a clear, if not yet entirely complete, understanding of the Island's long-term culture history. The initial occupation of the Island appears to have occurred late in the Maritime Archaic period, *ca*. 5,000 BP. Nearby southern Labrador shows clear evidence for occupation much earlier in the Maritime Archaic Period (by *ca*. 8,000 BP), and insular Newfoundland was theoretically habitable by this time as well (Macpherson 1981). The scarcity of evidence for an early Maritime Archaic occupation of the Island (Reader 1996) has yet to be fully explained, though it has been suggested that post-glacial sea level changes may partly account for this (Bell and Renouf 2003).

The Maritime Archaic Amerindian occupation is followed, after a hiatus of several centuries, by an Early Palaeo-Eskimo (Groswater) occupation, dating to *ca*. 3,000 to 2,200 BP. This in turn is followed by a distinct Late Palaeo-Eskimo (Middle Dorset) occupation dating to *ca*. 2,000 to 1,200 BP. Dorset sites in Newfoundland are both larger and more numerous than those of any other period, and although absolute population estimates are impossible to gauge based on current data, the Dorset occupation appears to have been the most extensive and its population levels were probably the highest in the Island's prehistory. Perhaps because of the large size and number of sites, it has proved possible to recognize regional variation in Newfoundland Dorset artifact styles. It has been suggested that the Dorset population of Newfoundland may be divided into at least three distinct regional groups (Robbins 1985, 1986), an intriguing pattern given what is known about residential mobility and fluidity in circumpolar hunter-gatherer bands. While it may have seen the most extensive occupation, the Dorset period was also the briefest, apparently ending by *ca*. 1,000 BP.

The final Recent Amerindian occupation (sometimes referred to as the "Recent Indian", or Late Pre-contact Period) began by at least 1,200 BP (or potentially as early as 2,000 BP; see Hartery 2007), and ended with the historically-documented extinction of the Beothuk early in the 19th century. Beothuk sites of the Early Contact Period (A.D. 1,500 to 1,700) have been identified on the Avalon Peninsula (Gaulton 2001; Gilbert and Reynolds 1989), Bonavista Bay (McLean 1994) and in Notre Dame Bay (Pastore 1992). Later historic Beothuk sites (A.D.

1,700 to 1,829) are limited to the Exploits Valley; the final refuge of the Beothuk prior to their extinction in 1829 (Devereux 1965, 1970; LeBlanc 1973).

The Newfoundland Aboriginal culture-historical sequence is thus a discontinuous one, characterized by repeated human extinctions or abandonment. Culture-processual explanation of this pattern has implicated the simplicity and instability of Newfoundland ecosystems, arguing that ecosystem simplicity on the Island allows little room for variation in hunter-gatherer adaptive responses, while the consequent instability ensures that hunter-gatherer adaptations must inevitably fail (Tuck and Pastore 1985; Schwarz 1994a; Holly 1997).

Detailed data on subsistence would enable a clearer picture of the nature of, and variation in, pre-contact adaptations to the Island. Unfortunately, such information is patchy. There are detailed faunal data on Palaeo-Eskimo winter-spring subsistence on the west coast (e.g., Renouf 1991), and on Recent Amerindian spring-summer activities on the northeast coast (Pastore 1992; McLean 1990), but there are not yet sufficient faunal data to reconstruct complete seasonal rounds for any one region or period. Available settlement pattern data augment the faunal material, and allow a broad reconstruction of subsistence-settlement patterns for each period (Pastore 1986), particularly now that there is evidence related to pre-contact land-use in the interior (Schwarz 1992, 1993, 1994a). Though these schemes doubtless obscure some regional variation (Robbins 1985), reconstruction of adaptations for the Island as a whole suggests that pre-contact adaptations did vary. Recent Amerindian and Maritime Archaic adaptations appear to have been more generalized, with settlement broadly distributed across near-coastal interior, inner coastal and outer coastal zones, while Palaeo-Eskimo subsistence and settlement appears more concentrated in outer coastal settings, suitable for the intensive exploitation of harp seal herds. Maritime Archaic and Recent Amerindian settlement conforms closely to ones that have been predicted to have long-term adaptive success (Rowley-Conway 1990).

It is important to note that most archaeological research on the Island has been concentrated on the coast. This is largely due to the fact that archaeologists have tended to regard the Island's marine resources as rich and stable, in contrast to an interior resource base which is seen as limited, impoverished and prone to periodic and dramatic fluctuations in abundance (Tuck and Pastore 1985). In consequence, archaeologists have tended to concentrate their efforts on investigating coastal sites, assuming that the archaeological potential of the interior is generally low. It has long been recognized that the archaeological potential of one interior region - the Exploits River - has been relatively high, but this has been viewed as exceptional. The historic resources of the Exploits Valley are dominated by the remains of the Beothuk, a people forced into a deep interior caribou-hunting adaptation by spreading European settlement along the coast. Pre-Beothuk remains are relatively scarce along the Exploits. This historic Beothuk interior adaptation, of course, ended ultimately in extinction, and the Beothuk have thus been regarded as the exception that proves the rule; successful hunter-gatherer adaptation to the deep interior is impossible over the long term, and would never have occurred without competition from expanding European settlement (Tuck and Pastore 1985).

In recent years, this view of the Newfoundland interior resource base has been modified somewhat. Investigations on near-coastal interior lakes (Gilbert and Reynolds 1989; Penney 1988a; Schwarz 1992, 1993; Erwin and Holly 2006; Thomson 1987a) have repeatedly yielded evidence for Recent Amerindian, Maritime Archaic and, to a lesser extent, Palaeo-Eskimo occupation, indicating that the archaeological potential of lakes situated less than 30 km from the sea may be quite high. This is consistent with the prediction, made independently by Peter Rowley-Conway, that the near-coastal interior should be the optimal location for hunter-gatherer winter settlement in Newfoundland (Rowley-Conway 1990). The extent and importance of pre-historic incursions into the deep interior reaches of the Island remains to be determined.

Newfoundland has had a long history of European settlement, and historical archaeology in Newfoundland has, not surprisingly, tended to focus on the unusually early European remains. The earliest of course is the Norse site at L'Anse aux Meadows, dated *ca*. 1,000 BP (Ingstad 1969, 1970), a period that archaeologists still generally regard as "pre-historic" in Newfoundland. The intensive European migratory fishery that developed and expanded through the 16th century is well documented by the Basque remains at Red Bay (Tuck and Grenier 1989). The 17th century has recently become a focus of investigation (Gilbert 2000; Tuck 1996). Outside of the Avalon Peninsula, this century is still sparsely documented archaeologically, though there are likely many sites of this period along the coast, pertaining to the English, French and Basque migratory fisheries. Possible 17th century Basque material has been recovered in survey on the west coast (Schwarz 1994b).

The 18th century, a period which saw considerable growth in the resident population of Newfoundland, is well-represented at archaeological sites across the Island (Skanes and Reynolds 1996; Skanes 1997, 2004a, 2004b); perhaps the most relevant to the present Study Area is Lower Sandy Point, a frontier salmon fishing and trapping station in the Bay of Exploits (Schwarz 1995). The 19th century is similarly well represented but this period, like the 20th century, has yet to attract detailed archaeological investigation. As with archaeology of the Pre-contact Period, and for many of the same reasons, research in historic archaeology has been strongly focused on the coast. Historic European activities in the interior, such as trapping (Pastore 1987; Schwarz 1995) and "winterhousing" (Smith 1987), have not been investigated archaeologically.

Previous archaeological research on the Island as a whole therefore indicates some 5,000 years of occupation. Aboriginal occupation occurs in four distinct periods (two of Amerindian affiliation and two of Palaeo-Eskimo), and was demonstrably intensive along the coast. Interior occupation, primarily by Amerindian groups, appears to have been focused on near-coastal interior lakes, particularly those that appear to lie on travel routes leading deeper into the interior. Interior settlement appears to have occurred primarily in autumn and oriented toward intercepting migrating caribou, though fish emerge as a likely important secondary resource. In addition to near-coastal lakes, some settlement clearly occurred along rivers and on lakes in the deep interior as well. Specific locations favoured for settlement include prominent points of land and sheltered, sandy coves. Archaeological evidence for historic European occupation has been concentrated on the coast, particularly in locations that are now long-established towns, or in documented historic fortifications. The remains of isolated fishing premises and abandoned "outports" may occasionally be encountered all along the coast. There is archaeological evidence for 18th century European settlement in inner bay regions, but nothing early has yet been recovered in the interior.

As the transmission corridor traverses almost the entire Island, from the Northern Peninsula to the Avalon Peninsula, a great deal of the research and assessment work undertaken to date is relevant to the current Project and study. However, because much of the corridor generally lies within the less intensively-investigated interior hinterland, a more limited number of archaeological research and assessment projects have actually been undertaken within the corridor itself, and relatively few archaeological sites have been recorded thus far. Most are associated with the Island's major interior waterways.

Prior to the current assessment of the Island portion of the transmission line, the corridor, as it existed in 1998, was subjected to a historic resources overview assessment. Despite the investigation of 38 areas along the corridor, with methods that included aerial overview and photography, foot surveys and limited testpitting, no new sites of cultural significance were identified, and it was concluded from the research that in general the historic resources potential of the corridor was low (Gerald Penney and Associates Ltd. 2002).

Subsequent to that research, a reevaluation of existing data sources, including the Provincial Archaeological Site Record Inventory, updated and revised Project mapping and archaeological, ethnographic, ethnohistoric, historic and theoretical literature, led to the identification of 60 areas within the Island portion of the Study Area for which further field assessment was considered necessary. The available information indicated potential for pre-contact archaeological sites related to various Amerindian and Palaeo-Eskimo groups, as well as historic European settlement from the 16th to the 20th century.

3.1.3 Churchill River Estuary and Upper Lake Melville (Labrador)

Background Research Results: History, Ethnography and Land-use

Though the Innu of Hamilton Inlet were clearly in contact with Europeans by the 17th century and possibly earlier (Zimmerly 1975; Mailhot 1997), the earliest close contact documented specifically for the Churchill River Estuary and Upper Lake Melville sub-area (Figure 3-1) occurred when Louis Fornel established a trading post at North West River in 1743. This post and another on the south side of the river (Mailhot 1997) were operated (with some interruptions) by a series of Quebec-based and English merchants until 1837, when the HBC acquired the properties on both sides of the river. The HBC maintained a monopoly on the fur trade in the area until 1901, when Revillon Freres Trading Company Limited established a competing post on the south side of the river, opposite the HBC post (Zimmerly 1975).

Initially, in the 18th century, and continuing through most of the 19th, the parties involved in the fur trade consisted primarily of European traders on the one hand, and Innu hunters and trappers on the other. However, by the closing years of the 19th century, the Settler population became increasingly involved in the trapping of furs for trade, and by the early 20th century had largely usurped Innu trapping grounds along the Churchill and Naskaupi Rivers and elsewhere (Tanner 1947, 1978; McGee 1961). Innu involvement in the fur trade continued nevertheless, but was rendered increasingly more difficult. Until the settlement period of the 1960s, the Innu camped seasonally in the general vicinity of (or close to) the North West River post(s) to have easier access to trade. For example, a well-known photograph of an Innu camp taken in 1891 by Henry Bryant (reproduced and discussed in McCaffrey et al. 1989) is thought to have been located just above the rapids at the eastern end of Grand Lake. However, some campsites were a considerable distance from the post(s) and situated at locations such as the head of Grand Lake, the mouth of the Kenamu River, the mouth of the Churchill River and Mud Lake (Mailhot 1997).

The shorelines of upper Lake Melville and the Churchill River estuary lie within relatively easy reach of Sheshatshiu (Figure 3-1), even for “minimally active” and “moderately active” community-based harvesters (*sensu* Armitage 1990), and Innu land-use has continued at a high level through the early period of permanent settlement at Sheshatshiu to the present day, despite competition for resources with the growing non-Innu population in the region (Armitage 1990). Local harvesting activities are particularly important in summer and winter, when even the most active harvesters are generally based in the community. Seasonal harvesting occurs all along these shorelines (for a more detailed discussion, see Armitage 1990), though seasonal campsites are particularly associated with certain traditionally-important locations, including: the mouth of the Kenamu River, an important fishing location in both summer and winter; Carter Basin at the mouth of the Kenemich River; Sebaskachu Bay and Mulligan; Mud Lake; and Grand Lake, especially at the rapids between Grand Lake and Little Lake.

Archaeology

The archaeological sequence for south/central Labrador was initially developed by William Fitzhugh, based on his extensive research at North West River and elsewhere in Hamilton Inlet in the late 1960s (Fitzhugh 1972, 1974, 1975, 1977, 1978a, 1978b). This sequence provided the basic culture historical and culture-processual framework for all subsequent archaeological work in Labrador north of the Strait of Belle Isle. As most of the research subsequently undertaken by Fitzhugh and his associates has focused on coastal regions to the north, this remains the definitive sequence for south/central Labrador. Fitzhugh located and excavated sites in many locations in Hamilton Inlet along a lengthy east-west transect stretching from the coast at Groswater Bay to the interior at North West River, and recorded evidence for important differences in the occupation histories of Groswater Bay and North West River. Various sites in Groswater Bay showed evidence for a lengthy occupation by several coastal-adapted Palaeo-Eskimo and Inuit cultures. North West River, on the other hand, had a briefer sequence composed entirely of Amerindian occupations. Some of these groups exploited coastal resources to some degree, but others seemed to be restricted to interior fishing and hunting activities.

The earliest well-defined human occupation in Hamilton Inlet is not actually represented at North West River. Maritime Archaic sites were identified only at the eastern end of Hamilton Inlet, on the northern shore of Groswater Bay. Although Maritime Archaic sites were not identified in the vicinity of North West River, models of Maritime Archaic subsistence settlement systems include hypothesized inner bay settlement in the autumn, and interior hunting camps in winter. Fitzhugh proposed that Maritime Archaic autumn and winter sites could eventually be located at high elevations (>30 m) north and west of North West River in ancient inner bay locations along the present drainages of the Churchill River and Naskaupi River/Grand Lake.

The subsequent Intermediate Period in Labrador (*ca*. 3,500 to 2,000 BP) was best known from sites identified around the present community of North West River at the western end of Hamilton Inlet. These sites exhibited a wide variety of artifact styles and raw material types, leading Fitzhugh to postulate a series of discrete, sequential occupations. Subsequent work on the north-central coast led Nagle (1978) to collapse these into a single culture-historical unit (the Saunders Complex - see also Loring 1983, 1989), which may have some utility on the coast, although this scheme appears too simple to encompass the complexity of the North West River collections. These Intermediate occupations are broadly contemporary with the Pre-Dorset, Groswater and Early Dorset Palaeo-Eskimo occupation of the coast.

The Intermediate Amerindian period in Labrador is followed by the late pre-contact Point Revenge Complex originally dated to after 1,000 BP. As with the Intermediate Period complexes, Point Revenge has since been recognized as a widespread culture-historical unit, with numerous sites identified in coastal and interior regions. More recently, work on the north-central coast of Labrador has led Loring (1989) to define the early, late pre-contact Daniel Rattle Complex, which dates to *ca*. 1,800 to 1,000 BP. These late pre-contact occupations are broadly contemporary with the Middle and Late Dorset Palaeo-Eskimo occupation of the coast and, toward the end of the sequence, with the earliest sites of the Neo-Eskimo Tradition.

Sites dating to the protohistoric and early historic period in central Labrador were, and still remain, elusive, but later historic Aboriginal sites were noted by Fitzhugh; historic Inuit sites (the Ivuktoke Phase) appear to be restricted to the eastern portions of Hamilton Inlet, while historic Innu sites (the Sesacit Phase) are concentrated around the western end of Lake Melville and the neighbouring river valleys (Fitzhugh 1972).

The historic Settler period in the area is represented by the present-day community at North West River. From 1743, European traders, first the French and later employees of the HBC, were drawn to this location to obtain

furs from the Innu, who had travelled to the area each summer for millennia. By the beginning of the 20th century, both Innu and Settlers were involved in trapping for furs to trade at the post.

Since the 1960s, development within the community of North West River has severely affected the archaeological resources there, and many of the site components investigated by Fitzhugh appear to have been obliterated by road and/or house construction. However, some additional research conducted in the area has yielded positive results (i.e., Thomson 1987b; Penney 1988b, 2002a, 2002b; Schwarz and Schwarz 1997; IEDE/Jacques Whitford 1999). More recently, archaeological work in the North West River area has extended to the community of Sheshatshiu, revealing rich archaeological resources on this side of the river as well (Jacques Whitford 2000b; IELP 2003; Schwarz 2004). As at North West River, these are found on former marine terraces, at elevations of 14 to 38 m asl.

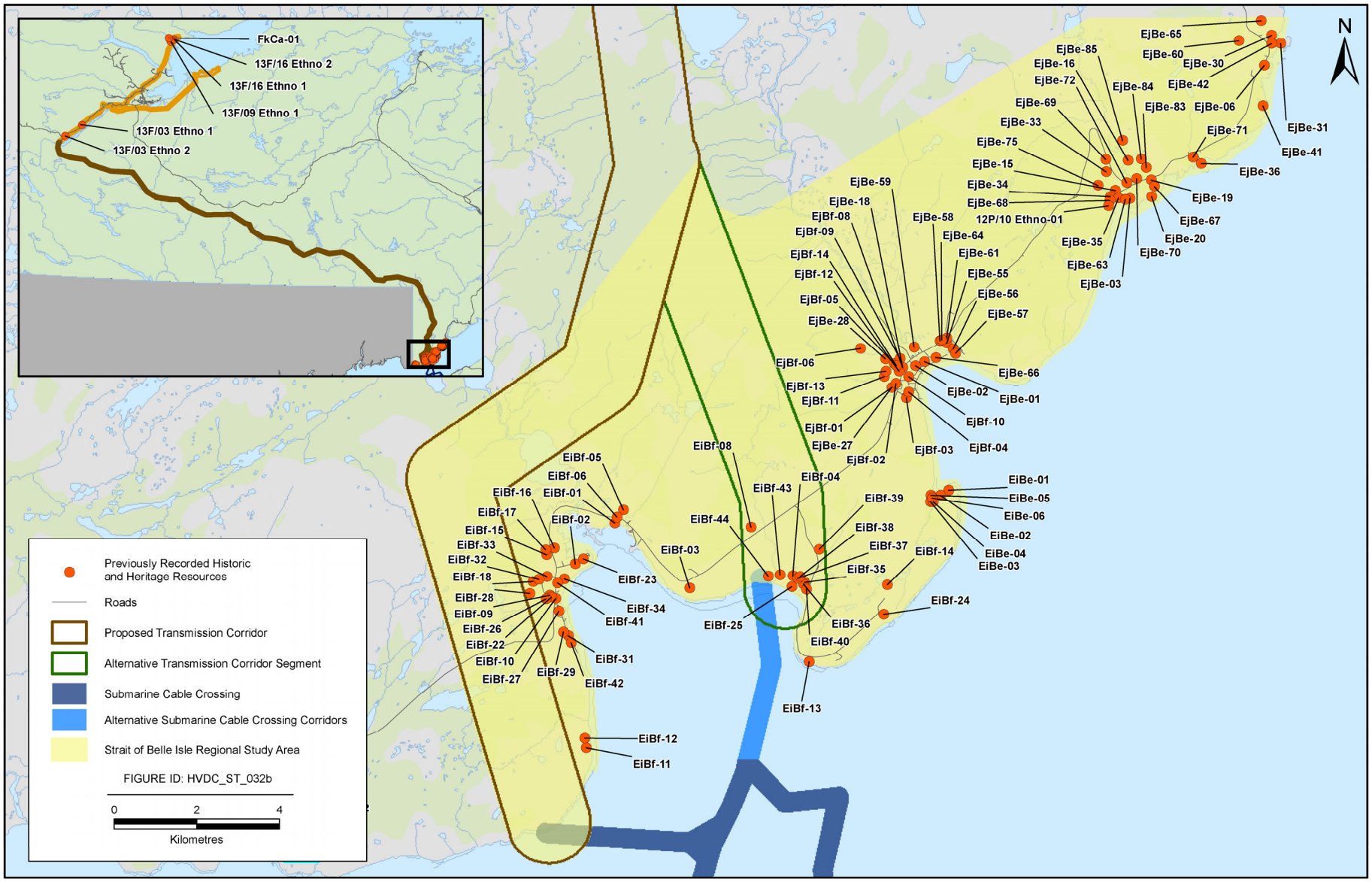
Various phases of research related to the Lower Churchill Hydroelectric Generation Project, especially in the 1998 (IEDE/Jacques Whitford 2000), led to the identification of 41 sites, including nine registered archaeological sites, in the Churchill River estuary and the upper Lake Melville area, including a cluster of four Intermediate-Period sites at former river mouth terraces near Happy Valley, and two pre-contact sites on high-elevation terraces between Mud Lake and Muldoon Point. One of the latter dates to the Intermediate Period, but the other, on the highest 60 m terrace, yielded a diagnostic stemmed Ramah chert point base which represents the first evidence yet found for Maritime Archaic occupation in upper Lake Melville.

A number of smaller historic resources research projects in the lower Churchill River valley and upper Lake Melville were undertaken at approximately the same time as the Lower Churchill Hydroelectric Generation Project assessments in the late 1990s and in subsequent years. Two of the cluster of Intermediate-Period sites identified during the 1998 Lower Churchill Hydroelectric Generation Project assessment near Happy Valley have since been excavated and another small site recorded (Neilsen 2004, 2005). An additional small pre-contact site was recently recorded during impact assessment in the same general area (Erwin 2005). In addition, a brief reconnaissance undertaken for the Department of Canadian Heritage in 1997 (Schwarz 1997a) included some recording at a large historic Innu campsite at the mouth of the Kenamu River, while historic and ethnographic Innu sites have also been identified near the mouth of Sebaskachu River (Thomson 1984).

No submarine archaeological research has taken place in Lake Melville and the overall potential for remains would appear to be low. However, there is one historic aircraft registered for the marine environment - an American B-17 Flying Fortress that crashed in Lake Melville on April 19, 1944, after leaving the airbase at Goose Bay en route to Europe. According to the Archaeological Site Record Form for the site obtained from the PAO, the exact position of the aircraft is unknown. When plotted on Project mapping using the coordinates provided on the Site Record Form, the site falls well outside the Study Area.

Excluding sites recorded during various phases of assessment of the Labrador - Island Transmission Link Project and the Lower Churchill Hydroelectric Generation Project, scores of archaeological and ethnographic sites have been recorded in the Churchill River Estuary and Upper Lake Melville sub-area. The majority of these are clustered in the North West River/Sheshatshiu area. Of the remainder, one archaeological site and three ethnographic sites, all located in Sebaskachu Bay, actually lie within the Study Area (Figure 3-2; Appendix B). In this report, "previously-recorded" sites refer to those recorded in studies unrelated to the Lower Churchill Projects.

Figure 3-2 Previously Recorded Historic and Heritage Resources: Labrador Study Area



3.1.4 Churchill Valley, from Muskrat Falls to Gull Island (Labrador)

Background Research Results: History, Ethnography and Land-use

The early 19th century saw the HBC begin acquiring certain of the King's Posts on the Lower North Shore of Quebec, and also establishing their own post at North West River (for detailed results and references, see IEDE/Jacques Whitford 2000). Gradually, it became clear to the factors that the fur trade had not transformed the Innu into clients of the HBC, but rather, that trapping had simply been incorporated into a traditional way of life in which traditional subsistence activities such as caribou hunting held priority.

Moreover, it became clear that those Innu hunters who operated in the interior ranged widely across Labrador, and were by no means tied to particular trading posts. On the contrary, they could (and did) readily move from one post to another to trade to their best advantage. Deep interior posts like Fort Nascopie (1838 to 1868) and Winokapau Post (1863 to 1874) were established by the HBC in an effort to bring the trade closer to the Innu interior hunting grounds and to intercept trade, which might otherwise go to posts on the Lower North Shore of the St. Lawrence in Quebec and elsewhere.

Neither Fort Nascopie nor Winokapau Post was a great success. Fort Nascopie, for instance, was poorly supplied, and also poorly sited. While it lay on a major Innu travel route, it stood in a location where Innu were not inclined to stay for any great time, in part because of poor local fish and caribou resources (McCaffrey 1989). It is not clear whether Winokapau Post suffered for the same reason. Yet there seems little doubt that Winokapau lay on a travel route known and frequented by the Innu. In fact, Innu guides easily led Père Babel to the post location from Mingan in the summer of 1866, soon after the post first opened (Tremblay 1977).

Three HBC posts were established along the Churchill River, all outposts of the North West River Post: Sandy Banks; Gull Island; and Winokapau. Sandy Banks was the first of the Churchill River outposts to be established, and is the only one of the three to have been situated between Muskrat Falls and Gull Island. It is first mentioned in the North West River Post journals in 1836, though it may have been in use prior to this date. The outpost subsequently remained in use at least until 1875, after which no further reference appears in the journals (see Jacques Whitford/IELP 2001a).

The extensive background research undertaken for the Lower Churchill Hydroelectric Generation Project in 1998 (IEDE/Jacques Whitford 2000) revealed little detailed information on Innu settlement in the Churchill River valley prior to the 19th century. Though the Innu interacted with European traders before this time, these interactions occurred primarily at coastal fur trade posts. The Innu spent most of each year hunting and travelling in the interior, where Europeans appear rarely to have ventured.

In the latter half of the 19th century, as the fur trade reached its peak, the Innu were becoming increasingly drawn into the trade, but by the end of the century, the Innu were abandoning the Churchill River as a primary travel route as more and more Innu chose to travel to the growing mission at Sept-Iles, and either left the Lake Melville area altogether, or came to trade at North West River by other routes. At the same time, Settler trappers from western Lake Melville came increasingly to encroach on the trapping areas along the Churchill River. The causal connection between the decline of Innu settlement on the Churchill and the rise of Settler trapping in the area is not entirely clear. Tanner (1947) indicates that Settler encroachments were driving the Innu from traditional trapping areas, not without conflict. Mailhot's discussion of the issue implies the Innu had other motives for abandoning the Churchill River, and that Settler encroachment was only a consequence (Mailhot 1997). Wherever the truth lies, in the early days of the 20th century, the Churchill River was increasingly

becoming a trapping area, which Settlers from western Lake Melville claimed as their own. Nevertheless, land-use data indicate continued seasonal Innu settlement in various locations along the Churchill River between Muskrat Falls and Gull Lake. One site at Ushkan-shipiss, near the mouth of Upper Brook, is reported to have been the location where the last shaking tent ceremony in Labrador and Quebec took place in the fall of 1969 (Innu Nation 2007).

Archaeology

With the exception of highway-related assessments (e.g., Jacques Whitford 1998b), virtually all the archaeological evidence from the Muskrat Falls to Gull Island sub-area (Figure 3-1) has been recovered in the context of archaeological assessment of the Lower Churchill Hydroelectric Generation Project. Brief initial surveys between 1974 and 1980 for the Lower Churchill Development Corporation (Thurlow and Associates 1974; Tuck 1981) revealed little evidence of historic resources other than a number of trapper's tilts, and a single cluster of pre-contact remains in the vicinity of Muskrat Falls.

Subsequently, between 1998 and 2006, intensive assessment of various components of the Lower Churchill Hydroelectric Generation Project were undertaken along the Churchill River valley. The archaeological assessment focused on the proposed Gull Reservoir between Gull Island and Churchill Falls, but also encompassed the remainder of the river between Gull Island and Lake Melville, along with other generation and transmission facilities.

During assessments between 1998 and 2006, 1,212 testing locations were investigated, with 44,517 testpits being excavated. In all, 308 archaeological and contemporary ethnographic sites were inventoried. The 240 contemporary ethnographic sites included tilts, traps, industrial features and Innu and Settler campsites. The 27 historic components include Innu and Settler campsites and two HBC trading posts. Forty-two pre-contact sites were recorded, 32 of which were situated in the Churchill River valley.

Sixty-five of these sites are located along the Churchill River between Muskrat Falls and Gull Island. These include 19 pre-contact sites, all but one of them dating to the Intermediate period (3,500 to 2,000 BP). Thirteen of these are clustered at Gull Lake and Gull Rapids, and it is hypothesized that this site complex reflects relatively intensive seasonal settlement around Gull Lake at this time, perhaps associated with harvesting waterfowl in spring and fall. Five more Intermediate Period sites form a smaller cluster in the Sandy Banks area, near the mouth of Edward's Brook, and similar site clusters have also been recorded further downstream at Muskrat Falls and another near Happy Valley. These clusters are relatively evenly-spaced some 20 to 25 km apart, possibly equivalent to one day's travel, and the sites at Muskrat Falls and the Sandy Banks area may represent travel stops. Only one Late Pre-contact Period site has been recorded in this area, and it is hypothesized that pre-contact Aboriginal settlement in the Churchill River valley declined considerably after the Intermediate Period.

Five historic sites have been recorded along the Churchill River between Muskrat Falls and Gull Island. A number of tilt sites (i.e., temporary trapper's cabins, typically constructed of ax-hewn logs) are likely associated with Settler trapping along the river, all of which appear to date to the latter portion of the Historic Period (i.e., the first half of the 20th century). Historic Period sites identified to date include the former HBC post at Sandy Banks, one of the three posts established by the company along the Churchill River in the mid to late 19th century.

The high (30 to 100 m asl) dunefield terraces traversed by the Muskrat Falls-Gull Island ac transmission line associated with the Lower Churchill Hydroelectric Generation Project on the north side of the river have yielded only contemporary sites - Innu camps associated with the various access roads constructed in the area since

1970. Terraces at this elevation have theoretical potential to yield very old pre-contact sites (Maritime Archaic Period, older than 4,000 BP), but no such sites have yet been encountered in testing.

Not including sites identified during various phases of the Lower Churchill Hydroelectric Generation Project, only two ethnographic sites were previously recorded for the Churchill River Valley, from Muskrat Falls to Gull Island (Figure 3-2; Appendix B).

3.1.5 Gull Island to the Strait of Belle Isle (Labrador)

Background Research Results: History, Ethnography and Land-use

Innu settlement in the interior was little documented by Europeans, who rarely ventured far from the coast through most of the Contact Period. Several researchers have attempted to characterize and reconstruct historic and pre-contact Innu land-use on the basis of ethnographic evidence. Speck (1931) and Speck and Eiseley (1942) identified a number of Innu bands and band territories and suggested that the various band groups reflected pre-contact patterns of land-use and settlement. Speck (1931) was also interested in the origins and development of individually owned property, identifying a system of family hunting territories, at least in the southern and western forested region. In contrast, research among the southern Innu groups identified colonial economic forces, as instrumental in determining the location of Innu groups (Leacock 1954), with the further implication that Speck's band territories did not reflect pre-contact occupancy. A later model advanced by Tanner (1978) also held that individually-owned hunting territories did not exist. Instead, Innu land-use was organized around separate caribou herds, and hunters and their families moved within the regions of these herds. More recently, Mailhot (1997) presented a model arguing that kinship relations were the determining factor in band movement and access of individual family groups to one hunting region or another. Additionally, Mailhot proposed that hunting groups did not frequent specific areas from one year to the next; rather, their land-use patterns were characterized by considerable (but structured) mobility.

Contemporary land-use data indicate that the Eagle Plateau and the interior hinterland of southeast Labrador is a traditional hunting, fishing, and trapping territory of Innu from Labrador and Quebec, and represents one of the core harvesting zones for the "southern" Innu hunting groups from Sheshatshiu. The Eagle River Plateau comprises not only a harvesting area but a nexus of Innu travel routes linking western Lake Melville, Sandwich Bay and the southeast Labrador Coast, and the Lower North Shore of Quebec (Armitage 1990; Schwarz 1997b).

Innu land-use data pertaining to the 20th century have been collected in some detail (Tanner 1978; Armitage 1990; Mailhot 1997) and are widely available, at least in outline. Tanner, for example, argues that Innu families from Sheshatshiu tended to live in one of five harvesting areas situated to the north, west and south of the community. He notes that families traditionally operating around the headwaters of the Eagle, Kenemich, St. Augustin and St. Paul Rivers tended to trade at a number of coastal locations, principally North West River and St. Augustin and, until the 1940s, Sandwich Bay. Families would travel to the Plateau area via Kenamu River from North West River in August. A favoured travel route led up the Kenamu River as far as Salmon River, ascending the western slopes of the Kenamu Valley to reach the Plateau at Unikush Lake (IELP 2003), though other routes continued along the Kenamu to Little Drunken River. From the Plateau lakes, families could move north into the Mealy Mountains to hunt caribou in fall, and spend the winter dispersed across the Plateau. Some might travel to North West River or St. Augustin for Christmas. Spring saw families gather to fish and hunt waterfowl on the Plateau before returning to the coast in summer. This pattern of land-use continued through the first half of the 20th century, though with more and more time spent on the coast, until the government requirement to keep

children in school at North West River limited family movements to the immediate hinterland of Lake Melville (Mailhot 1997).

In 1973, with the establishment of the Outpost Program, Innu families began travelling seasonally to the Plateau once again, this time by air. Favoured destinations were Latuekupau and the Mistassini area, both lakes suitable for landing floatplanes, and winter/spring were the seasons of most intensive occupation. Innu land-use within south/central Labrador consists of seasonal settlement, oriented primarily toward hunting migratory waterfowl, fishing, and hunting/trapping of small game such as beaver, muskrat, marten and otter (Armitage 1990). Most of the families who use the area come from Sheshatshiu, and access is usually by air from the floatplane base at Otter Creek. However, individuals and families from St. Augustin also harvest game in this area (Deschênes 1983), often travelling through the region by snowmobile.

While Labrador Innu land-use in the Eagle Plateau area is well-documented and (in some cases) available in published form, Quebec Innu land-use in Labrador is more difficult to describe. Even though land-use data have been collected (e.g., Deschênes 1983), for the most part they are not readily available to researchers.

Turning to the southern coastal portion of this sub-area (Figure 3-1), whaling activities by Basque in the 16th century marked the onset of continuous, though seasonal, European presence in southern Labrador (Tuck and Grenier 1989). By the 17th century, a number of factors led to the decline of the Basque whaling and cod fishing operations in the Strait of Belle Isle and the St. Lawrence River, including the local decimation of whale populations in southern Labrador (for a more detailed discussion of the historical background for the Strait of Belle Isle, see IEDE/Jacques Whitford 2000).

French interest in the resources of Labrador began in the late 16th century, with French expansion along the Gulf of St. Lawrence eastward towards Blanc Sablon. The French occupation of much of Labrador took the form of concessions issued by the king granting portions of land to those who carried recommendations from the governors or intendants of the colony (Trudel 1978). The holders of these concessions were entitled to exclusive use of the fishing grounds, including the right to compete with seasonal cod-fishing vessels from France. In addition, they were granted rights to the seal fishery and trade with Aboriginal groups. One of the earliest and largest concessions in Labrador was granted to Augustin Le Gardeur de Courtemanche in 1702 for the coast between the Kegaska River (near Anticosti Island) and Hamilton Inlet (Zimmerly 1975; Kennedy 1995).

With the British conquest of New France in 1760 and the Treaty of Paris signed in 1763, the English took over administration of Labrador. The English expanded their fishing operations and instated a policy of resource exploitation that determined much of the economic and settlement structure of the region. Some of the largest merchant operations on the southern Labrador coast in the period from 1763 to the 1870s originated from the island of Jersey, but other British merchants also began to establish fishing stations in the Strait of Belle Isle and along the Labrador seaboard as far north as Hamilton Inlet.

One of these was George Cartwright, whose detailed journals are a valuable source of information on 18th-century British enterprise in southwestern Labrador and also on relations with the Innu and Inuit in the region; the Inuit presence in the Strait of Belle Isle region is well-documented in European sources, though in historical terms it was relatively short-lived - from the 17th or possibly 16th century to the late 18th century (Trudel 1978; Martijn 1980). The Innu presence clearly began much earlier and continued much later, yet there are few direct references to Innu use of the Study Area pre-dating the 19th century. This is in large part a result of limited European presence in interior Labrador at that time.

Settlement in the 19th century burgeoned along the Strait of Belle Isle. Jersey fish merchants set up large fishing establishments between Bradore and Forteau. Large numbers of American schooners from the Boston region began to frequent the Labrador coast, operating alongside British and Newfoundland vessels involved in the stationary Labrador fishery between Red Bay and Sandwich Bay. The 19th century coastal enterprise in southern Labrador established the settlement patterns still apparent today. In the south coastal area of the Labrador, the descendants of European "livyers" maintained, until at least the 1980s, a pattern of seasonal movement between summer fishing homes along the outer coast and winter trapping homes well upriver from the inner coastal zone (Jackson 1982). In the 1940s, residents of Chateau Bay spent the winter 8 km (5 miles) inland, and further southeast in the Strait of Belle Isle a similar pattern prevailed (Tanner 1947), though resettlement and access to centralized social programs have gradually brought an end to this pattern of land-use (see IELP 2002).

Archaeology

Little archaeological research has been undertaken in the interior upland between Gull Island and the Strait of Belle Isle. In 1997, a brief survey on the Eagle Plateau (Schwarz 1998) focused on the headwater lakes of the Eagle River, some 25 km north of the Study Area. Survey led to the recording of 10 ethnographic sites, Innu campsites on Mistassini Lake and Kameshikamat and an important Intermediate-period pre-contact and historic site, Meshustun 1 (FeBu-01), north of Crooks Lake. Subsequently, overview assessment was undertaken along the corridor of the Trans Labrador Highway (Phase 3) from Happy Valley-Goose Bay to Cartwright Junction (IELP 2002). Assessment encompassed a broad corridor traversing the upper Traverspine and Kenamu Rivers, and the Eagle Plateau. This work led to the identification of 37 archaeological and ethnographic sites, the majority (60 percent) concentrated on Unikush Lake at the western edge of the Eagle Plateau, and on the upper Kenamu River between Pleasure Steady and the mouth of Salmon River. These two areas, which lie on a major traditional Innu travel route from upper Lake Melville to the Eagle Plateau, also yielded the only pre-contact sites in the study. Otherwise, the only other sites recorded in the upland interior of this sub-area are 16 ethnographic sites recorded during assessment of the transmission line corridor itself (Minaskuat 2008a). Many of these lie outside the current corridor and Study Area.

In comparison to the interior, a long tradition of archaeological research along the Strait of Belle Isle has revealed a rich and long-standing human history, beginning with the earliest occupation of the province, by late Palaeo-Indian/Early Archaic hunters. Scores of archaeological sites have been recorded on elevated marine terraces along the Strait of Belle Isle, but there appears to be a clear distinction between the high archaeological potential of the Strait of Belle Isle coastal strip and the generally lower potential of the interior portions of this sub-area. The contrast is partly an artifact of research, since far less research has been conducted in the interior, but it may also reflect a real difference in the relative potential of the coast and the interior in this sub-area.

The earliest archaeological investigations in the Strait of Belle Isle region were conducted by T.G.B. Lloyd (1875) in 1873, A.V. Kidder (1927) in 1910, and A.H. Mallery in 1947 (Harp 1963). The first important research-oriented archaeological investigation in that region was by Elmer Harp in 1949 (Harp 1963), followed by surveys and excavations in 1950 and 1961. Harp recorded 25 sites in the region between Forteau Bay and Pinware Bay, and introduced the idea of a Maritime Archaic culture, outlining its northward spread over time. Harp's identification of Dorset Palaeo-Eskimo material led to the recognition of cultural links with the eastern Arctic and with sites on the Island of Newfoundland, thus expanding the known territorial extent of the Dorset culture.

In the mid-1970s, McGhee and Tuck (1975) followed Harp's results in the southern Labrador region with the partial excavation of 14 sites between Forteau Bay and Pinware Bay. Chief among their contributions was

identification of an Archaic occupation in the Strait of Belle Isle. Their revisit to Harp's previously recorded site of L'Anse Amour led to excavation of a spectacular Archaic Indian burial mound. Radiocarbon dates from L'Anse Amour (*ca*. 7,200 and 6,200 BP) rank among the earliest dates for human occupation in the far Northeast. Following upon McGhee and Tuck's work were site-specific studies that refined the Archaic cultural sequence in southern Labrador (Madden 1976; Renouf 1976, 1977). An extensive survey of the coast of the Strait of Belle Isle from the Québec/Labrador border to Cape Charles was completed in 1986 (Auger and Stopp 1986, 1989). The 1986 survey added 74 new sites to the existing inventory of 67 sites, including additional Maritime Archaic sites, early and late Palaeo-Eskimo sites, Recent Indian material and historic sites. Later test excavation was undertaken at one of these sites, a Late Pre-contact Indian occupation at Overfall Brook 1 (EiBf-11) at Forteau Point (Stopp 2000).

Archaeological investigations not far from the Study Area, along the southwest bank of the Blanc Sablon River on the Québec North Shore (Groison 1985; Taillon and Barré 1987; Pintal 1989), have yielded important data revealing a similar breadth of occupation, ranging from the early Archaic to the late pre-contact period. Palaeo-Eskimo occupation is also documented, particularly in the Groswater period, though evidence of Late Palaeo-eskimo (Middle Dorset) occupation of the North Shore area is virtually nonexistent.

Long-term research relating to the Historic Period began in the late 1970s. A decade of land and underwater excavations were undertaken at the Basque whaling site at Red Bay (Stevens and Waddell 1986; Tuck and Grenier 1989), with occasional surveys for Basque material elsewhere in the Strait of Belle Isle (Vera et al. 1986); there were impact assessment surveys (Keenlyside 1985; McGhee 1989), and Reginald Auger's graduate research on Historic Inuit presence in the Strait of Belle Isle (Auger 1985, Pastore and Auger 1984).

Excluding sites recorded during various phases of assessment of the Lower Churchill Hydroelectric Generation Project, 98 archaeological sites and one ethnographic site have previously been recorded within the Gull Island to the Strait of Belle Isle sub-area. The vast majority of these are clustered within the regional Study Area at the Strait of Belle Isle between Forteau Point and West St. Modeste (Figure 3-2; Appendix B).

3.1.6 Strait of Belle Isle (Marine Environment)

Background Research Results

Based on the known cultural-historical sequence for southern Labrador as described in previous sections of this report, it is evident that the marine environment of the Strait of Belle Isle within and adjacent to the corridors proposed for cable crossings has potential to contain historic resources, most notably shipwrecks. It is equally possible that the foreshore/intertidal zone may also have been used at various points in time during the historic period (i.e., from the 16th century on) for wharfing, processing fish and/or marine mammals (i.e., seals and whales), and for the construction of various types of fisheries-related buildings and structures.

Despite the diverse and long-standing use of the maritime resources of the region, underwater archaeology in the Strait of Belle Isle has been limited to a number of locations on the Labrador side between Chateau Bay and Red Bay situated to the northeast of the proposed cable crossing. By far the majority of research was conducted at Red Bay by Parks Canada's Marine Archaeology Unit during the late 1970s and 1980s. That project in particular focused on the excavation and recording of a number of 16th century Basque whaling vessels (both ships and small boats), as well as several near-shore, underwater features and deposits, including the remains of wooden slipways, wharves, and "cutting-in stations" used for flensing whales, and a number of fishbone deposits resulting from the processing of codfish. Even with the destructive effects of ice, shifting sands and

gravels, and ongoing water erosion, structural remains identified in the marine environment close to shore proved to be in a remarkable state of preservation. Remains recorded in offshore areas were equally well preserved (Tuck and Grenier 1989; Grenier et al. 2007).

Other underwater archaeological research projects conducted along the Lower North Shore of Quebec to the west of the Study Area have also noted similar results (Fitzhugh 2006, 2007). Thus, there is potential for historic resources to be present in the marine environment of the Study Area, particularly in the offshore region of the Strait of Belle Isle.

While no Project-related Historic and Heritage Resources fieldwork was conducted within the marine environment of the Strait of Belle Isle, there are a number of shipwrecks reported for the area (Barron n.d.), several of which are shown to be situated in the general vicinity of the cable crossings (Figure 3-3). However, it is important to note that, unlike known archaeological findings on land, the data used for plotting the marine sites are not considered accurate in the majority of cases, as they are not based on actual sightings and recording of remains. The positions of the shipwrecks were calculated from a database that included degrees only (no minutes or seconds were given), thus their locations are almost certainly off by several kilometres. The information used in developing the database was likely compiled from a review of secondary and other source material, including schematic (and un-scaled) maps and posters, published histories, and general accounts of shipping and the loss of vessels in the region. In summary, the locations for shipwrecks shown on Figure 3-3 must be seen as representational rather than accurate.

Of the marine sites discussed above, only one shipwreck – the *HMS Raleigh* – is registered with the PAO as an archaeological site, and its position is considered accurate (this is a potential Unexploded Ordinance site as well). This known shipwreck, situated at Point Amour, was considered by Nalcor Energy in the eventual identification of the submarine cable corridors across the Strait, which were selected so as avoid this location (Figure 3-3; Appendix B).

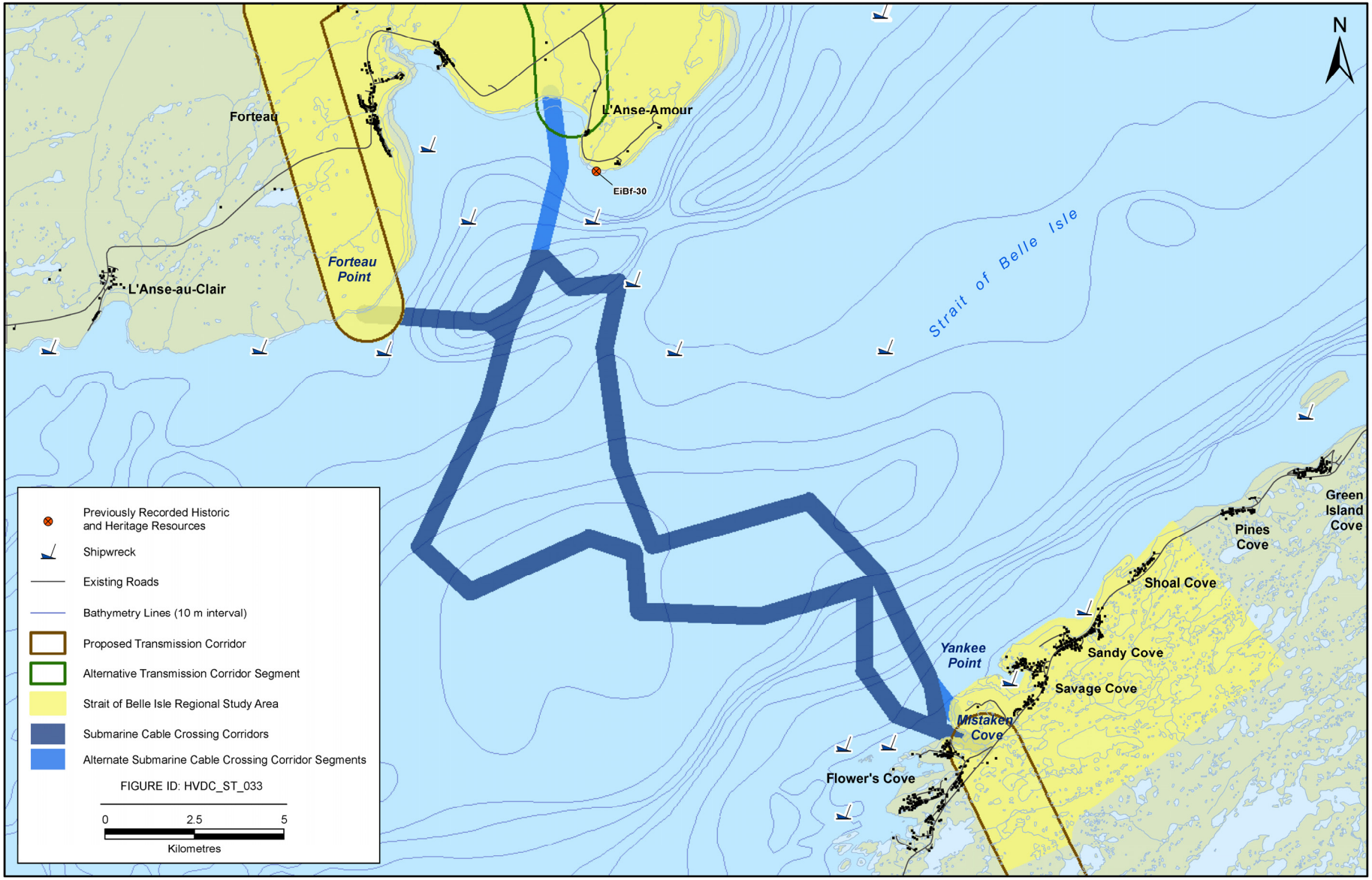
A review of the sonar and underwater video data collected during the 2007 to 2009 marine studies of the Strait of Belle Isle Study Area yielded no evidence of shipwrecks, aircraft, sub-sea installations or any other anthropogenic features in either of the proposed corridors, either in the offshore or near-shore environments.

3.1.7 Northern Peninsula (Newfoundland)

Background Research Results: History, Ethnography and Land-use

The Northern Peninsula sub-area (Figure 3-1) can boast the longest documented history of European occupation in the province, beginning with the brief but very early Norse presence at the northern tip of the Peninsula in the years around 1000 AD (Ingstad 1969, 1970). However, it was not until several centuries later that a more substantial and continual seasonal European presence developed in the region. It is likely that European fishermen were operating off the west coast of Newfoundland at least from the beginning of the 16th century, when they first began to fish around the island. Among the earliest were undoubtedly the Basques, who were whaling at Red Bay and other stations in the Strait of Belle Isle from the 1540s (Barkham 1982).

Figure 3-3 Shipwrecks Reported for the Strait of Belle Isle (Marine Environment)



In all likelihood, Basques were also fishing off the west coast of Newfoundland from this time. However, a review of Basque maps and sailing directions suggests that early Basque activity on the west coast south of the Strait of Belle Isle was overshadowed by the whaling industry to the north, and really only grew in importance after approximately 1590 (Barkham 1989). This may have been related to a progressive decline in the productivity of whaling, and a shift in emphasis from whaling in the Strait in the 16th century to fishing and sealing along the west coast of Newfoundland in the 17th century (Barkham 1989).

By the 18th century, Basque fishing effort appears to have declined, as Basque stations were increasingly taken over by French fishermen (Barkham 1989). French involvement in the west coast fishery may have fluctuated, owing to repeated wars with the English. Through the 18th century, successive treaties, Utrecht in 1713, Paris in 1763, and Versailles in 1783, periodically modified, but always re-affirmed, French treaty rights with respect to their fishery in western Newfoundland. While the French fishery likely declined during periods of war, and grew during periods of peace, it is clear that throughout this period, and beyond, French fishermen did conduct a frequent and extensive seasonal summertime cod fishery from shore stations along the Gulf coast of Newfoundland. At the same time, permanent French settlement began to develop in the region, particularly on the Labrador side of the Strait, but to some extent on the Island side as well. In 1702, Courtmanche was granted the concession for southern Labrador, subsequently sub-divided into further concessions, in which the economic emphasis was not on the cod fishery, but on sealing and the fur trade. From 1712 to 1763, two contrasting patterns of exploitation can be seen in the region: the migratory French cod fishery; and the sedentary Canadian seal fishery (Thornton 1977).

There is evidence that migratory fishermen were in contact with various Aboriginal groups in the region; by 1580 and especially after 1620, Inuit bands were venturing seasonally into the Strait of Belle Isle (Martijn 1980) to acquire European goods by trade or raid. In the early 18th century, both Inuit and Beothuk bands were raiding French premises on the Northern Peninsula, and the former were also trading with Basque fishermen based at Port au Choix (Marshall 1996). However, the Inuit presence was short-lived, and by the end of the 18th century, Inuit voyages this far south had become unusual (Trudel 1978).

However, it was the sedentary sealing and fur-trading posts that had the most intensive contact with Aboriginal groups. Although efforts to integrate the Beothuk into the fur trade seem to have been as unsuccessful here as elsewhere, there is evidence that Innu associated with the Brador post in Labrador ranged as far as Newfoundland to trap furs for trade (Martijn 1989; see also Martijn et al. 2001). While the French may not have "sent" them there, it is nevertheless clear that they encouraged and helped outfit these Innu trappers. Innu trapping on the west coast of Newfoundland continued off and on through the 18th century, and even through the 19th century.

Through the 18th century, the "French Shore" was a zone of contention, with the English expanding into French treaty areas in times of war, and the French returning in peacetime to recover their fishing rights; particularly after the Treaty of Paris ended the Seven Years War in 1763, the French tried to encourage the recovery of the fishery by offering bounties to fishing ships (see Innes 1954). During most of the 18th century, this was a contest between French with treaty rights to fish on the shore and English who argued those rights were not exclusive. However, by the 1770s, a number of permanent English settlers were established along this coast, fishing for salmon in the summer and fur-trapping in the winter (see Innes 1954; Mannion 1977).

Permanent English settlement in the area, initially involving men recruited by West-country English merchants to work on shore stations as caretakers, winter crews and sealers, increased greatly in the mid-19th century (for a detailed review of this process, including the contrasting settlement histories of the Newfoundland and Labrador sides of the Strait, see Thornton 1977). After 1830, these "wintermen" began to settle permanently in the Strait,

hunting seals and trapping for furs in winter, fishing for salmon and working shore stations in the cod fishery in the summer.

Subsequently, the 19th century saw a mixture of conflict and cooperation between an increasing population of English residents and French migratory fishermen. The French fishery grew rapidly in the early 19th century. Encouraged in part by the bounty system, the French developed increasingly intensive fishing methods, including the use of setlines or trawls (see Innes 1954).

Declining yields in the resident salmon fishery after 1840, probably because of over-fishing (Mannion 1977), were thus offset by opportunities in a new herring fishery as French demands for bait for their intensive setline fishery induced local residents to fish herring for a lucrative (and at times illicit) bait trade with the French (Innes 1954; Mannion 1977). By the 1860s, the herring fishery had been transformed into a major commercial enterprise in the Bay of Islands (Mannion 1977). After the 1870s, herring yields began to fluctuate, but in the 1880s lobster, formerly used for bait, became an important commercial species at Port au Port, in the Bay of Islands, in Bonne Bay and at Port au Choix (Mannion 1977). The fortunes of various fisheries thus waxed and waned in series, but the development of additional industries led to an overall growth of settlement in the later 19th century. Lumbering, shipbuilding and, in some cases, mining, became important industries in the last quarter of the 19th century. Not long after the close of the century, in 1904, the termination of French treaty rights on the west coast brought to a close the conflict and cooperation of French and English interests, which had dominated the region's history for nearly 200 years.

Archaeology

Early archaeological research in the Northern Peninsula sub-area focused initially on the pre-contact period. Elmer Harp's investigations in 1949 and 1950 (Harp 1964) established Port au Choix as the site of the province's largest and best-preserved Palaeo-Eskimo site, situated as it is in a strategic location ideal for exploiting the annual harp seal migrations into and out of the Gulf of St. Lawrence. Further work by Tuck (1976b) at Port au Choix in the late 1960s also documented the province's largest and best-preserved mortuary site dating to the Maritime Archaic period. This location clearly supports some of the most important archaeological resources on the island. Subsequent excavations by Renouf (1999b), beginning in the early 1980s, have recovered valuable new data on the nature of the Palaeo-Eskimo occupation of the site, in addition to documenting evidence for nearby occupation in other periods as well. Most recently, investigation of raised terraces in the Port au Choix area has led to the identification of Maritime Archaic habitation sites, at elevations of 6 to 10 m asl, likely associated with the mortuary site excavated by Tuck. Further north, near Plum Point, ongoing investigations have similarly revealed evidence for occupation through the known span of Newfoundland's prehistory, including the Maritime Archaic, Early and Late Palaeo-Eskimo and Recent Indian periods (e.g., Reader 1999; Hartery 2007). None of the research projects associated with these sites have included significant assessment of their interior hinterlands, but near-coastal interior sites have been recovered in small surveys along the Northern Peninsula, on Main River (Carignan 1975), Parson's Pond and Portland Creek Pond (Biggin 1985; Thomson 1987b). Recently, a number of Maritime Archaic Amerindian sites and stray finds have also been reported at elevations comparable to those at Port au Choix at various locations along the west coast of the Northern Peninsula, including Big Brook, Green Island Brook, Bird Cove and River of Ponds (Bell and Renouf 2003).

Historical archaeology in the Northern Peninsula sub-area has a relatively long history as well, beginning with investigations by Helge and Anne-Stine Ingstad and later by Parks Canada at the unique Norse occupation site at

L'Anse au Meadows (Ingstad 1969). In the 1980s, Auger (1989, 1991) excavated historic Inuit sites on both sides of the Strait of Belle Isle and, more recently, field research has been undertaken at early historic French fishing stations on the eastern side of the Northern Peninsula (Pope 2006, 2007). All of these investigations lay at some distance from the Study Area, but they do document historic occupations, which may potentially be represented in closer proximity to the HVdc transmission line corridor. For instance, though historic Basque activities on the Newfoundland side of the Strait have yet to be archaeologically-documented in detail, there is reason to believe that strategic harbours such as Plum Point (formerly known as Old Ferrole), have potential to yield a wealth of new data on this aspect of Newfoundland's history (Jacques Whitford 1993; Thomson 1993, 1995).

It may be noted that a number of small historic resources assessments have also been undertaken in near-coastal and interior settings along the west coast of the Northern Peninsula since 1990, including assessment on Torrent River (McAleese 1992) and Rattle Brook (Jacques Whitford 1997), generally with negative results.

Excluding sites recorded during assessment of the HVdc transmission line, sites previously recorded in the vicinity of the Northern Peninsula sub-area include clusters in the Port au Choix and Bird Cove areas. However, only two archaeological sites, situated along the coastal strip of the Strait of Belle Isle, actually lie within the Project Study Area (Figure 3-4: Appendix B).

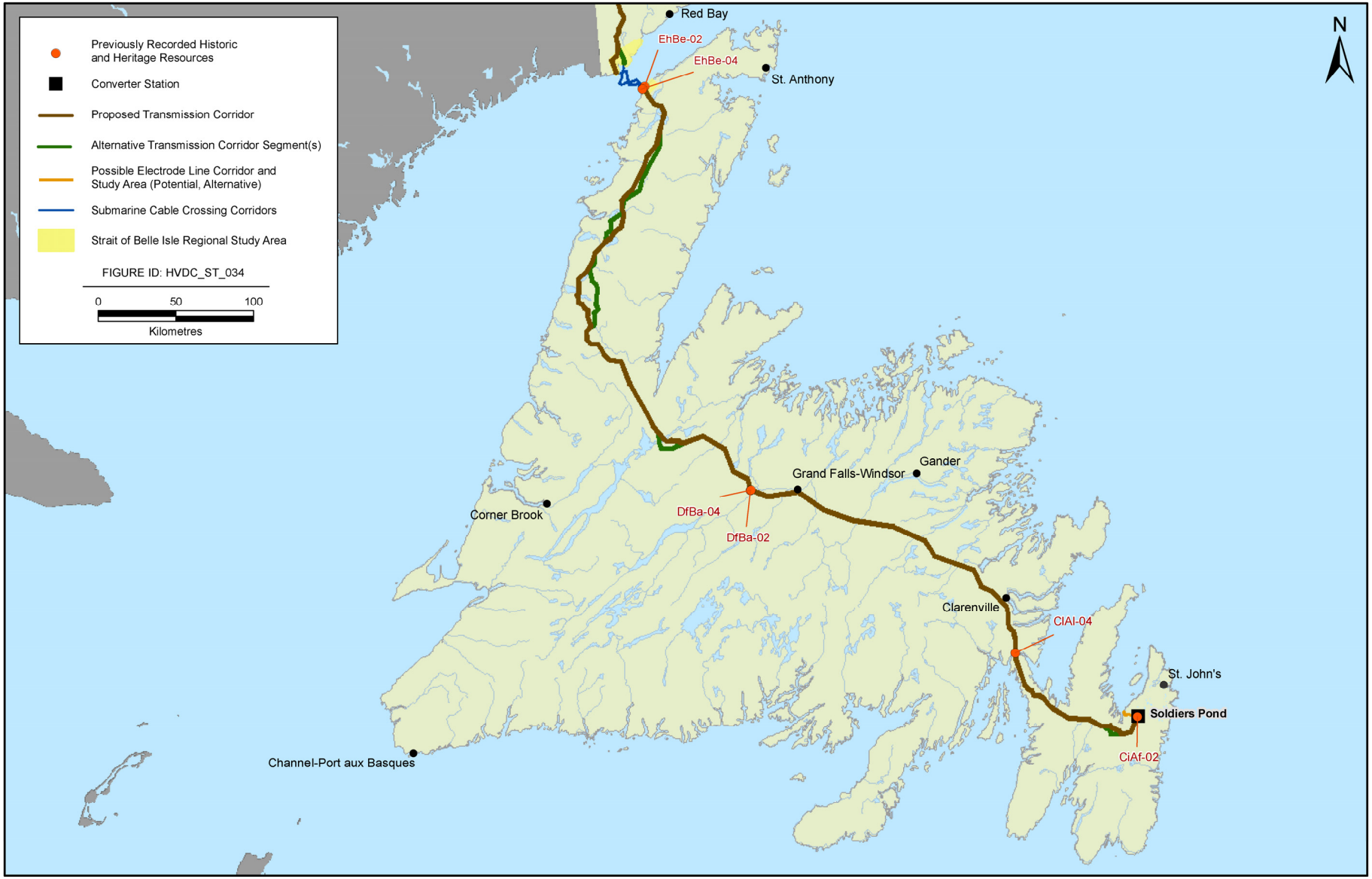
3.1.8 Central and Eastern Interior (Newfoundland)

Background Research Results: History, Ethnography and Land-use

Early European settlement in Newfoundland was initially seasonal, and generally focused on outer coastal islands and headlands well-situated to prosecuting the cod fishery. Such locations are remote from the interior waterways traversed by the transmission line corridor within the Central and Eastern Interior sub-area (Figure 3-1). Although occasional encounters with Beothuk are recorded, these occurred primarily in coastal areas, allowing the Beothuk to continue their patterns of settlement in the interior largely as their ancestors had in the Pre-contact Period. However, by the late 17th century, English fishing centers such as Bonavista and Salvage were developing into year-round settlements (Macpherson 1977), and at least some of the local inhabitants were wintering in the interior (Major 1983; Head 1976).

The 18th century saw increasing European exploitation of inner bays and interior zones of Newfoundland. Among the most important factors initially drawing Europeans to these areas was the development of the salmon fishery (see Taylor 1985). Salmon fishing was well established by 1705, with George Skeffington and James Campbell having salmon fishing premises to the north of Bonavista, at Indian Bay, Dog Bay and Freshwater Bay. Many other such salmon-fishing operations were underway by the 1720s. In 1723, Skeffington was granted sole rights to the salmon fishery in a number of these bays, including Freshwater Bay. Lumbering, trapping and hunting, both commercially and for subsistence, were also became increasingly important winter activities in the 18th century (for the impact of this on the Beothuk, see also Pastore 1987). Since deforestation occurred relatively quickly around the older communities due to logging for household fuel and lumber, people relocated from their coastal homes to cabins in the interior, a practice known as winterhousing in Newfoundland (see Smith 1987; Head 1976). During the 18th century, the expansion of European activity from outer coastal to inner coastal and even interior areas, and increasing encroachment by Mi'kmaq from the south coast (Pastore 1978a, 1978b), appear to have driven the Beothuk to the more westerly interior reaches of the Island.

Figure 3-4 Previously Recorded Historic and Heritage Resources: Newfoundland Study Area



By the 19th century, permanent European settlement in the inner bays intensified as families established seasonal, and eventually, lasting communities, primarily for logging (Feltham 1992). By the end of the 19th century, Mi'kmaq hunters were ranging widely across the Bonavista Bay - Gander Lake hinterland, particularly along the Northwest and Southwest Gander Rivers and Gander Lake (Millais 1907; Pastore 1978a; Skanes 2005).

The Historic Period also saw an expansion of European activity westward from early settlements such as Bonavista. French fishing crews were operating in eastern Notre Dame Bay from the 17th century, and by 1732, permanent European settlement had expanded west along the Newfoundland coastline to encompass offshore islands such as Twillingate, which offered access to rich ground-fish stocks. However, it took several more decades for settlement to spread to deep, sheltered bays such as the Bay of Exploits. The resources that gradually attracted Europeans to these areas were salmon (see Schwarz 1993, 1994), furs and timber, but once there, they encountered as well the native Beothuk inhabitants of the Island, who had retreated in the face of European encroachment to interior refuges such as the Exploits Valley.

Several European expeditions in the late 18th and early 19th centuries, including John Cartwright's expedition up the Exploits in 1768, Buchan's in 1811, and Cormack's travels in the interior in 1822 and 1827 (Howley 1915; Marshall 1996), describe the vestiges of Beothuk settlement along the Exploits River and elsewhere in the western interior hinterland of Notre Dame Bay. However, by the beginning of the 19th century, the Beothuk, denied access to critical coastal food resources and reduced by disease, had already declined in numbers and the captive Shanadithit, the last known Beothuk, died of tuberculosis in St. John's in 1829.

Archaeology

Of the Central and Eastern Interior regions traversed by the transmission line corridor, the Exploits Valley has the longest and most intensive history of archaeological research. Many of the sites pertaining to the final Beothuk occupation of the Exploits were first identified by Don Locke (n.d.), who advanced the hypothesis that Beothuk sites are not merely scattered along the rivercourse, but are in fact concentrated in five discrete sites clusters: Indian Point; Noel Paul's Brook; Red Indian Falls; Badger; and North Angle. Locke argued that these five clusters effectively control the five known or likely crossing points where the river intercepts the principal north-south caribou migration routes.

Since the mid-1960s, professional archaeologists have tended to concentrate their efforts on investigating sites already identified by Locke. The first investigator to follow up on Locke's leads was Devereux, who undertook excavations at the Pope's Point Site in Badger (Devereux 1965) and at Indian Point, on Red Indian Lake (Devereux 1970). At Indian Point, Devereux recovered both structural and artifactual remains pertaining to the Beothuk, and or pre-historic Recent Indian component. Pope's Point yielded Beothuk and Recent Indian material, and also a small Late Palaeo-Eskimo (Dorset) component. In the 1970s, LeBlanc (1973) undertook excavations at the nearly pure historic Beothuk site at Wigwam Brook, the centrepiece of the North Angle site cluster. In addition to historic Beothuk material, LeBlanc collected 16 ground slate fragments, presumably reflecting a small Maritime Archaic Amerindian occupation at the site. Both the Indian Point and Wigwam Brook excavations produced sizeable Beothuk faunal assemblages, analysis of which (Stewart 1971; 1973) indicated prolonged seasonal occupation at these sites (see Rowley-Conway 1990), and a clear emphasis on caribou hunting.

Subsequent surveys included a very cursory survey of Victoria Lake and the Lloyd's River system (Madden 1975), and a survey of western Notre Dame Bay (Penney 1988b) also recovered one pre-contact site in the interior north of the Exploits Valley. A canoe-based survey of the Exploits River conducted in 1982 revisited the major

site clusters, including the group of Beothuk sites in the Badger area (Thomson 1983). A comprehensive survey of the entire length of the main stem of the Exploits River (Schwarz 1993) identified a number of generally small pre-contact sites within and between the known Beothuk site clusters. The nearest site cluster to the transmission line corridor is the large site complex in the Badger area. This complex includes the multi-component site at Pope's Point (Devereux 1965; Schwarz 1993), as well as a smaller pre-contact site on the opposite bank of the Exploits, and pre-contact (and Beothuk or possibly historic Mi'kmaq occupations) at the mouth of Little Red Indian Brook (Locke n.d., Schwarz 1993). Two of the three sites on Two Mile Island (Thomson 1983) lie within the corridor.

Recent investigations on Birchy Lake, in close proximity to the transmission line corridor, have recovered evidence for significant pre-contact settlement. The six new sites that have been found revealed mostly-deflated cultural deposits of Maritime Archaic, Groswater Palaeo-Eskimo and late pre-contact Beaches Complex origin (Erwin and Holly 2006; Holly and Erwin 2008).

In the interior hinterland of Bonavista Bay, the most important previous archaeological research was a survey of Gambo Pond in the late 1980s, which yielded 18 pre-contact sites, four of which were excavated (Schwarz 1992, 1994a). This research revealed extensive Recent Indian use of the near-coastal hinterland, with less extensive settlement occurring in the Maritime Archaic and Palaeo-Eskimo periods. The results of this survey verified predictions that pre-contact settlement patterns in Newfoundland should include significant occupation in the near-coastal interior, within reach of both marine and terrestrial game resources (Rowley-Conway 1990; Holly 1997). The transmission line corridor crosses Triton Brook approximately 15 km west of the largest of the Gambo Pond sites, Triton Brook 1 (DdAp-02). This same survey recovered a single lithic stray find on Terra Nova Lake.

In addition, a number of smaller assessments and surveys have been conducted in various locations between the Exploits River and Port Blandford (e.g., Renouf 1992; Schwarz 2005; Skanes 2005). In the Gander River drainage, one pre-contact (Palaeo-Eskimo) site has been recorded on the Gander River below Gander Lake (Pastore and Evans 1979), and an historic Mi'kmaq site near Middle Ridge was excavated in 1982 (Penney and Nicol 1984).

Excluding sites recorded during assessment of the HVdc transmission line discussed below, sites have previously been recorded in several locations in general proximity to the Central and Eastern Interior sub-area of the HVdc transmission line corridor, most notably at Birchy Lake, the Exploits River and Gambo Pond. Of these, only two archaeological sites actually lie within the Study Area corridor, both situated in the Badger area on Two Mile Island (Figure 3-4; Appendix B).

3.1.9 Avalon Peninsula (Newfoundland)

Background Research Results: History, Ethnography and Land Use

The Avalon Peninsula sub-area (Figure 3-1) was probably the first region of the Island to see a sustained presence by Europeans, which sources indicate was well underway by the mid-16th century (Prowse 1972). The early fishery was seasonal and focused on cod, and by the close of the century, the English had made substantial gains on the French, Portuguese and Spanish fisheries that had preceded them (Cell 1969). Typically, fishing vessels would arrive in Newfoundland in May (or earlier) and remain until as late as October, when they would depart with a cargo of dried fish. Because the English fishery was largely shore-based, with efforts focused on a lightly salted and sun-dried product, access to beaches and the near-shore environment was essential for

construction of wharves, stages, fish drying flakes, "cookrooms" and rough-made accommodations. Periodic over-wintering by fishers for purposes of maintaining and constructing fisheries infrastructure almost certainly occurred at that time, and encounters with Aboriginal people did take place. Nevertheless, reference to contact during the 16th century in the general vicinity of the Study Area is limited to a single event in Placentia Bay in 1594 (in this case, an indirect contact assumed to be Aboriginal), when the crew of the English vessel *Grace*, after having constructed stages and successfully fishing for a period of time, found that the moorings of their two pinnaces and ship's boat had been cut during the night. Assuming the worst, the captain elected to depart the area (Marshall 1996).

In the 17th century, as the fishery grew and use of east coast of the Island expanded considerably, several attempts were made at permanent settlement on the Avalon Peninsula: notably at Cupids in Trinity Bay in 1610 and at Ferryland south of St. John's in 1621. After *ca.* 1620, the English effectively controlled the coast of the Peninsula from Renews north, with the French concentrating their activities in Trepassey, St. Mary's and Placentia Bays. To protect their interests in the region, the French established a garrison at Placentia in the 1660s, and the English constructed fortifications at St. John's and at a number of other east coast locations. While references from the 17th century to Beothuk use of the isthmus of the Avalon Peninsula in the vicinity of the Study Area are rare, they do include a 1612 statement by John Guy, Governor of the newly-founded English settlement at Cupids, that Beothuk from Trinity Bay were in the practice of travelling overland to Placentia Bay to catch salmon in the Come By Chance River, a distance (at the northern end of the isthmus) of only 3 to 4 km. Also from that time, Guy described a Beothuk camp on the western shoreline of Dildo Pond in the present community of Blaketown. The southern portion of that pond is within 2 km of the current HVdv transmission line corridor.

Other early 17th century references to Aboriginal people in the area include mention of camps at Dildo South, Stock Cove and Great Mosquito Cove in Bull Arm, and at Sunnyside at the bottom Trinity Bay. Other historical records suggest that Beothuk encampments may also have been situated at Hopeall and in the vicinity of Heart's Ease (Marshall 1996).

At the end of the 17th century, during the 1696-97 campaign against the English settlements on the east coast of the Island, French troops and mainland Indian allies reportedly crossed the isthmus of Avalon from Placentia Bay to Trinity Bay, hauling boats and supplies acquired from the French capital at Placentia (Plaisance). Also during that conflict, Pierre Le Moyne d'Iberville, advancing north along the east from St. John's, eventually occupied Frenchman's Island at the bottom of Trinity Bay for a brief period, where he reportedly held in temporary holding cells, English fisherman and families (Williams 1987). Frenchman's Island is situated approximately 500 m to the north of the HVdc transmission corridor.

The late 17th and early 18th centuries saw an increase in permanent settlement of the Avalon Peninsula and along the east coast of the Island of Newfoundland generally, and it was a time when the English migratory fishery reached its peak in production, employment and economic benefits. It eventually expanded to a point where it exceeded the French fishery, which up to that time had been the larger of the two. The reasons for the increase in English activities are complex and multifaceted, but in part are due to the terms outlined in the Treaty of Utrecht in 1713, which forced the French from most of the Island of Newfoundland, providing considerable opportunities for expansion by English fishers (Matthews 1988).

By 1836, there were approximately 53,000 people on the Avalon Peninsula and by the end of the century the population had surpassed the 100,000 mark. Settlement within the bays of the Peninsula adjacent to the Study

Area had grown, which undoubtedly resulted in an increased use of the interior hinterland for winterhousing and for the procurement of food, furs and timber resources. Also in the mid-19th century, as communication with the outside world improved, a telegraph house to intercept trans-Atlantic messages by means of a sub-marine cable was erected at the bottom of Bull Arm in Trinity Bay, in a wooded area approximately one km from the shoreline and within the current HVdc transmission line corridor. Used for only a brief period in the late 1850s, the two buildings at the site were eventually abandoned and gradually fell into a state of disrepair (Rowe 2008). Remains of the structures are currently visible and are registered with the PAO as an archaeological site.

Archaeology

Along the Isthmus of Avalon, the HVdc transmission line corridor closely tracks the shorelines of both Trinity and Placentia Bays, although only one archaeological site is registered for the corridor. The site, situated to the east of the Trans-Canada Highway and west of the community of Sunnyside, at one time consisted of two buildings constructed as a trans-Atlantic cable station, which was apparently used briefly during the 1850s. To date, no systematic research or recording of the remains has been conducted; however, the site has been subject to some preliminary surface recording by personnel from the PAO (Photo 3).

Photo 3: Remains of Stone Foundation at Cable Station

Archaeological research in the adjacent coastal areas has yielded numerous other sites, and some of these have seen systematic investigation, notably at Frenchman's Island, Stock Cove and at Great Mosquito Cove in Bull Arm (Evans 1981; Robbins 1985; Gilbert and Reynolds 1989; LeDrew, Fudge and Associates 1990; Gilbert 1996a, 1996b, 1996c). At least one pre-contact site is known to exist in the isthmus interior (Gilbert 2002).

To the southeast of the isthmus, at least two pre-contact sites are known for the interior portion of the Avalon Peninsula (Tuck 1979), one of which is situated within the HVdc transmission line corridor at Soldiers Pond near the beginning of the potential electrode line corridor to Conception Bay. The site, which yielded a single, expanding-stemmed projectile point of possible Maritime Archaic Amerindian origin, was identified by Geologist Wade Neale in the late 1960s on a small island on the southeast side of the pond. Despite an attempt to locate other associated remains (Gerald Penney and Associates Ltd. 2002), none have been recorded. The second pre-contact site reported for the interior of the Avalon Peninsula is situated on Thomas Pond to the northeast of Soldiers Pond, where a patinated biface was located in 1994 (Gerald Penney and Associates Ltd. 2002).

No archaeological research has been undertaken in the marine environment of Conception Bay. Since the shoreline has seen considerable disturbance and alterations due to previous industrial development, the potential for *in situ* archaeological remains to be situated in the marine environment is considered low.

Prior to assessment of the current Project, sites had previously been recorded in several locations in general proximity to the Avalon Peninsula sub-area of the HVdc transmission line corridor. Notable site clusters include Bull Arm and the head of Trinity Bay, including Dildo Pond. Only two sites, the Maritime Archaic Amerindian

lithic find at Soldier's Pond and the Bay Bulls Arm Telegraph Station near Sunnyside, lie within the Study Area (Figure 3-4; Appendix B).

3.2 Archaeological Resources: Field Study Results

3.2.1 Study Area Overview

Archaeological field studies relevant to the assessment of the Study Area from Gull Island in Labrador to Soldiers Pond on the Avalon Peninsula, and the potential electrode lines from Gull Island to Lake Melville via Muskrat Falls and from Soldiers Pond to Conception Bay, were undertaken over a period of 12 years, from 1998 to 2009.

A large portion of the assessment effort was undertaken in 1998. The 1998 workscope encompassed the full range of the generation project and transmission corridor options in Labrador and included assessment of the then-current transmission line corridor from Gull Island to the Strait of Belle Isle, the proposed Gull Island and Muskrat Falls reservoir areas, and extended to include the Churchill River estuary as far east as Happy Valley-Goose Bay and the Mud Lake area.

Field studies in 2000 were more focused on particular project elements, including some limited fieldwork in the Churchill River estuary. However, the work most relevant to the Project was the assessment of various project features north of Gull Lake. Field studies in 2006 were similarly more focused, and a large field-testing program was undertaken along a (somewhat redefined) transmission line corridor between Gull Island and the Strait of Belle Isle. In addition, assessment was conducted along the interconnecting transmission line between Gull Island and Muskrat Falls, included as a component of the Lower Churchill Hydroelectric Generation Project.

Field research in 2008 included limited assessment of the eastern extremes of the electrode line options in upper Lake Melville, and most importantly, focused on extending assessment to include the Newfoundland portion of the transmission line, from the Strait of Belle Isle to Soldiers Pond.

In 2009, Project-related Historic and Heritage Resources research was conducted at specific geotechnical drill sites on both sides of the Strait of Belle Isle.

In terms of their relevance, these field studies may be classified into three groups.

- Field studies targeted specifically at the current definition of the Study Area; this includes the 2008 field assessment on the Island of Newfoundland, and parts of the 1998 and 2006 field studies of the corridor from Gull Island to the Strait of Belle Isle in Labrador (IEDE/Jacques Whitford 2000; Minaskuat Inc. 2008a).
- Field studies targeted at previously-defined transmission line corridors that diverged to a greater or lesser extent from the current route; this includes parts of the 1998 and 2006 field studies of the corridor from Gull Island to the Strait of Belle Isle (IEDE/Jacques Whitford 2000; Minaskuat Inc. 2008a).
- Field studies focused on the Lower Churchill Hydroelectric Generation Project that happen to include testing locations lying within or in close proximity to the current transmission line corridor; this includes parts of the 1998 and 2000 assessment of the Muskrat Falls Reservoir, Churchill River Estuary and upper Lake Melville, parts of the 2000 assessment of project features in the Gull Lake area, and all of the 2006 field assessment of the proposed interconnecting transmission line corridor between Muskrat Falls and Gull Island (IEDE/Jacques Whitford 2000; Jacques Whitford/IELP 2001c; Minaskuat Inc. 2008a, 2008b).

- Field studies focussed at specific site locations where Project, geotechnical activities would occur; this includes the field research completed on both sides of the Strait of Belle Isle in 2009 (Stantec 2009, 2010).

These field studies (notably those described in bullets two and three above, and to some extent, bullet four), included assessment of testing locations situated outside the Study Area. Such outside testing locations are nevertheless relevant, particularly in development of archaeological potential mapping (see Section 3.3), because they sample zones or Zone Types comparable to those found within the Study Area, and including them in the assessment effectively increases the sample size for all archaeological potential Zone Types.

Including all relevant results, both within and outside the Project Study Area, field assessment of the proposed transmission and electrode line corridors and the regional Study Areas on either side of the Strait of Belle Isle, included investigation of 457 locations. Of these, 21 were assessed from the air only, and 436 were assessed on the ground. Of those assessed on the ground, 119 were investigated by visual inspection alone, while 15,095 testpits were excavated at the remaining 317 testing locations, for an average of 48 testpits per sub-surface testing location.

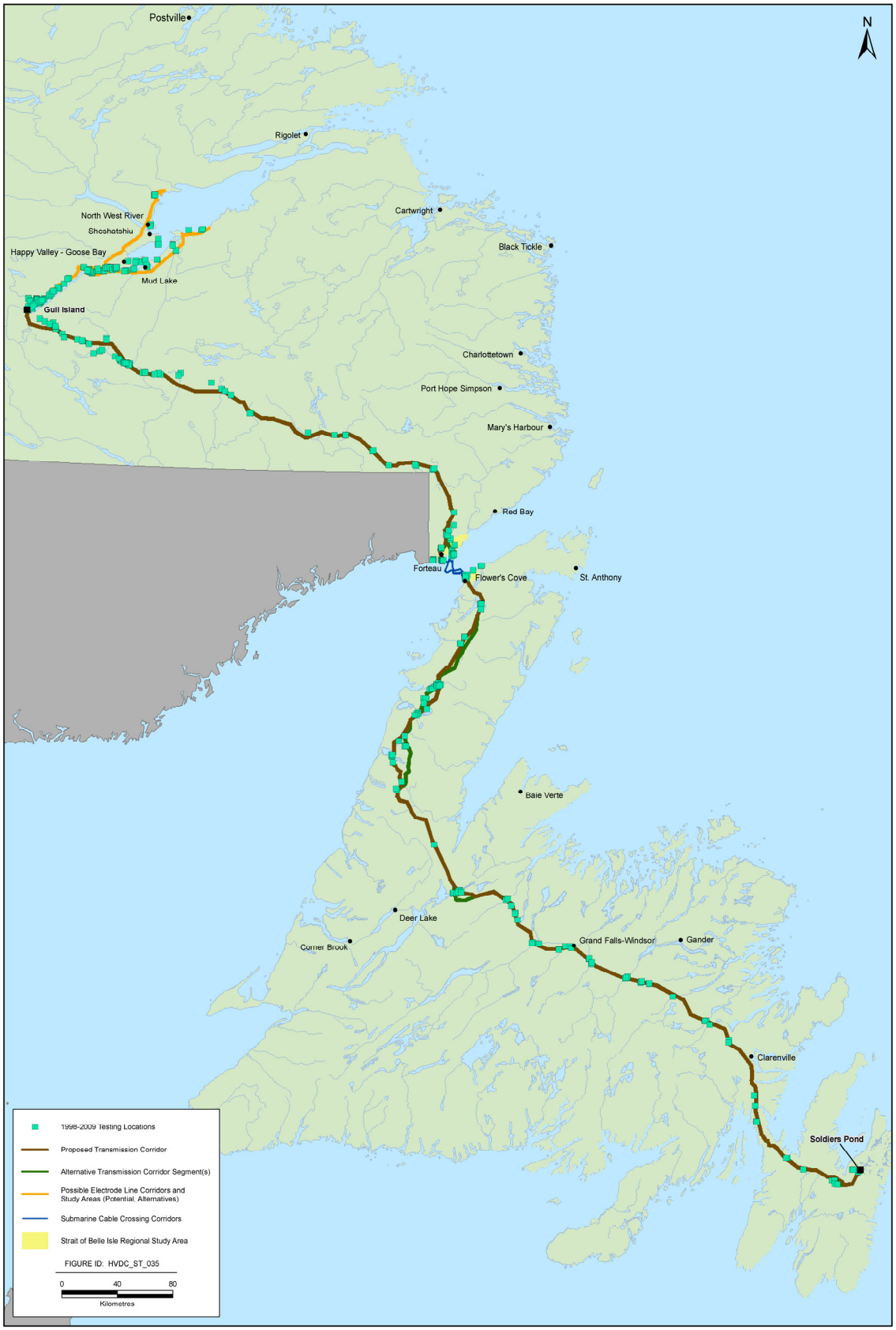
Considering only those testing locations that lie within the transmission corridor or are close enough to be directly linked to a mapped archaeological potential zone, the total number of testing locations is 312, of which 20 were assessed from the air only, and 292 the ground. Of these, 78 were investigated by visual inspection alone, while 7,496 testpits were excavated at the remaining 214 testing locations, for an average of 35 testpits per sub-surface testing location.

The distribution of assessment effort (excluding aerial inspection) within the corridors across the entire Study Area is summarized in Table 3-1 and shown on Figure 3-5 and in Appendix C.

Table 3-1 Summary of Archaeological Ground Testing Effort for All Study Area Sub-Regions

	Number of Testing Locations	Percentage of Total Testing Locations per Sub-area	Number of Testing Locations Investigated by means of Surface Inspection	Number of Testing Locations Investigated by means of Sub-Surface Testing	Percentage of Total Testing Locations Investigated by Means of Sub-Surface Testing	Number of Testpits per Sub-area	Average Number of Testpits per Sub-Surface Testing Location
Churchill River Estuary & Upper Lake Melville (Labrador)	31	10.6	15	16	51.6	549	34.3
Muskrat to Gull Island (Labrador)	52	17.8	12	40	76.9	2,318	57.9
Gull Island to Strait of Belle Isle (Labrador)	72	24.7	12	60	83.3	3,249	54.1
Northern Peninsula (Newfoundland)	59	20.2	12	47	79.7	662	15.3
Central and Eastern (Newfoundland)	62	21.2	16	46	74.2	689	15.0
Avalon Peninsula (Newfoundland)	16	5.5	11	5	31.3	29	5.8
TOTAL	**292**	**100**	**78**	**214**	**73.3**	**7,496**	**35**

Figure 3-5 1998 to 2009 Testing Locations, Labrador – Island Transmission Link



Assessment effort has been greatest in Labrador, since the Study Area in that portion of the province has been directly or indirectly assessed over a period of 11 years, from 1998 to 2009, while Newfoundland portions of the corridor were investigated mainly in 2008, with limited research on the Northern Peninsula in 2009 (Stantec 2009, 2010). However, since the bulk of the Newfoundland field study was conducted relatively recently, a greater proportion of testing locations on the Island lie directly within the presently-defined Study Area. As a result, assessment effort is actually fairly evenly distributed along the corridor except on the Avalon Peninsula, with approximately 53 percent of testing locations located within Labrador sub-areas and the remainder on the Island. Sub-surface testing was the prevalent assessment method in all sub-areas except for the Avalon Peninsula, where fewer areas are amenable to testpitting due to the nature of the terrain. The average number of testpits per testing location is significantly higher in Labrador than on the Island, reflecting the abundance of extensive and well-preserved (and easily testable) marine and riverine terrace systems found there.

Field assessment results are described in more detail for each sub-area in the following sections.

3.2.2 Field Study Results: Churchill River Estuary and Upper Lake Melville (Labrador)

The Churchill River Estuary and Upper Lake Melville sub-area includes the possible (alternative) electrode line corridors leading east from Muskrat Falls. From there, two electrode line options lead to upper Lake Melville. One runs north of the Churchill River estuary, then turning north to cross Goose River, the Grand Lake narrows and the Sebaskachu River to a point east of Sebaskachu Bay. The other runs south of the estuary, crossing the Traverspine, Kenamu and Kenemich Rivers, to terminate on the Lake Melville shoreline just east of Rabbit Point.

As defined for the present study, the western limit of this sub-area lies immediately below Muskrat Falls. Although this sub-area has seen a relatively high level of assessment, this is the sub-area with the smallest percentage of testing locations actually found within the Study Area. This is because roughly 75 percent of the fieldwork here was conducted in 1998, while the electrode line corridors were only defined in 2008. Most of the field assessment here has been focused more on collecting baseline data along the shoreline to contribute to assessment of possible downstream impacts from the power generation project, and it is simply fortuitous that some of these testing locations happen to lie within or close to the electrode line corridors.

Considering only those testing locations that lie within the corridor, or close enough to be directly linked to a mapped archaeological potential zone, 31 testing locations have been assessed in this sub-area, of which one was assessed solely from the air, and 30 on the ground. Of these, 15 were investigated by visual inspection alone. A total of 549 testpits were excavated at the remaining 16 testing locations, for an average of 34.3 testpits per sub-surface testing location, which is close to the Project-wide average.

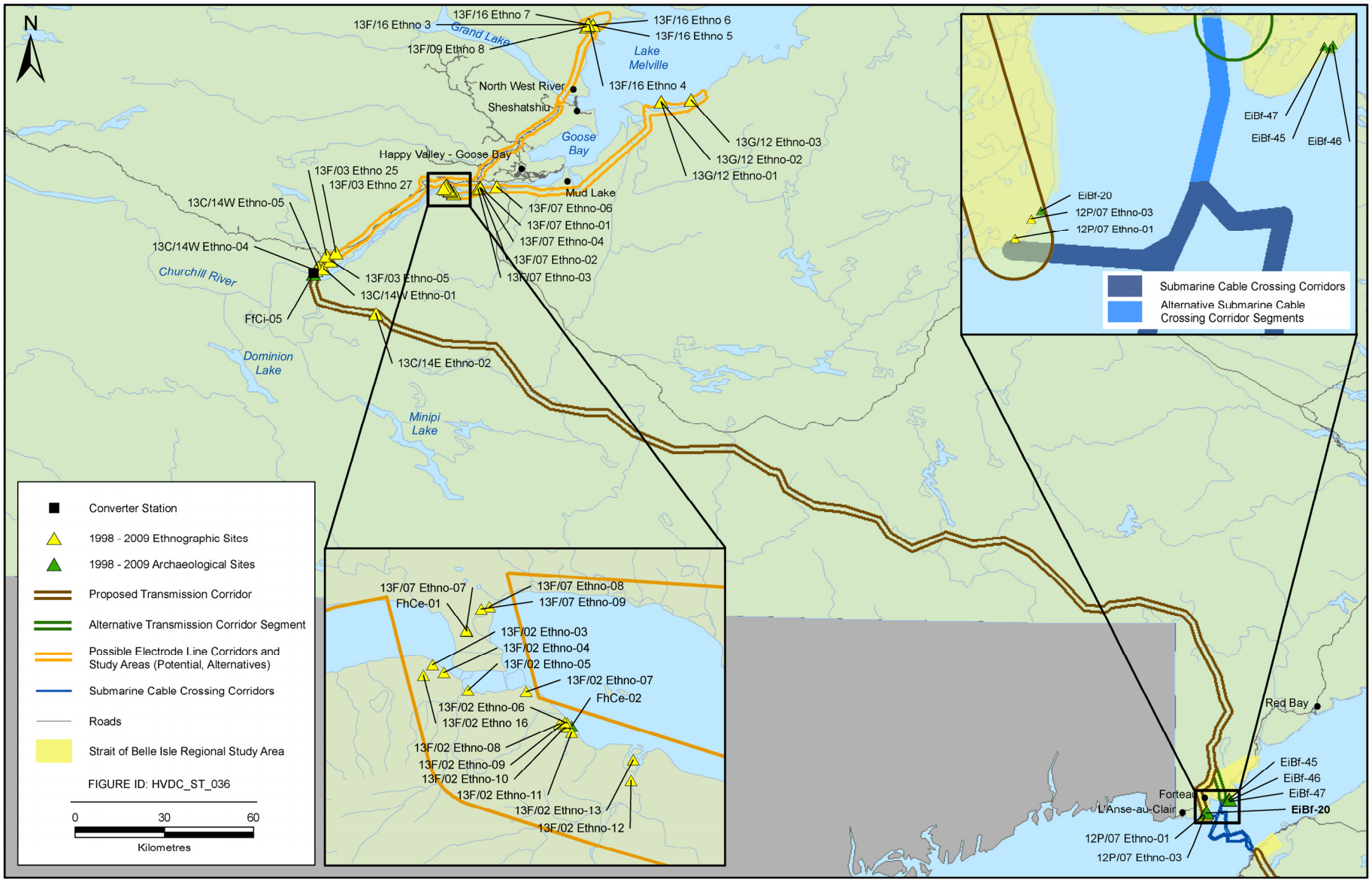
The testing led to the discovery of one archaeological site and 23 ethnographic sites within the Study Area (Figure 3-6; Appendix D).

Archaeological Sites

Single Flake(FhCe-02)

One purple quartzite flake was located at this site in 1998 during research of the portage trail that skirts the southern bank of the Churchill River at Muskrat Falls (IEDE/Jacques Whitford 2000). The artifact was surface-collected from the beach to the east of the eastern terminus of the trail. Visual inspection of the eroding riverbank above the beach failed to identify any additional evidence of stone tool manufacture. However, several stray finds were reported for various locations along this trail (Tuck 1981).

Figure 3-6 Archaeological and Ethnographic Sites 1998 to 2009: Labrador Portion of the Study Area



Ethnographic Sites

Goudie's Tilt (13F/07 Ethno-01)

This site, recorded in 1998 (IEDE/Jacques Whitford 2000), consists of one tilt and associated remains that were located in the vicinity of Muskrat Island. The tilt measured 3 m by 2.5 m and 1.5 m high, and consists of seven tiers of ax-hewn logs, with the roof covered with canvas. There was a fly screen on the door, suggesting a summer occupation. Associated objects and features identified at the site included a ladder made of small logs, a metal stove and stovepipe, metal and plastic buckets and a shovel with a broken handle. The construction of the tilt probably dates to the 1950s and it may have been abandoned during the mid-to-late 1970s.

Goudie's Cabin and Tilt (13F/07 Ethno-02)

This tilt, also recorded in 1998 (IEDE/Jacques Whitford 2000), was located approximately 50 m west of site Goudie's Tilt (13F/07 Ethno-01) discussed above. Other remains identified at the site included an outhouse, a standing canvas tent, the floor of a new cabin and two marten traps. A blue plastic jug used as a marker attached to a post on the beach read: "W. Goudie LIA 0081". It appeared that the tilt was either not used in the summer or had been abandoned, as the residents had set up a tent beside it. The tilt measured 3 m by 3 m. The front wall was constructed of 14 tiers of logs, but the side-walls had only four. The roof was covered with metal sheeting, with a hole cut for a stovepipe.

Trap (13F/07 Ethno-03)

One metal trap housing made of poles and logs was found in 1998 (IEDE/Jacques Whitford 2000) near a very small stream, approximately 600 m west of the Goudie sites. The design of this traditional trap is similar to the traps found elsewhere along the Churchill River.

Trapping Site (13F/07 Ethno-04)

Five snares of different sizes and one rectangular marten trap, were found in 1998 (IEDE/Jacques Whitford 2000), approximately 25 m west of Goudie's Tilt. One large snare made of strong wire, set between poles and sticks, was attached to a fallen tree. The marten trap was found 3 m from the large snare.

Tent Frame (13F/07 Ethno-06)

This site was found in 1998 (IEDE/Jacques Whitford 2000) on the west bank of Caroline Brook, close to its mouth and approximately 2 m above the river level. Inspection of the area led to the discovery of a tent frame and some associated materials, including chopped and split firewood, stove-support pegs (no metal stove), three cobble-size rocks and eight planks. A few poles on one side were part of the tent frame. Traces of a spruce bough remained on the ground and there were several tea bags near the stove area. Several cut trees, mostly small, could be seen around the camp. Additional items observed include a plastic bucket hung in a tree, a garbage bag and a Wild Cat beer can. A trapper's cabin was reported to have been located in this area in the 1920s, but no evidence of it was found.

Mackenzie River 1 and Mackenzie River 2 (13F/02 Ethno-12 and 13F/02 Ethno-13)

During assessment in 1998 (IEDE/Jacques Whitford 2000), visual inspection was conducted along the west shore of the McKenzie River, continuing approximately 0.75 km upstream. The purpose of the inspection was to identify the location of a reported sawmill. Two contemporary sites containing very little evidence of human activities were discovered on the west bank of the river mouth close to an area that had been intensively cut,

probably over 20 years before. A stovepipe measuring 1.5 m long was found that had been abandoned no more than two years previously. Several wooden beams and planks, including one with nails, were found closer to the Churchill River junction and approximately 300 m north of the first site. The location of the sawmill was not confirmed.

Green Trap (13F/02 Ethno-10)

A variety of evidence of human activity was observed at several locations along the long portage trail on the south side of Muskrat Falls in 1998 (IEDE/Jacques Whitford 2000). The site was located along a small trail that branches off to the southeast near the eastern end of the main trail. A marten trap with green paint was found here.

Wood Stack (13F/02 Ethno-11)

This site recorded in 1998 (IEDE/Jacques Whitford 2000) consisted of a stack of firewood situated next to a fallen tree and a flat rock, which may have been used as a stove platform.

Tied Pole (13F/02 Ethno-06)

Another site was located in 1998 along the long portage trail on the south side of Muskrat Falls (IEDE/Jacques Whitford 2000). The site consisted of a tied pole and a rusted tin can.

Toboggan (13F/02 Ethno-08)

The single artifact recorded at this site in 1998 (IEDE/Jacques Whitford 2000) was a toboggan made of wood and aluminum. It was partially buried and the exposed wooden frame was overgrown with moss.

Marten Site (13F/02 Ethno-09)

This site was located in 1998 along the portage trail on the south side of Muskrat Falls (IEDE/Jacques Whitford 2000). It consisted of a single marten trap.

Muskrat Tent (13F/07 Ethno-08)

This contemporary camp was located at the east end of trails that branch off the Muskrat Falls access road. During assessment in 1998 (IEDE/Jacques Whitford 2000), a tent frame with upright poles was found in a clearing near the terrace edge. This site also included an external fireplace and firewood stacked near the entrance of the habitation. The site was in excellent condition and had probably been used less than five years before. No cultural materials indicating an earlier occupation were identified.

Pop Bottle (13F/07 Ethno-09)

This site was found in 1998 near a geotechnical marker, a short distance from 13F/07 Ethno-09 (IEDE/Jacques Whitford 2000). It was located in a clearing surrounded by trees. A fireplace, a glass pop bottle, two shotgun shells and a lock were seen. Most visible features or objects were distributed within an approximately 15 m^2 clearing. However, several other gun shells were noted approximately 50 m further along the road, near an abandoned drill site.

Kinriakak 1 (13G/12 Ethno-01)

During field assessment of the eastern ends of the alternative electrode line corridors in 2008, a single Innu campsite was identified behind the broad sandy beach at Kinriakak Point, some 10 km east of the mouth of the

Kenemich River at Carter Basin. Surface-visible remains included a clearing for a 3.5 m x 3.5 m tent, six tent poles, three notched wooden stove support pegs, several exposed cobbles, plywood marten trap boxes and a light scatter of glass, plastic and metal debris. One stubby beer bottle and tin cans with 1970s-style pull-tabs indicate occupation beginning the in the 1970s and likely continuing to the present day.

Kinriakak 2 (13G/12 Ethno-02)

Another campsite was recorded in 2008, only 100 m east of Kinriakak 1. This clearing in woods behind the beach contained a single tent pole, a decaying stack of cut firewood, a small cobble alignment partly exposed in the grass and a single marten trap box. Pull-tab cans in a later style indicate occupation from the 1980s to date. It is probably an Innu campsite as well.

Rabbit Point 1 (13G/12 Ethno-03)

Rabbit Point is a small, sandy point of land at the mouth of a brook on the southern shore of Lake Melville, approximately 10 km east of Kinriakak Point. Field assessment in 2008 on the western side of the mouth of the brook led to the discovery of a series of almost overgrown former campsite clearings in woods not far from the point where two cabins have been built. Surface-visible remains within the overgrown clearings consisted of two rusted sheet metal camp stoves and a light scatter of tin cans. No plastic debris was noted. This likely represents an Innu campsite dating to the 1970s, which fell out of use once the cabins were built nearby.

Sebaskachu Bay 1 (13F/09 Ethno 2)

Field assessment at the northeastern end of the electrode line option on the northern shore of Lake Melville in 2008 led to the discovery of a series of ethnographic sites near the entrance to the bight in Sebaskachu Bay. One of these was located on the southern side of the bay, on a small point of land flanking a narrow but sheltered east-facing sandy beach. Surface-visible remains included one tent site clearing with scattered debris, including tent poles tied with green twine, cut firewood, one camp stove and a light scatter of tin cans and glass bottles. In addition, in woods to the south, behind the beach, there was an alignment of three small brush lean-to structures. Fifteen testpits excavated around the site yielded no cultural material. This is interpreted to be the remains of an Innu campsite, no older than the 1980s and continuing in use into the relatively recent past.

Sebaskachu Bay 2 (13F/16 Ethno 3)

Across from Sebaskachu Bay 1, the entrance to the bight is marked by an extremely prominent sandy point of land, approximately 1 km east of the mouth of Sebaskachu River. Two cabins have been constructed on this point. Approximately midway between the cabins, the remains of a campsite were noted in 2008, partly hidden in a clearing in the alders. Exposed cobbles and tent poles lashed together define a single tent site. The ridgepole is still partly in place, with one end lodged in the crook of a tree. This appears to be another Innu tent site, likely less than 10 years old.

Sebaskachu Bay 3 (13F/16 Ethno 4)

During the 2008 assessment, another campsite was recorded east of Sebaskachu Bay 2 on the northern side of the bay. Visible remains were limited to a collection of tent poles, a piece of plywood and the remains of a rubber boot, all in a small clearing. This appears to be another small Innu campsite less than 20 years old.

Sebaskachu Bay 4 (13F/16 Ethno 5)

Another pair of campsites was recorded in 2008 on the smaller but still prominent point of land approximately 1.5 km east of Sebaskachu Bay 2. One is a small campsite clearing surrounded by winter-cut tree stumps and containing several rotted tent poles, one still tied with twine, and one tin can. Like the other sites in the area, this appears to be another small Innu campsite less than 20 years old.

Sebaskachu Bay 5 (13F/16 Ethno 6)

Another other campsite recorded in 2008, on the same point of land as Sebaskachu Bay 4, consisted of another single tent site, this one represented by a small clearing just inside the trees at the tip of the point. The only remains noted were a ridgepole and other tent poles lashed with nylon rope and some exposed cobbles. There was no glass, metal or plastic debris. This appears to be another Innu campsite, no more than 20 years old.

Sebaskachu Bay 6 (13F/16 Ethno 7)

The final site recorded in 2008 on the north side of Sebaskachu Bay is located a short distance north of Sebaskachu Bay 2. The site consists of a small clearing in alders behind a long sandy beach facing west, toward the mouth of Sebaskachu River. The only visible remains, aside from the clearing itself, are two tent poles. This is likely another Innu campsite, no more than 20 years old and probably more recent than that.

Summary

The only archaeological site recorded for this sub-area was discovered in 1998 (IEDE/Jacques Whitford 2000). Seven of the ethnographic sites are also clustered on the southern and northern shore below Muskrat Falls. The remaining 16 ethnographic sites are distributed in various locations along the southern shore of the Churchill River, near MacKenzie River, Muskrat Island and Caroline Brook, with another small group of sites at Kinriakak Point and Rabbit Point, east of Carter Basin, and a larger group situated near the bottom of Sebaskachu Bay (Figure 3-6; Appendix D).

Although only one archaeological site actually lies within the Study Area (electrode line corridors), it should be noted that assessment for the Lower Churchill Hydroelectric Generation Project has led to the recording of many archaeological sites elsewhere along the shoreline of Upper Lake Melville and, in particular, on marine terraces up to 30 m asl in Happy Valley-Goose Bay and the Mud Lake area, and many more such sites have been recorded in previous work. Therefore, the potential of this general area to yield sites is potentially much higher than results from the Study Area suggest.

3.2.3 Field Study Results: Churchill Valley, from Muskrat Falls to Gull Island (Labrador)

The Churchill Valley from Muskrat Falls to Gull Island sub-area consists of the electrode line corridor between Muskrat Falls and Gull Island. As defined for the present study, the eastern limit of this sub-area lies immediately below Muskrat Falls, while the western limit lies on the north bank of the Churchill River immediately above Gull Lake. This section of the Churchill valley has seen a high level of assessment, primarily focused on the proposed Muskrat Falls Reservoir.

The only testing locations from this work that have any bearing on the present Study Area are those that were located at Muskrat Falls and Gull Rapids, at the eastern and western ends, respectively. However, an additional field assessment program was undertaken in 2006 to assess the high terraces north of the Churchill River along the proposed transmission line linking Gull Island and Muskrat Falls associated with the Lower Churchill

Hydroelectric Generation Project (Minaskuat Inc. 2008b), and this corridor corresponds closely to the present electrode corridor. In addition, assessment north of Gull Lake was undertaken in 2000, and many of these testing locations lie within the present corridor or are located close enough to be linked to defined potential zones within the corridor. Consequently, a relatively high percentage (61 percent) of relevant testing locations north of the Churchill River in this area actually lie within the potential electrode corridor.

Considering only those testing locations that lie within the corridor or close enough to be directly linked to a mapped archaeological potential zone, 52 testing locations have been assessed in this sub-area, none by air alone. Of the 52 ground-tested locations, 12 were investigated by visual inspection alone. A total of 2,318 testpits were excavated at the remaining 40 testing locations, for an average of 57.9 testpits per sub-surface testing location. This greatly exceeds the Project-wide average, primarily because the corridor traverses extensive high (30 to 100 m asl) sandy terraces amenable to large-scale intensive testpitting.

The testing led to the discovery of two archaeological sites and 12 ethnographic sites within the Study Area. The archaeological sites both lie close to the Churchill River at either end of this sub-area (Figure 3-6; Appendix D).

Archaeological Sites

Muskrat Falls (FhCe-01)

The Muskrat Falls site was first reported by Fitzhugh (1977) and was the only pre-contact site recorded during the initial assessment of the Lower Churchill Hydroelectric Generation Project (Thurlow et al. 1974; Tuck 1981). Pre-contact materials were originally encountered on both the north and south side of the falls. The component on the north side was located atop a high narrow flat-topped terrace fragment at 65 m asl overlooking the river, along a steep, but relatively short, traditional portage route that led up and around the falls. This terrace fragment has experienced a major slope failure on the downstream side during the last 30 years, but the site was located midway between the upstream and downstream edges and may not have been affected. As the lithic component here appeared to be relatively small, Tuck excavated it in the 1970s, collecting quartzite flakes indicating an Intermediate Indian affiliation, though no diagnostic artifacts were recovered.

As the only previously-known pre-contact site in the Churchill River valley and one that was clearly situated in a strategic location, Muskrat Falls was assessed to be an important zone for further archaeological testing in 1998 (IEDE/Jacques Whitford 2000). Assessment indicated that the north side of Muskrat Falls has seen extensive disturbance in recent years, some associated with engineering studies and recreational activities. The area excavated by Tuck in 1979 was still evident as a level, sandy exposure approximately 9 m in diameter, with occasional quartzite flakes scattered on the surface. The remains of three Innu campsites lay 8 to 15 m to the east. The first consisted of a 3 m by 3 m floor of old spruce boughs with four wooden stove supports, while the other two consist of indistinct scatters of old spruce boughs approximately 3 m in diameter. There was virtually no debris associated with any of them. Judging by their condition, they appeared in 1998 to be approximately 20 to 30 years old.

One hundred and eighty-eight test pits were excavated at 5 m intervals in transects leading east, west and south of the original findspot, and along the western, uneroded margin of the terrace. The rationale for this testing was that the site had been a strategic location at least since the development of the falls, perhaps in the post-Archaic period, and therefore, later components and further Intermediate Indian occupation areas could be present. On the basis of the previous find, these would likely be oriented toward the upstream side of the terrace, or perhaps sheltered in woods and hummocks behind this terrace edge. As well, the original findspot

may not have been completely excavated. The results of this testing program were negative, suggesting that the site does not extend greatly beyond what is presently exposed, though lithic material was still visible in 1998, and a small collection made. As for the possibility of additional contemporary or later components, it was thought possible that the site might be a workstation associated with campsites at a lower level, particularly on the upstream side, which is uneroded. However, investigations along the western beach revealed no deflated lithic material, and the terrace slope behind appears uniformly steep, precluding habitation.

Tshiashkunish 5 (FfCi-05)

Tshiashkunish 5 was located during 2000 assessment (Jacques Whitford/IELP 2001c) on the north shore of the Churchill River at the eastern end of the narrows west of Gull Lake, near the point that marks the western end of Gull Lake. It lies approximately 3.5 km east of Gull Rapids. Cultural material was encountered in one test pit 1 m from the riverbank edge, on a small terrace fragment nestled against a backslope to the north and east. Material recovered included 38 flakes of grey, white and pink Saunders Chert and two finely-worked grey chert biface fragments: one a medial section, the other the base of a small square-based biface. All material was recovered from the A horizon, 7 to 11 cm below surface. Six additional test pits excavated around this unit failed to reveal additional lithic remains. The site therefore appears to measure no more than 40 m^2. The raw material indicates an occupation in the Intermediate Period, specifically a Saunders Complex (3,500 to 2,700 BP) occupation. The riverbank here is extremely high and steep, and was likely at the time of occupation as well. The most distinctive feature of this location is that it is the only portion of this shore with a backslope offering shelter to the north and east.

Ethnographic Sites

Muskrat Falls Cabin (13F/02 Ethno-16)

At the upper end of the portage route around Muskrat Falls, the remains of an approximately 3 m x 3 m dilapidated cabin were noted in the trees along the edge of Churchill River during field assessment in 2006 (Minaskuat Inc. 2008b). It was difficult to establish the age of the structure; however, it must have been constructed at least 30 years ago.

Muskrat Cabin 1 (13F/02 Ethno-03)

The site is located near the western end of the southern portage trail around Muskrat Falls, near the upper rapids, at less than 15 m asl, and only 2 to 3 m above the river. During assessment in 1998 (IEDE/Jacques Whitford 2000), traces of what appeared to be the corner of a cabin were seen, as indicated by roofing shingles, plywood, and a can almost totally overgrown with moss. A marten trap attached to a tree approximately 25 m from the cabin remains appears more recent.

Muskrat Cabin 2 (13F/02 Ethno-04)

A standing cabin was found in 1998 (IEDE/Jacques Whitford 2000) along a cut-line between the southern portage trail at Muskrat Falls and the Churchill River. The three-windowed cabin was made of wooden planks, whereas the typical tilt frame is made of hewn logs. Traces of recent human activities were found inside or near the cabin, including a large metal container, a kettle hanging in a tree, a 5-gallon oil container, a rectangular metal stove, a stovepipe, a few logs, a small table and a metal bed frame. The cabin was probably built during the early 1970s; however, more recent tin cans and drill cores were present, suggesting recent reuse of the site.

Marten Traps (13F/02 Ethno-05)

During assessment in 1998 (IEDE/Jacques Whitford 2000), several marten traps were found lying on the ground on the north side of the portage trail on the south side of Muskrat Falls. The damaged traps were not set up in the trees. Traps would not normally be set near a camp and the closest habitation site is located more than 0.5 km away; therefore, this may have been a storage place for traps.

Wire (13F/02 Ethno-07)

Another site discovered along the long portage trail on the south side of Muskrat Falls in 1998 (IEDE/Jacques Whitford 2000), this site contained a single, very recent rabbit snare made of a wire tied to a small cut tree.

Sweat Lodge (13F/07 Ethno-07)

This site on the northern side of Muskrat Falls, recorded in 1998 (IEDE/Jacques Whitford 2000), was comprised of three loci. Three tent places (Locus a) were situated near an outhouse at the western end of the Muskrat Falls parking area. At the edge of the road, a pile of cobbles (Locus b), were observed that had clearly been exposed to fire (red color and black stain). It seems likely that the rocks may have been used in a sweat lodge. Another feature (Locus c) located a short distance from the cobbles may have been a tent or another sweat lodge.

Box Trap 5 (13C/14W Ethno-04)

This site was discovered during the investigation of miscellaneous Project features north of Gull Island in 2000 (Jacques Whitford/IELP 2001b). A marten (box type) trap was found in the forest less than 120 m to the west. The trap was half the size of a normal trap of this type, and was perhaps 10 years old at the time of the assessment.

Cut Pole and Snare (13C/14W Ethno-05)

This site was also discovered in 2000 (Jacques Whitford/IELP 2001b) during the investigation of a proposed borrow pit. It consisted of a small axe-cut tree stump, 30 cm high, and a part of a snare.

Tshiashkunish 3 (13C/14W Ethno-01)

Tshiashkunish 3, recorded in 1998 (IEDE/Jacques Whitford 2000), was located on the edge of a sandy clearing marking the former Gull Island campsite for the Lower Churchill Hydroelectric Generation Project. The site consisted of two campsites. One was a tent frame situated in the trees, with many standing tent poles. The other consisted of a spruce-bough and moss floor with a tent pole cache and several hearths scattered on the open sand nearby. This recent Innu campsite appeared in 1998 to be less than 15 years old.

Tshiashkunish 4 (13F/03 Ethno-05)

This site lay along a former road leading from the Trans Labrador Highway. This recent Innu camp, recorded in 1998 (IEDE/Jacques Whitford 2000), lay in lichen woodland beside the road, at approximately 100 m asl, on a broad dunefield terrace system. The site consisted of a single tent frame situated in a small clearing near the edge of the trees. Some tent poles were still standing, and one was lashed with nylon line. Wooden stove supports were *in situ*, though overgrown with lichen. The site appeared to be less than 20 years old.

Cutting Loc. 3 (13F/03 Ethno-25)

This site, a wood cutting location, was recorded during field assessment of the proposed Gull Island to Churchill Falls transmission line corridor in 2000 (Jacques Whitford/IELP 2001b). A single saw-cut tree stump was noted along the shoreline of a small pond. The tree appeared to have been cut at least 30 years earlier.

Another Pole (13F/03 Ethno-27)

This site was recorded in 2000 during field assessment of a borrow pit located between the Trans Labrador Highway and Pena's River (Jacques Whitford/IELP 2001b). A single, long cut pole was noted leaning against a clump of spruce trees in an area that had already seen extensive ground disturbance.

Summary

Two archaeological sites are located at opposite ends of this sub-area: one at Muskrat Falls; and the other at the bottom of Gull Island Rapids. Both are pre-contact sites dated to the Intermediate Period in central Labrador prehistory (3,500 to 2,700 BP).

In addition, five of the 12 ethnographic sites in this sub-area were located at Muskrat Falls; these include campsites, tilts and remains of trapping activities. It is not surprising that sites are associated with the two locations that the corridor approaches the Churchill River, since numerous archaeological and ethnographic sites have been recorded along the river between Muskrat Falls and Gull Island (IEDE/Jacques Whitford 2000; Jacques Whitford/IELP 2001b; Minaskuat Inc. 2008b).

The remaining seven ethnographic sites are situated in the interior of the high sandy terraces north of Gull Lake. These sites are clearly oriented to access roads dating to the 1970s and later, and their locations likely do not reflect any historic or pre-contact patterns of land-use (Figure 3-6; Appendix D).

Intensive testing along high terrace edges between Gull Island and Muskrat Falls have so far failed to yield evidence of pre-contact occupation. Such evidence, if found, would be highly significant as sites at these elevations would date to the earliest Archaic period in the region. However, it is possible that these high terraces actually predate the initial human occupation of central Labrador (Jacques Whitford 2000b).

3.2.4 Field Study Results: Gull Island to the Strait of Belle Isle (Labrador)

The Gull Island to the Strait of Belle Isle sub-area consists of the HVdc transmission line corridor leading from the south bank of the Churchill River (downstream of the proposed Gull Island generating station) south and east, crossing the Kenamu, Joir, St. Augustin, St. Paul's Rivers and several other drainages before turning south toward the Strait of Belle Isle. At a point approximately 14 km inland (northwest) from L'Anse Amour, roughly mid-way between the communities of Forteau Point and L'Anse au Loup, the 2 km-wide transmission corridor widens to roughly 25 km southwest-northeast to encompass a regional Study Area along the Strait of Belle Isle.

As discussed previously in Section 1.1 of this report, the Study Area along the coastal strip was expanded in order to ensure adequate and appropriate Historic and Heritage Resources baseline coverage of any proposed and potential Project sites, disturbances and eventual submarine cable crossings (Figure 1-1).

Field studies began in 1998 with testing that focused primarily on the then-defined southern end at the Strait of Belle Isle. This was followed in 2006 by field-testing focused on the interior sections south of Gull Lake, along the upper Kenamu River, and along the southern margins of the Eagle Plateau. In 2009, additional field-testing was

conducted at a number of locations within the regional Study Area on the Labrador side of the Strait of Belle Isle in relation to a geo-technical drilling program. Because the corridor has been redefined at a number of stages, only approximately 60 percent of testing locations from the 1998, 2006 and 2009 field programs still lie within the presently-defined Study Area. However, even this level of assessment represents the highest level of field assessment for any sub-area.

Considering only those testing locations that lie within the corridor or close enough to be directly linked to a mapped archaeological potential zone, 73 testing locations have been assessed in this sub-area, one by air alone. Of the 72 ground-tested locations, 12 were investigated by visual inspection alone. A total of 3,249 testpits were excavated at the remaining 60 testing locations, for an average of 54.1 testpits per sub-surface testing location. This exceeds the Project-wide average (surprising for an area that is largely upland), but this can be explained by the extensive sandy deposits and riverine terraces (typically considered to be areas of potential) found along even the upper reaches of major rivers such as the Kenamu and the St. Augustin.

This testing led to the discovery of four archaeological and three ethnographic sites within the Gull Island to the Strait of Belle Isle Study Area (Figure 3-6; Appendix D).

Archaeological Sites

Dakota (EiBf-20)

This site was found in 1998 (IEDE/Jacques Whitford 2000) while conducting close surface inspection of an eroding area near Forteau Point. A purple quartzite flake and a tiny fragment of marine shell were found on the surface of a sandy terrace less than 15 m asl. Subsequent sub-surface testing (43 testpits) in this zone revealed no additional pre-contact material.

Fox Cove 1 (EiBf-45)

The archaeological site, Fox Cove 1, was located during a Project-related assessment carried out in 2009 in relation to geo-technical drilling (Stantec 2009, 2010). The site is situated on the east side of Fox Cove just back from the edge of a raised and largely undisturbed terrace at approximately 11 m asl. Excavation of test pits in the vicinity of the proposed drill site led to the discovery of a number of flakes of a low-grade, white/grey chert directly below the sod cover.

No finished artifacts, or fragments of artifacts or features, were identified. Additional shovel testing of an area to the southwest of the original findspot revealed a concentration of flakes of the same description as those discussed above, as well as a small flake of Ramah chert and a fragment of white quartz of possible cultural origin. Also recorded at this location was a battered fragment of what appears to be the working end of a ground-stone tool, possibly from an adz or ax. Despite the limited testing conducted during the assessment, it was concluded that archaeological deposits (whether from one site or several), were spread over an area measuring at least 15 m^2.

Comparison of the materials identified in test pits at Fox Cove 1 with collections recorded during pervious archaeological research projects (McGhee and Tuck 1975) suggests that it is a similar (if not the same) raw material to some of that recovered from several other sites in southern Labrador, including those referred to as: Graveyard (EiBf-6); Forteau Point (EiBf-2); English Point; and Iceberg (EjBe-19). These sites, which range in elevation from approximately 6 to 12 m asl (i.e., the same as Fox Cove 1), were dated to between 3,000 and

4,000 BP, placing them at the end of the Maritime Archaic Amerindian occupation of the region (McGhee and Tuck 1975; Tuck 1976b: Auger and Stopp 1986).

Also identified as a surface find in an eroded pathway close Fox Cove 1 was a small fragment of fossilized material. The finding was not entirely unexpected, given that the red limestone outcrops in this area (Colman-Sadd and Scott 1994) include rare reef-building fossils referred to as Archeocyathids (Fong 1967; James and Dubrenne 1980a; Dubrenne and James 1981). For a more detailed discussion of the Palaeontological Resources of the Strait of Belle Isle area, see Section 3.4 of this report.

Fox Cove Quarry (EiBf-46)

A second archaeological site was identified at Fox Cove during the 2009 field study. The site is situated approximately 20 m to the northeast of Fox Cove 1 and consists of a roughly rectangular configuration of stone rubble measuring at least 12 x 8 m, with a massive cavity cut through the central area. It is likely that the feature resulted from the quarrying of building materials used in the construction of the Pointe Amour lighthouse in the 1850s. While the rubble itself is not necessarily considered to be a unique or rare resource, it is possible that other remains associated with the quarry, such as workshops and stonemason's tools and equipment, could be present in the area (Stantec 2009, 2010).

Fox Cove 2 (EiBf-47)

A third archaeological site, consisting of two Loci, was identified at Fox Cove during the 2009 assessment (Stantec 2009, 2010). The site is situated on the north side of the Fox Cove road at an elevation of approximately 15 m asl, at the juncture of the road and a trail that runs toward Schooner Cove.

Locus 1 consisted of a small concentration of stone chipping debris (commonly referred to as flakes) of what appears to be a low-grade, white-grey (and slightly banded) siliceous siltstone. Due to the limited sample size and the lack of any diagnostic artifacts, it was not possibly to confirm the cultural affiliation or age of the materials. However, based on other archaeological findings in the Strait of Belle Isle area, (McGhee and Tuck 1975), the elevation of the site asl could suggest a late Maritime Archaic Amerindian period of occupation of between 3,000 and 4,000 years ago. It is also possible that the site could be associated with the subsequent Intermediate Amerindian Period.

Locus 2 is situated to the north of Locus 1. This section of the site revealed the base of a bi-facially flaked point of what appears to be Saunders chert. A tentative interpretation of the artifact is that it is associated with the Intermediate Amerindian Period of occupation, which would fall between 3,500 and 2,000 years ago (Nagle 1978; Nielsen 2004, 2005).

Ethnographic Sites

Cut Wood and Marker (12P/7 Ethno-01)

In 1998 (IEDE/Jacques Whitford 2000), several test pits were excavated in the vicinity of Forteau Point, on top of a sand dune. A piece of cut board, measuring 15 cm by 5 cm by 3 cm, was found in a test pit. This piece of wood was in a vertical position, with the top in the peat layer and the bottom dug in the sand. A recent stone marker was located 50 m east of this finding at the east end of the sand dune.

Wooden Duck (12P/7 Ethno-03)

In 1998 (IEDE/Jacques Whitford 2000), several test pits were excavated in the vicinity of this site, which included a contemporary cabin (still in use) and associated objects, including a wooden duck decoy lying just outside the front door. This contemporary site is located near Forteau Point, at less than 15 m asl.

Sawhorse (13C/14E Ethno-02)

This camp, recorded in 2006 (Minaskuat Inc. 2008a), was situated in the uplands between Gull Lake and the Kenamu River, in a small, boggy clearing. It was almost certainly used during winter, when access by snowmobile along the old cut-line would have been possible. Remains at the site included a number of log platforms - possibly used for tent flooring - a sawhorse, several piles of deteriorated firewood and one waist-high log structure that may have been used as a table for butchering animals. The number and height of cut trees surrounding the clearing, as well as the fact that it was extremely wet underfoot, further support the conclusion of winter usage. The age is estimated to be 20 years; however, no conclusive statement can be made as to cultural affiliation (Photo 4).

Photo 4: Remains of Recent Camp, HVdc Corridor, Labrador

Summary

Four archaeological sites and two ethnographic sites were identified at the Strait of Belle Isle end of this sub-area. In addition, one ethnographic site was located in the uplands between Gull Lake and the Kenamu River. It should be noted that a further 13 ethnographic sites were recorded in the interior between Gull Island and the Strait of Belle Isle in 2006 (Appendix C), but these do not lie within the presently-defined Study Area.

3.2.5 Field Study Results: Strait of Belle Isle (Marine Environment)

Although no underwater field assessment was undertaken by the Historic and Heritage Resources study team, a review of seabed data collected in 2008 and 2009 revealed no evidence of sites or materials within the corridor (see discussion of background research results in Section 3.1.5).

3.2.6 Field Study Results: Northern Peninsula

The Northern Peninsula sub-area consists of a roughly 5 km-wide (NW to SE) regional Study Area along the Strait of Belle Isle that extends from the southwest side of Mistaken Cove to just northeast of Shoal Cove, a distance of approximately 10 km NE to SW. Also included is the 2 km-wide transmission line corridor leading from the regional Study Area, south along the interior axis of Northern Peninsula. For the purposes of this report, the southern boundary of this sub-area is set at an arbitrary point just west of Taylor's Brook. Field studies were

undertaken in this area in the fall of 2008 and within the regional portion of the Study Area at the Strait of Belle Isle in 2009.

A total of 68 testing locations assessed in this sub-area lie within the corridor and nine of them were assessed from the air only. Of the 59 ground-tested locations, 12 were investigated by visual inspection alone. A total of 662 testpits were excavated at the remaining 47 testing locations, for an average of 15.3 testpits per sub-surface testing location. This level of sub-surface testing is considerably lower than the Project-wide average, but is typical for the sub-areas on the Island of Newfoundland, where there are fewer opportunities for large-scale testing programs than in central Labrador (Table 3-1).

Field assessment led to the discovery of four archaeological sites and one ethnographic site within the Study Area (Figure 3-7; Appendix D).

Archaeological Sites

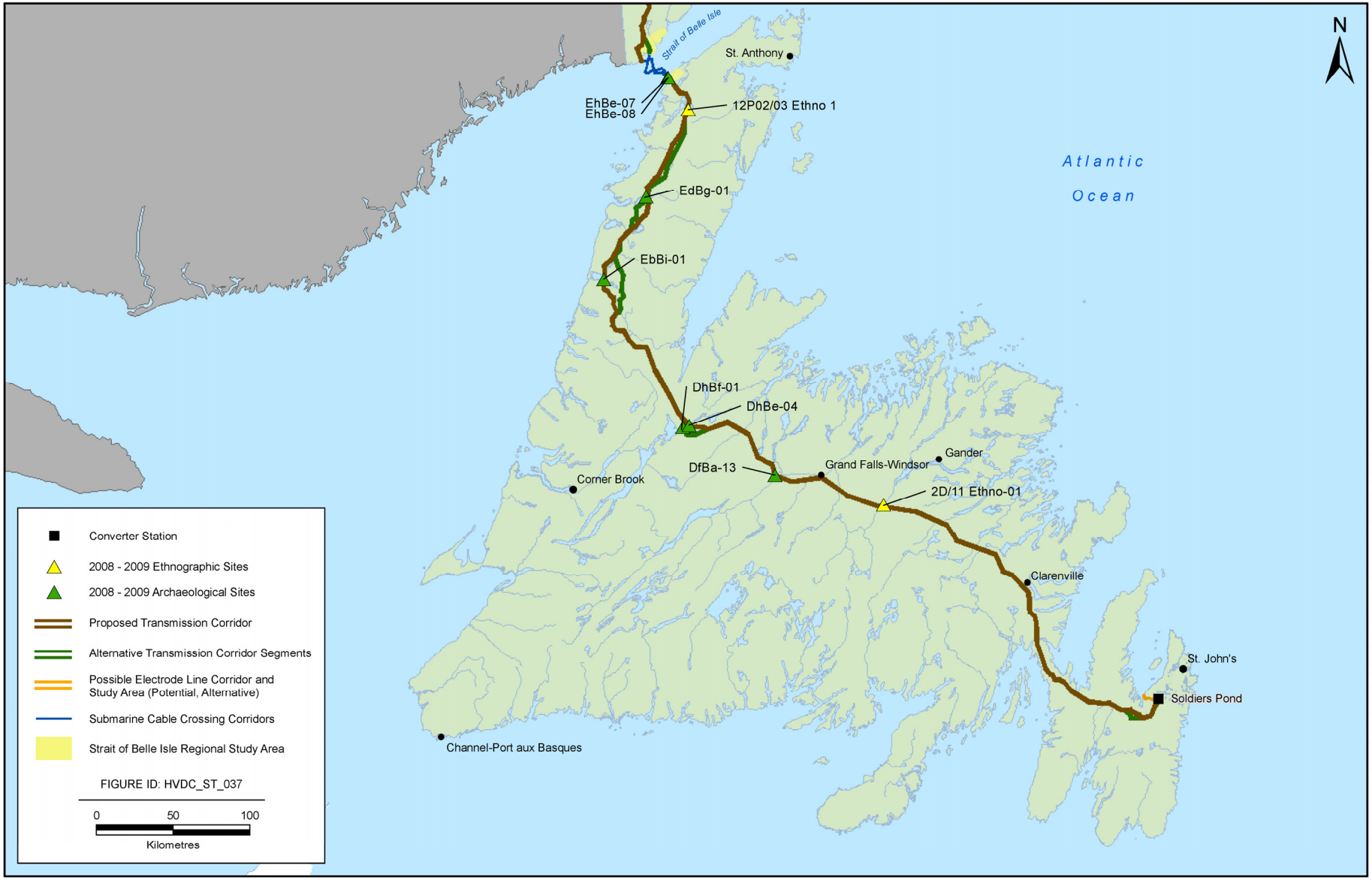
Mistaken Cove 1 (EhBe-07)

This site, situated on the southwest side of Mistaken Cove in Area 1, has been assigned an archaeological registration number based on the finding of a single Dutch flooring tile of late 19th or early 20th century origin by a local resident (exactly when is uncertain) while excavating post-holes for a kennel he was constructing for his dog-team. The black tile is roughly 6 cm x 6 cm, and has the inscription Alfred Regout, Maastricht, Holland, on the underside. Correspondence with an employee of the tile manufacturer Royal Mosa in Maastricht, the company that bought the business of Alfred Regout in 1964, confirmed the age of the tile to be of the period mentioned above. The artifact was located in a slightly raised clearing approximately 3 m asl at the western end of Mistaken Cove. Despite the excavation of several test pits throughout the reported find area, no other materials were recorded to confirm that a building once stood on the site.

Mistaken Cove 2 (EhBe-08)

This site also consists of a single artifact recovered by a local resident. In this case, the artifact is a pair of French binoculars of late 19th or early 20th century origin found on a beach in Mistaken Cove following a storm, which may have washed them up from the seabed. The binoculars are inscribed with the maker's name – DERAISME – and the place of manufacture – FABT?, PARIS. Although no other materials (such as ship's timbers) were noted at the time, the individual who reported the find concluded that the binoculars could have come from a shipwreck situated somewhere in the cove. Since the time of the find, no other artifacts or wooden structural components have surfaced and there is no local knowledge of a wreck in the area. Given the shallow water depth in Mistaken Cove, and the high degree of boating that would have taken place in the past, it seems likely that if there was a wreck in the offshore zone adjacent to the shoreline where the binoculars were found, there would be some local knowledge of it, which does not appear to be the case. Nevertheless, the possibility does exist that there are other related remains on the seabed.

Figure 3-7 Archaeological and Ethnographic Sites 2008 and 2009: Newfoundland Portion of the Study Area



Middle Pond 1 (EdBg-01)

Middle Pond is situated above Western Brook Pond in the Torrent River Drainage, some 11 km east of Hawkes Bay. Eight testing locations were investigated where the transmission line corridor traverses the western shore of the lake. One of these is a low, forested point fronted by a sandy beach at the mouth of the small brook that descends to Middle Pond from Indian Steady. During visual inspection along the beach, a single small flake of Ramah chert was collected from beneath a wind-blown tree at the edge of the bank, near the tip of the point. Excavation of 78 testpits in four rows in woods around the point and behind the sandy beach failed to reveal any *in situ* source deposit for this flake. It should be noted that beach sand extends into the woods and the point of land is obviously seasonally awash. It is likely that the flake located in 2008 had eroded from a now-deflated archaeological deposit. However, a small *in situ* deposit may still remain somewhere in the general location of the find. The site elevation is approximately 40 m asl.

Portland Creek Pond 1 (EbBi-01)

Findings at this site consist of one water-worn, black chert flake and one water-worn, translucent quartzite flake (possibly Ramah), located on a long sandy beach at the extreme eastern end of Portland Creek Pond, approximately 800 m northwest of the mouth of Inner Pond. The section of the beach on which the artifacts were located is no more than 4 m wide and is exposed to both the north and east winds. Moreover, the terrain at the upper edge of the beach rises steeply for approximately 2 m to a narrow embankment of sand backed by bog and a thick growth of alder.

While the beach itself can be walked and small craft can be landed on it, prolonged (or even overnight) stays in the immediate vicinity of the find seem unlikely. Taking into account wave and ice action, and the glacial rebound of the area, it is highly likely that the artifacts have been moved over time from an unknown shoreline (or former shoreline) location. Due to the water-worn condition and limited size of the collection, ascribing cultural affiliation at this point is not possible.

Ethnographic Sites

Round Lake 1 (12P2/03 Ethno 1)

This ethnographic site is situated on the south shore of Round Lake, approximately 200 m west of Bear Brook, and encompasses a large grass-covered clearing of at least 150 m^2 that was likely used during the early part of the 20th century as a logging camp and work area. Metal debris from skidders and other logging equipment was noted at a number of locations within the meadow. Just above the shoreline toward the west end of the clearing, in an area that is partially overgrown, the remains of a roughly 15 m long wooden tugboat were identified, along with parts of a wooden slipway on which the craft would have been moved in and out of the lake. The tug, which at this point is extremely deteriorated, appears to have been framed, planked and decked with local softwoods, and fastened with square, galvanized nails and spikes. The boat, which was almost certainly used for moving massive booms of timber around the lake, appears to have been powered with an engine situated toward the stern, and remains of the metal tiller and rudder were also noted. The slipway on which the tug was situated was constructed of squared timbers supported on a framework of stones and boulders. It seems likely that the boat would have been used during the ice-free months and hauled up onto the shoreline prior to freeze-up in the fall. Regarding the age of the craft in particular and the camp in general, information suggests that the main period of operation for logging in that region of the Northern Peninsula was the first half of the 20th century, although it continued for several decades after that. Certainly the dimensions of

the trees that have grown up around the meadow and adjacent to the boat and slipway, suggest that the area has not been used as a logging camp for at least 25 years, and possibly longer (Photo 5).

Photo 5: Tugboat Remains, Round Lake (Newfoundland)

Summary

Two of the four archaeological sites recorded for the Northern Peninsula Study Area were found on the coast of the Strait of Belle Isle. A third site, at Portland Creek Pond, is located at a constriction in a major waterway, and one of the principal waterway-crossings for the transmission line corridor in this sub-area. Archaeological sites have previously been recorded elsewhere on Portland Creek Pond, and the lake lies close to sea level, with potential to yield formerly-coastal archaeological sites. The fourth archaeological site was identified at Middle Pond close to the point where the corridor crosses the Torrent River drainage. Although the site elevation may be too high to have been a coastal site during the human occupation of the Northern Peninsula, it does lie in the interior hinterland of the major multi-component site complex at Port-au-Choix (Figure 3-7).

The one ethnographic site, thought to be associated with logging activities on the Northern Peninsula, was situated on the south shore of Round Lake (Figure 3-7; Appendix D).

3.2.7 Field Study Results: Central and Eastern Interior (Newfoundland)

The central and eastern interior sub-area consists of the Study Area leading from Taylor's Brook east across the major southwest-northeast drainages of central Newfoundland, including Birchy Lake, Gander River, Southwest Gander River, Triton Brook, Terra Nova River and Southwest River, as far as Goobies Pond. Field studies were undertaken in the fall of 2008. The assessed corridor thus corresponds closely to the present corridor and, as a result, over 98 percent of the testing locations that were investigated lie directly within the corridor.

A total of 67 testing locations assessed in this sub-area lie within the corridor, five of them assessed only from the air. Of the remaining 62 ground-tested locations, 16 were investigated by visual inspection alone. A total of 689 testpits were excavated at the remaining 46 testing locations, for an average of 15 testpits per sub-surface testing location (Table 3-1). This level of sub-surface testing is lower than the Project-wide average, but is the highest rate achieved on the Island of Newfoundland, where there are fewer opportunities for large-scale testing programs than in central Labrador (Figure 3-5; Appendix C).

Field assessment led to the discovery of three archaeological sites and one ethnographic site within the corridor (Figure 3-7; Appendix D).

Archaeological Sites

Tea Bay 1 (DhBf-01)

A single, palm-sized flake of Ramah chert was located on the beach of a prominent point of land at Tea Bay, Birchy Lake, approximately 300 m northwest of the bridge on the Trans-Canada Highway (Photo 6). The artifact has been retouched along one face and does not appear to be water-worn, which could indicate it had recently eroded onto the beach from the adjacent embankment. However, testing throughout the undisturbed forested area back from the water, and an examination of exposed soils on either side of an existing driveway to a cottage, failed to identify any additional cultural materials. As well, the owner of the cottage situated on the point of land adjacent to where the artifact was located stated that during the time he has owned the property he had not found any similar lithic materials in the wooded area or on the beach. However, it is of note that in recent times he had made considerable effort to stabilize the edge of the embankment with large rocks and boulders along a large portion of the point, which clearly indicates that erosion has been a problem. Therefore, it seems likely that an unknown portion of the bank has been lost to water and ice action, which may have displaced or destroyed any evidence of past occupation.

Photo 6: Tea Bay, Birchy Lake, Newfoundland

Due to the limited nature of the find at Tea Bay, it is not possible at this point to establish cultural affiliation, although the relative size of the artifact and the material type may suggest Maritime Archaic cultural affiliation. It is not unexpected that a pre-contact site would be found at this location, close to a natural constriction in the lake. It is more surprising that more materials were not found, particularly since the shoreline to the west of Tea Bay at Birchy Narrows would likely have been a prime location for intercepting caribou as they forded the lake. It is possible that road and cabin construction has resulted in considerable shoreline disturbances and loss (or burial) of materials in that area.

South Side 1 (DhBe-04)

Like Tea Bay 1, this site is represented by a single lithic piece. In this case, a water-worn flake of black chert of unknown cultural affiliation was found on the beach on the southern side of Birchy Lake. The area above the beach where the artifact was found is heavily forested and the terrain at the edge of the trees has seen considerable disturbance and erosion from water and ice scouring. Consequently, it is likely that the artifact has been eroded from a source deposit elsewhere. A close examination of beach (currently a high-traffic area for all terrain vehicles), and the eroded embankment behind the beach, failed to identify any additional cultural materials. The relatively low-lying and wet terrain nearby was not amenable to sub-surface testing; it is likely that the artifact is an isolated find and no other materials of the period are present in the immediate area.

Two Mile 1 (DfBa-13)

Prior to the 2008 assessment, three archaeological sites had already been recorded on Two Mile Island on the Exploits River, upstream of Badger. Field assessment in 2008 focused on investigating the riverbanks to the north and south of the island. Field assessment revealed that the northern bank has been severely affected by road-works over many years, as Route 370 (the Buchans Highway) closely tracks the shoreline, in places only a few metres away. Excavation of testpits in a small grove of birch in an overgrown bulldozer cut across from the eastern end of Two Mile Island revealed disturbed soil - a dusty grey-brown pebbly loam. One testpit yielded a single tiny flake of patinated chert; surrounding testpits were negative. It is highly unlikely that any intact pre-contact site still survives in this highly disturbed location.

Ethnographic Sites

Two Clearings (02D/11 Ethno 1)

This ethnographic site consists of two clearings situated on the Southwest Gander River next to a small brook. The largest clearing is approximately 8 m x 8 m and evidence suggests that a cabin had once stood there and that it had probably burnt. Testing in the clearing and in the wooded area surrounding it revealed a variety of debris including glass bottles, roofing felt, tin cans, a length of chimney and stove parts. The second clearing, which is slightly larger than the first, was situated further back in the trees approximately 20 m from the shoreline of the river. Testpitting in this area led to the discovery of stove parts, tin cans and wall-framing, all of which suggest a second cabin had been situated here. Based on the age of the materials recovered from both areas, it appears that the site is less than 50 years old.

Summary

The three archaeological sites recorded in the central and eastern interior of Newfoundland were all found at two of the principal waterway crossings in this sub-area: Birchy Narrows and the Exploits River. Both Birchy Lake and the Badger area on the Exploits have previously yielded significant pre-contact and/or historic Aboriginal archaeological sites. The ethnographic site was recorded on the Southwest Gander River, another major waterway crossing (Figure 3-7; Appendix D).

3.2.8 Field Study Results: Avalon Peninsula (Newfoundland)

The Avalon Peninsula sub-area consists of the transmission line corridor leading from Sunnyside south along the Isthmus of Avalon then east across the Peninsula to Soldiers Pond. From there a proposed electrode line corridor leads northwest, reaching Conception Bay near the Holyrood power plant facility. Field studies were undertaken in the fall of 2008. As elsewhere on the Island, the assessed corridor corresponds precisely to the present corridor route, and on the Avalon, 100 percent of the testing locations that were investigated lie within the corridor.

A total of 21 testing locations were assessed in this sub-area within the corridor, five of which were assessed from the air only. Of the remaining 16 ground-tested locations, 11 were investigated by visual inspection alone. A total of 29 testpits were excavated at the remaining five testing locations, for an average of 5.8 testpits per sub-surface testing location. This is the lowest level of sub-surface testing, and of testing in general, for the entire assessment, reflecting the scarcity of suitable testing locations in this sub-area (Figure 3-5; Appendix C).

No archaeological or ethnographic sites were recorded during field assessment on the Avalon Peninsula.

3.3 Archaeological Resources: Archaeological Potential Mapping Results

3.3.1 Introduction

As noted in Section 2.1.3.3, the methodology for archaeological potential mapping was originally developed in 2000 to map archaeological potential along the Churchill River for the Lower Churchill Hydroelectric Generation Project. Specific methods varied according to the base mapping available, but some was done at 1:50,000, and the method used for 1:50,000 potential mapping in the 2000 study was followed again in 2008 and 2010.

The basic approach has been to map Zone Types defined on the basis of topographic and hydrographic attributes and then to compile data on testing effort and the number of sites identified within each Zone Type to arrive at the probability of sites being present and located per unit effort within each Zone Type. In this approach, the Zone Type definitions remain relatively fixed, but actual potential ratings are based on empirical field assessment data, and these ratings can be continually reassessed following further fieldwork as the sample sizes increase. The rating of archaeological potential is thus an iterative process. Potential ratings for the various Zone Types have been determined by the results of previous studies, initially mostly in the Churchill River valley (Jacques Whitford/IELP 2001c; Minaskuat 2008b), but these ratings may now be reassessed again, employing aggregate data from all field studies since 1998, including new data on testing effort and results from the 2008 and 2009 field studies.

3.3.2 Data Sources for Rating Archaeological Potential

Previous discussion of field assessment results in Section 3.2 has focused exclusively on sites and testing locations located in mapped zones within the Project Study Area itself, but for assessment of potential, a broader sample, including results from outside the corridor as well, is both acceptable and desirable.

Critical criteria for determining whether including testing activities and sites located outside the corridor may be included in the analysis are that those data must:

- allow comparison of the level of sampling effort with the number of sites recovered;
- allow assignment of outside testing locations and sites to the same Zone Types (though not necessarily to the same zones) as those found within the corridor; and
- sample landscapes comparable to that found within the corridors.

The first criterion is relatively easy to satisfy employing any field study data collected during assessment of the Lower Churchill Hydroelectric Generation Project and this Project. From the outset, these data have been collected, recorded and compiled in such a way that assessment effort can be quantified, both in terms of the number of testing locations and in terms of the assessment effort involved at each location. Each site recorded can be keyed to a specific testing location and equally important, testing locations with negative results have been recorded and tabulated as comprehensively as those that yielded sites. However, archaeological sites recorded by other researchers in previous work generally cannot be incorporated into the analysis. While the sites themselves are often clearly documented, older reports do not necessarily quantify the level of assessment undertaken to recover those sites, nor do they often comprehensively record (or even necessarily mention) testing locations that yielded negative results. Development of archaeological potential ratings is therefore limited to comparing assessment effort and results from components of the Labrador - Island Transmission Link and the Lower Churchill Hydroelectric Generation Project.

The second criterion is also relatively easy to satisfy. The Zone Types employed in potential mapping for the Labrador – Island Transmission Link and the Lower Churchill Hydroelectric Generation Project are defined by readily-recognizable topographic and hydrographic attributes. Even in the absence of zone mapping, sites and testing locations can easily be assigned to a Zone Type on the basis of written descriptions, aerial imagery, or even coordinates and a topographic map. Theoretically, all data on assessment effort and results from the Labrador – Island Transmission Link and the Lower Churchill Hydroelectric Generation Project satisfy the second criterion.

The third criterion is somewhat more restrictive. A large proportion of the testing effort undertaken in this general area between 1998 and 2006 has been focused on the banks of the Churchill River, a relatively unique environmental setting not duplicated elsewhere in the Project Study Area. Although the Lake Melville electrode corridors do track the river below Muskrat Falls, and the HVdc transmission line corridor crosses the river in two places, the Churchill River is hardly comparable to most of the landscapes traversed by the transmission line corridors. If these data were incorporated into the analysis, the huge inventory of sites and testing locations along the Churchill River would dominate and potentially skew the analysis.

As a result, the assessment of archaeological potential for the transmission line project incorporates only the following parts of the Lower Churchill Hydroelectric Generation Project data:

- Below Muskrat Falls and on the shoreline of upper Lake Melville, all Project sites and testing locations were located on estuarine, coastal and marine terrace landforms closely comparable to those found within the corridors. All Project data from below Muskrat Falls are therefore included in the analysis, whether or not they were collected directly within the electrode line corridors.
- Between Muskrat Falls and Gull Island, sites and testing locations located on the Churchill River banks are included only if they lie within the electrode line corridor. Otherwise, data from this section of the river are included in the analysis only if they were collected from the high terraces north of the river, in the general vicinity of the corridor. The majority of the relevant data were collected in 2000 during assessment of project features north of Gull Lake and (Jacques Whitford/IELP 2001b) and in 2006 during assessment of the Lower Churchill Hydroelectric Generation Project interconnecting transmission line from Gull Island to Muskrat Falls.
- Between Gull Island and the Strait of Belle Isle, all previous assessment data from 1998, 2006 and 2009, including those collected from outside the present corridor, effectively sample the same landscape as that of the present corridors.

On the Island of Newfoundland, all sites and testing locations were included in the analysis, including those from 2009. Virtually all of these are located within the present Study Area and the few that are not are less than 5 km outside but can be linked to an identifiable Zone Type.

3.3.3 Assessment of Potential for Archaeological and Ethnographic Sites

Including all relevant data, as noted above, a total of 457 testing locations investigated between 1998 and 2009 effectively sample the landscapes of the Study Area. Assessment at these 457 locations led to the discovery of 97 archaeological and ethnographic sites. On average, there is a 21.2 percent chance (97 divided by 457) of encountering an archaeological or ethnographic site at any given testing location.

The data are broken down according to Project sub-area and Zone Type in Table 3-2.

Table 3-2 Testing Locations vs. Sites by Zone Type and Component (including Ethnographic Sites)

Zone Type		Churchill Estuary to Upper Lake Melville		Muskrat Falls to Gull Island		Gull Island to Strait of Belle Isle		Northern Peninsula		Central and Eastern Newfoundland		Avalon Peninsula		TOTAL		Total Probability
		Testing locations	Sites	Testing locations	Sites	Testing locations	Sites	Testing locations	Sites	Testing locations	Sites	Testing locations	Sites	Testing locations	Sites	
1	Contemporary Strategic Shoreline	29	21	11	6	53	16	44	5	34	3	2	0	**173**	**51**	**0.296**
2	Contemporary Generic Shoreline	14	7	21	2	34	4	14	1	26	1	2	0	**111**	**15**	**0.135**
5	Former Strategic Shoreline	13	9	2	2									**15**	**11**	**0.733**
6	Former Generic Shoreline	19	1	30	0	1	1							**50**	**2**	**0.04**
7	Coastal Plain					39	7							**39**	**7**	**0.179**
8	Terrace Interior	4	1	15	4									**19**	**5**	**0.263**
9	Upland	5	4	3	1	17	1	7	0	3	0	12	0	**47**	**6**	**0.128**
10	Wetland					1	0	1	0					**2**	**0**	**n/a**
12	Esker					1	0							**1**	**0**	**n/a**
	Total	**84**	**43**	**82**	**15**	**146**	**29**	**66**	**6**	**63**	**4**	**16**	**0**	**457**	**97**	**0.212**
Total Probability			**0.512**		**0.183**		**0.199**		**0.091**		**0.064**		**n/a**		**0.212**	
n/a = Not applicable																

While the Project-wide average probability of encountering a site in any given testing location is 0.212, there is some regional variation. Archaeological potential appears to be highest in the Churchill River estuary and Upper Lake Melville region, and only slightly below average between Muskrat Falls and Gull Island and between Gull Island and the Strait of Belle Isle. In contrast, the potential of the Newfoundland sub-areas appears significantly below average, particularly on the Avalon Peninsula, where no sites were recovered.

Considering the aggregate figures for each Zone Type, archaeological potential appears to be highest in Zone Type 05 locations, average or above average in Zone Types 01, 07 and 08, and low in Types 02, 06 and 09. No sites have been encountered in Type 10 or Type 12 locations.

It should also be noted that, probabilities aside, Zone Type 01 and Zone Type 02 are the only Zone Types to yield sites on the Island of Newfoundland, and thus, these are the only Zone Types to consistently yield sites across the length of the Study Area (except for the Avalon Peninsula, where no sites were recorded).

The data in Table 3-2 may be calculated as probabilities by dividing the number of sites by the number of testing locations (Table 3-3).

Table 3-3 Probability to Yield Sites, by Zone Type and Component (including Ethnographic Sites)

Zone Type	Churchill Estuary to Upper Lake Melville	Muskrat Falls to Gull Island	Gull Island to Strait of Belle Isle	Northern Peninsula	Central and Eastern Newfoundland	Avalon Peninsula	Average
01	0.724	0.545	0.302	0.114	0.088	n/a	**0.295**
02	0.5	0.095	0.118	0.071	0.038	n/a	**0.135**
05	0.692	1	n/a	n/a	n/a	n/a	**0.733**
06	0.053	n/a	1	n/a	n/a	n/a	**0.04**
07	n/a	n/a	0.179	n/a	n/a	n/a	**0.179**
08	0.25	0.267	na	n/a	n/a	n/a	**0.263**
09	0.8	0.333	0.059	n/a	n/a	n/a	**0.128**
10	n/a	n/a	n/a	n/a	n/a	n/a	**n/a**
12	n/a	n/a	n/a	n/a	n/a	n/a	**n/a**
Average	**0.512**	**0.183**	**0.199**	**0.091**	**0.064**	**n/a**	**0.212**
n/a = Not applicable							

Comparing the probabilities for each Zone Type in each Project sub-area with the average probabilities leads to the following observations:

- Zone Type 01 has high potential to yield sites, particularly in Labrador but also in Newfoundland;
- Zone Type 02 has higher potential only in the Churchill Estuary to Upper Lake Melville sub-area; otherwise it has slightly or significantly below-average potential;
- Zone Type 05 has been sampled only in the Churchill Estuary to Upper Lake Melville sub-area and Muskrat Falls–Gull Island, but shows extremely high potential in those sub-areas;
- Zone Type 06 shows high potential only in the Gull Island to Strait of Belle Isle sub-area, where it should be noted the sample size is relatively small (one testing location, one site);
- Zone Type 07 has been sampled only at the Straits end of the Gull Island to Strait of Belle Isle sub-area, where it shows moderate potential (i.e., the probability of recovering sites is only slightly less than the sub-area average);

- Zone Type 08 has been sampled only in the Churchill Estuary to Upper Lake Melville sub-area and Muskrat Falls to Gull Island, and shows higher-than-average potential only in the latter;
- Zone Type 09 has been sampled widely across Study Area, though sample sizes per sub-area are relatively small except in upland areas such as Gull Island to Strait of Belle Isle, the Avalon Peninsula, and to some extent the Northern Peninsula. The potential of this Zone Type appears highest in the Churchill Estuary to Upper Lake Melville sub-area, where this results from a single group of trapping-related ethnographic sites near Muskrat Falls; and
- Zone Types 10 and 12 are impossible to rate, as the sample sizes are small and no sites have been recovered. It may be noted that previous studies indicate the potential of Zone Type 10 is low, while the potential of the relatively rare Zone Type 12 remains indeterminate.

An interesting result from this analysis is the remarkably high potential indicated for Zone Type 05 compared to previous studies of archaeological potential for the Lower Churchill Hydroelectric Generation Project (Jacques Whitford/IELP 2001c, 2001d). Previous potential mapping studies noted the apparently low potential of Zone Type 05 but predicted that that this potential was in fact under-rated. There are two likely reasons why this Zone Type received low potential ratings in earlier studies but now appears to have greater potential. First, field-testing in Zone Type 05 locations yields almost exclusively pre-contact sites, which in the past have been overwhelmed in the analysis by high frequencies of ethnographic sites recovered from other Zone Types. Second, Type 05 zones are more frequent in coastal areas and at high elevations, away from the reservoir-defined areas previously assessed for potential in the Lower Churchill Hydroelectric Generation Project. Although significant sites are often recorded in Zone Type 05, the majority of these previously lay outside the areas actually mapped for archaeological potential.

3.3.4 Assessment of Potential for Archaeological Sites Only

In the foregoing analysis, no distinction has been made between archaeological and ethnographic sites. It is generally assumed that ethnographic sites may reflect ancient and historic patterns of land-use and may thus serve as effective predictors of archaeological potential in their own right. This is the principal reason the PAO requires field assessment to inventory ethnographic sites as well as archaeological sites. In the analysis of archaeological potential, ethnographic sites can thus "stand in" for archaeological sites, particularly when the available sample of archaeological sites is small.

However, in the case of Zone Type 05, whose archaeological potential may be masked by large samples of ethnographic sites, including ethnographic sites in the analysis may also sometimes distort apparent archaeological potential. Project data on testing locations and sites are again presented, but with ethnographic sites removed from consideration (Tables 3-4 and 3-5).

Obviously, when ethnographic sites are factored out of the analysis, the overall potential decreases. Of the 97 archaeological and ethnographic sites, only 34 are registered archaeological sites with Borden numbers, and the probability of locating a site in any given testing zone is now 7 percent rather than 21 percent. However, though the sample size decreases significantly, potential ratings do come into sharper focus.

Table 3-4 Testing Locations vs. Sites, by Zone Type and Component (Archaeological sites only)

Zone Type		Churchill Estuary to Upper Lake Melville		Muskrat Falls to Gull Island		Gull Island to Strait of Belle Isle		Northern Peninsula		Central and Eastern Newfoundland		Avalon Peninsula		TOTAL		Total Probability
		Testing locations	Sites	Testing locations	Sites	Testing locations	Sites	Testing locations	Sites	Testing locations	Sites	Testing locations	Sites	Testing locations	Sites	
1	Contemporary Strategic Shoreline	29	2	11	1	53	5	44	5	34	2	2	0	**173**	**15**	**0.087**
2	Contemporary Generic Shoreline	14	1	21	0	34	1	14	0	26	1	2	0	**111**	**3**	**0.027**
5	Former Strategic Shoreline	13	8	2	1									**15**	**9**	**0.6**
6	Former Generic Shoreline	19	0	30	0	1	0							**50**	**0**	**na**
7	Coastal Plain					39	7		0					**39**	**7**	**0.179**
8	Terrace Interior	4	0	15	0									**19**	**0**	**n/a**
9	Upland	5	0	3	0	17	0	7		3	0	12	0	**47**	**0**	**n/a**
10	Wetland					1	0	1	0					**2**	**0**	**n/a**
12	Esker					1	0							**1**	**0**	**n/a**
		84	**11**	**82**	**2**	**146**	**13**	**66**	**5**	**63**	**3**	**16**	**0**	**457**	**34**	**0.074**
Total Probability			**0.13**		**0**		**0.1**		**0.076**		**0.048**		**n/a**		**0.07**	
n/a = Not applicable																

Table 3-5 Probability to Yield Sites, by Zone Type and Component (Archaeological sites only)

Zone Type	Churchill Estuary to Upper Lake Melville	Muskrat Falls to Gull Island	Gull Island to Strait of Belle Isle	Northern Peninsula	Central and Eastern Newfoundland	Avalon Peninsula	Average
01	0.069	0.091	0.094	0.114	0.059	n/a	**0.087**
02	0.071	n/a	0.029	n/a	0.038	n/a	**0.027**
05	0.615	0.5	n/a	n/a	n/a	n/a	**0.6**
06	n/a	n/a	n/a	n/a	n/a	n/a	**n/a**
07	n/a	n/a	0.179	n/a	n/a	n/a	**0.179**
08	n/a	n/a	n/a	n/a	n/a	n/a	**n/a**
09	n/a	n/a	n/a	n/a	n/a	n/a	**n/a**
10	n/a	n/a	n/a	n/a	n/a	n/a	**n/a**
12	n/a	n/a	n/a	n/a	n/a	n/a	**n/a**
Average	**0.131**	**0.024**	**0.089**	**0.076**	**0.048**	**n/a**	**0.074**
n/a= Not applicable							

Regionally, the highest site frequency is still found in the Churchill Estuary to Upper Lake Melville sub-area. Probabilities for the Gull Island to Strait of Belle Isle and Northern Peninsula sub-areas lie at the overall average, while those for the Muskrat Falls to Gull Island and Central Newfoundland sub-areas are somewhat below average. The Avalon Peninsula has yielded no sites; its potential is indeterminate but qualitatively, is likely low.

Turning to the potential of individual Zones Types, only Zone Types 01, 02, 05 and 07 have yielded archaeological sites within the Study Area. Zone Type 01 and, to a lesser extent, Zone Type 02 most consistently yield sites across the Study Area, and are the only Zone Types to yield sites on the Island of Newfoundland. Zone Types 05 and 07 have not been sampled in all sub-areas. Archaeological potential overall is highest in Zone Type 05, above average in Zone Type 07, close to the average in Zone Type 01 and below average in Zone Type 02.

3.3.5 Archaeological Potential Ratings

Project data comparing archaeological testing effort and sites recovered provide empirical support for rating the archaeological potential of the various mapped Zone Types within the Study Area. Nevertheless, it is usually necessary to qualify apparent archaeological potential to account for variations in sample size, mapping constraints, and the nature of the archaeological and/or ethnographic sites commonly recovered in each Zone Type.

The most obvious conclusion to draw from the results presented in Section 3.3.4 is that only Zone Types 01, 02, 05 and 07 have yielded archaeological sites within the Study Area, and these Zone Types must therefore have high or, at least, moderate, potential to yield sites. However, assigning specific ratings to these Zone Types, and to those Zone Types that yielded no sites or only ethnographic sites, requires consideration of other data. The potential ratings for each Zone Type are presented in more detail below.

- Zone Type 01 has above average potential for archaeological and ethnographic sites in Labrador, and average potential to yield archaeological sites overall, suggesting a potential rating of moderate to high. However, it is the only Zone Type to consistently yield archaeological sites in both Labrador and Newfoundland, and as past studies have shown (Jacques Whitford/IELP 2001c, 2001d), is the only Zone Type

to consistently yield both pre-contact and historic-period archaeological sites. Consequently, its archaeological potential for this study is rated as **High**.

- Zone Type 02 generally has average to below average potential to yield sites of all types. This is consistent with previous findings and its archaeological potential for this study is rated as **Moderate**.
- Zone Type 05 has uniformly high potential, and the sites recovered in these zones are almost invariably pre-contact archaeological sites. Its potential appears higher than in previous studies, but for reasons outlined above, the results from the present study appear to reflect the true potential of this Zone Type. Consequently, its archaeological potential for this study is rated as **High**.
- Zone Type 06 has below-average potential and in the present Study has only yielded ethnographic sites. Its potential appears to be relatively low, but because some Zone Type 06 may in fact be Zone Type 05 whose strategic attributes are no longer evident, it is considered safer for cultural resource management purposes to rate the archaeological potential of this Zone Type as **Moderate**.
- Zone Type 07, sampled only on the Labrador side of the Strait of Belle Isle, has average potential to yield sites of all types, but significantly above average potential for pre-contact archaeological sites. Its archaeological potential may be considered high. It should be noted that the high potential for this Zone Type derives in large part because it includes localized areas of Zone Type 05. Where specific high-potential terraces within Zone Type 07 cannot be mapped separately, either because they cannot be distinguished in aerial imagery, or because they cannot practically be mapped at 1:50,000 scale, it is most appropriate to rate the archaeological potential of Zone Type 07 as **High**. This is the case on the Labrador side of the Strait of Belle Isle, and on the Island, it is the case along the western shore of the Northern Peninsula. However, where specific terrace features belonging to Zone Types 05 or 06 are extensive and recognizable enough to be distinguished in potential mapping, the remaining expanses of Zone Type 07 coastal plain are more accurately rated as having **Moderate** archaeological potential. This is the case in upper Lake Melville.
- Zone Type 08 has average potential to yield ethnographic sites in the Churchill River valley-Upper Lake Melville, and has not yielded true archaeological sites anywhere in the Study Area. It should be noted that the ethnographic sites recorded in Zone Type 08 are in most cases specifically oriented to recent roads, and these site locations likely do not reflect historic or pre-contact patterns of land-use. Consequently, its archaeological potential for this study is rated as **Low**.
- Zone Type 09 has not yielded archaeological sites within the present Study Area. Its above-average potential to yield ethnographic sites in the Churchill Estuary–Upper Lake Melville sub-area derives from a single group of trapping-related sites near Muskrat Falls. This does not warrant amending its potential rating, determined in earlier studies, from **Low**;
- Zone Type 10 has shown very low potential to yield sites of all types in this and previous potential mapping studies undertaken for the Lower Churchill Hydroelectric Generation Project. Its archaeological potential is rated **Low**.
- Zone Type 12 has shown potential to yield sites in other parts of the Canadian sub-Arctic but has yet to yield archaeological or ethnographic sites in this or previous studies in Newfoundland and Labrador. However, relatively few zones of this type (esker) are present in Lower Churchill Study Area, and as a result, few have been sampled. Pending the results of future sampling programs its potential is rated as **Moderate**.

Defined zones are listed in Appendix E of this report. Archaeological potential mapping for the Labrador - Island Transmission Link Study Area is presented in Appendix F at 1:50,000-scale. Mapped Zone Types are colour-coded and mapped as High, Medium, or Low potential, according to the rating scheme outlined above.

3.4 Palaeontological Resources

Palaeontological Resources refers to any fossilized traces or imprints of organisms preserved in or on the Earth's crust that provide information about the very early history of life on Earth. They are non-renewable and are of both scientific and educational value. The ability to assess and seek to avoid negative interactions with Paleontological Resources is contingent upon the understanding of their occurrences and distribution, both geologically and geographically.

Paleontology enhances the knowledge and understanding of the history of the environment by helping interpretation of the evolutionary relationships of organisms and ultimately a deeper understanding of biodiversity. The study compliments the understanding of Historic and Heritage Resources by providing information and data to place fossilized remains in a biological and geological context.

Palaeontological Resources are studied in three main ways:

1. *taxonomy*: the description of the characteristics of fossils enables them to be named to the genus and species to which they belong;
2. *palaeobiology*: the study of an assemblage of fossils, including predator-prey relationships and living conditions such as water depth and temperature. This is usually dependent to some extent on the sedimentology of the formation; and
3. *dating and biostratigraphy*: evolution of fossil groups vary considerably, making them exceedingly useful for dating in conjunction with chemical dating, as they can be used to determine stratigraphic ages between levels of chemical dating. Microfossils are often useful for this work as well, as they are more likely to remain undamaged than macrofossils.

Fossils are normally only found in sedimentary rocks (Blatt and Tracy 1994) because unlike most igneous and metamorphic rocks, they form at temperatures and pressures that do not destroy fossils and fossilized remains. They are not usually found in large-grained rocks such as conglomerates or in terrestrial sediments such as desert sands deposited by the wind, but are usually laid down underwater, either in freshwater or marine environments. Occasionally, fossils may be found in low-grade metamorphic rocks, especially where there is mainly heating and limited pressure involved in the metamorphic process. The more rare fossils that may be found in metamorphic rock tend to be smaller than those found in sedimentary rock. Fossils are rarely reported for volcanic rocks. In Central Newfoundland, these are usually from small deposits of shale and limestone that have shaken down the slopes of volcanic islands during earthquakes along the Iapetus Ocean suture and are deposited in sedimentary materials.

Fossils are typically laid down on the bedding planes of the layers of sedimentary rocks as they are deposited underwater. These formations can extend over large areas and are often covered by more recent rocks, glacial deposited soils, bogs and forests. It is only where the rocks outcrop or they are disturbed, and several beds are exposed, that the fossils they contain can be identified and used for correlation with other dated outcrops. Most natural outcrops are found on riverbanks and along the coast. These outcrops are representative of the rest of the beds that are covered, and the beds exposed can be studied in order of age. Disturbances are typically caused by blasting for road construction or quarrying.

The sedimentary rocks of Newfoundland, often very fossiliferous, were deposited during the late PreCambrian and Paleozoic eras, between approximately 585 and 280 million years ago. The sedimentary rocks of Newfoundland and Labrador contain macrofossils, microfossils and trace fossils of animals and plants from many

different phyla, such as brachiopods, clams, graptolites, trilobites, corals, tree ferns, fish, conodonts and ostracodes. Of these, trilobites, conodonts and graptolites are probably more often used for correlation and dating than any other fossil groups.

Fossils in Newfoundland and Labrador have usually been studied:

1. to date the rocks they occur in, during geological mapping;
2. to understand the environment in which they are laid down in sedimentological studies. These were both used in the understanding of plate tectonics in Newfoundland; and
3. to delimit the boundaries of the geological systems of the Geological Time Scale. Two of these systemic boundaries are in Newfoundland and have been studied in great detail.

3.4.1 Objectives

The primary objectives of the Palaeontological Resources component of the Historic and Heritage Resources Study were to identify any known fossil-bearing geological deposits within the Study Area, and specifically, to highlight locations in or near the transmission corridors where particularly significant fossils are known to occur.

It is important to point out that unlike archaeological materials, which are typically localized to relatively small areas and present more or less on the surface, fossils are distributed throughout geological formations that frequently cover vast areas. Since there may be vast fossil-free areas within the fossil-bearing deposits, and since fossiliferous materials may be buried beneath metres of glacial overburden and vegetation (and sometimes other rock), surface disturbance in an area of high potential may not encounter fossil remains.

As a result of these factors, it is difficult to establish with any degree of certainty from rock type if a deposit crossed by the transmission corridors has the potential to contain fossils. For example, even though large segments of the corridor on the Northern Peninsula may cross several fossil-bearing sedimentary rock types, without previous palaeontological field studies or incidental disturbance in the area, it is not possible to state that specific locations along the corridor contain fossils. However, details provided on the geological parameters that are conducive to the formation of fossils will help indicate where in the Study Area they are likely to occur.

3.4.2 Approach

To predict areas of potential for Palaeontological Resources within the Study Area, data from detailed studies of known geological outcrops, which have laid the foundation for our knowledge of the age and structure of the geology in Newfoundland and Labrador, have been examined. In particular, this includes:

1. the study of the structure of Newfoundland in the development of the Theory of Plate Tectonics where fossils determined which fault system was the suture in the Iapetus Ocean; and
2. the identification of the position of the World-wide Gold Spike at the systemic boundary between the PreCambrian and Cambrian systems and the Gold Spike at the boundary between the Cambrian and the Ordovician systems.

These studies are described to demonstrate how and where major fossils have been found and the potential for fossils to occur along the HVdc transmission line corridor. The Study Area transverses inland portions of the province for major sections of the route. Inland portions of the province are not as well mapped or studied for Paleontological Resources unless they are adjacent to areas of natural outcrops such as riverbeds, outcrops

exposed as a result of human activity (i.e., road construction and other excavations), or have been the object of geological mapping. Therefore, targeting locations within the Study Area that hold particular potential for Palaeontological Resources is based on knowledge of similar geological formations in other areas of the province that are known to support fossils.

3.4.3 Newfoundland and Labrador Geology with Potential for Palaeontological Resources

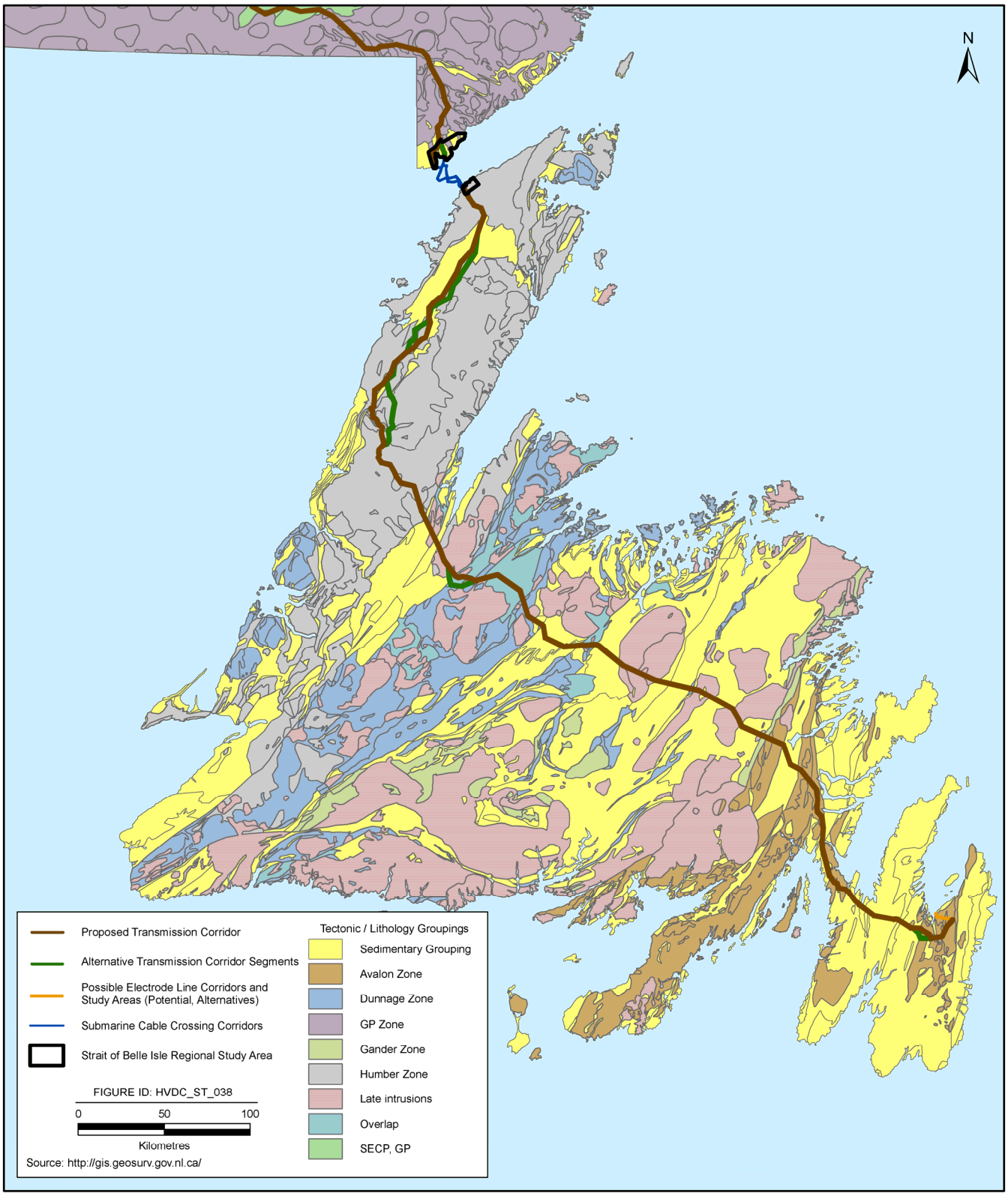
Crucial to understanding the geology of Newfoundland and Labrador is a description of plate tectonics and the closing of the Iapetus Ocean (a Pacific-style ocean that existed from the Late Precambrian to the mid-Silurian period *ca*. 600 to 420 million years ago) (Hancock and Skinner 2000). The Iapetus Ocean separated several continental masses by a distance of up to 5,000 km. The continent of Laurentia was to the north (present-day North America, Greenland and northern Britain), while to the south lay Gondwanaland (now South America, Africa, most of Asia, Australia, Antarctica and most of Europe) and to the east was Baltica (Scandinavia).

After the Iapetus Ocean closed, deposition of sedimentary rocks occurred in the Silurian period in the Gander and White Bay areas. In areas where there were intrusions of igneous rocks that were metamorphosed (deformed by folding and faulting and to become altered by the effects of pressure and heat) as a result of the closure of the Iapetus Ocean, many of the sediments and the fossils were partially or completely destroyed**.** Silurian and early Devonian period rocks known to contain well-preserved fossils were deposited further west in the area of the Port au Port Peninsula. To the east, paralleling the Long Range Mountains in the White Bay area, and south to Port aux Basques, subaerial, fluvial and lacustrine deposits were laid down in and around coal swamps and lakes of the Carboniferous Period. These contain coal and fossilized plants, and some fish remains have been identified to the south. The minor Carboniferous limestones were evaporitic deposits, which contain no fossils.

The rock outcrops along the coast and rivers of Newfoundland, especially along the northeast coast, are accessible and studies carried out there have shown the timing of the closing of the Iapetus Ocean. The suture, or fault, that marks the closing of the Iapetus Ocean extends north along the Appalachian Mountains of eastern North America, across the Island of Newfoundland and continues through Ireland and Scotland as far north as Scandinavia. The later opening of the Atlantic Ocean has not followed the same suture as where the Iapetus Ocean closed during the Silurian, but has left part of what developed on the eastern side of the Atlantic attached to North America, as seen in part of eastern Newfoundland and the Avalon and Burin Peninsulas. This occurrence was first recognized in Conception Bay South, where fossil trilobites of the same species as those known to exist in Wales were discovered (Howell 1920). At approximately the same time, the fossil trilobites on the coast of western Newfoundland were recognized as being of the same genera and species as those found in other parts of North America.

What was first recognized in trilobites has been confirmed in the studies of other fossil groups, especially graptolites and the microfossils called conodonts. Most of these fossils have been recovered from outcrops along the coast or in areas near the coast. Because the structure of the rocks in Newfoundland is dependent on the closing of the Iapetus Ocean, the structure crosses the island in a northeast-southwest direction (Figure 3-8).

Figure 3-8 Tectonic Map of Newfoundland and Southern Labrador



The rocks of central Newfoundland (known as the Dunnage and Gander Zones) positioned between those of the North American plate (known as the Humber Zone) in the west and the European-African plate in the east are the volcanic island arcs in the Iapetus Ocean (similar to the Japanese islands in the Pacific Ocean of today). This means that studies of rocks along the northeast coast can be applied to rocks of the same formations inland in central Newfoundland.

Systemic Boundary Studies

In the last 40 years, geologists have been looking world-wide for outcrops where there is continuous deposition across the geologic systemic boundaries. In many parts of the world where systems were originally named, the rocks pass suddenly from one system to another. For some reason, the area was raised above sea level and no deposition took place, leaving a gap in the rock layers before deposition resumed. In a few places, deposition is continuous. These places were surveyed and the fossil record studied in detail. Newfoundland was part of these studies for the boundaries of two different systems: the Pre-Cambrian-Cambrian Boundary (Landing and Benus 1994); and the Cambrian-Ordovician Boundary (Barnes 1988; Bergstrom et al. 1997).

Studies of the rocks of the Burin and Avalon Peninsulas have shown that there is continuous deposition across the Pre-Cambrian-Cambrian Boundary and the World Stratotype (an internationally agreed upon stratigraphic section which serves as the reference section for a particular boundary on the geologic time scale) and Gold Spike marker for that boundary has been positioned near the town of Fortune on the Burin Peninsula (Landing and Benus 1994).

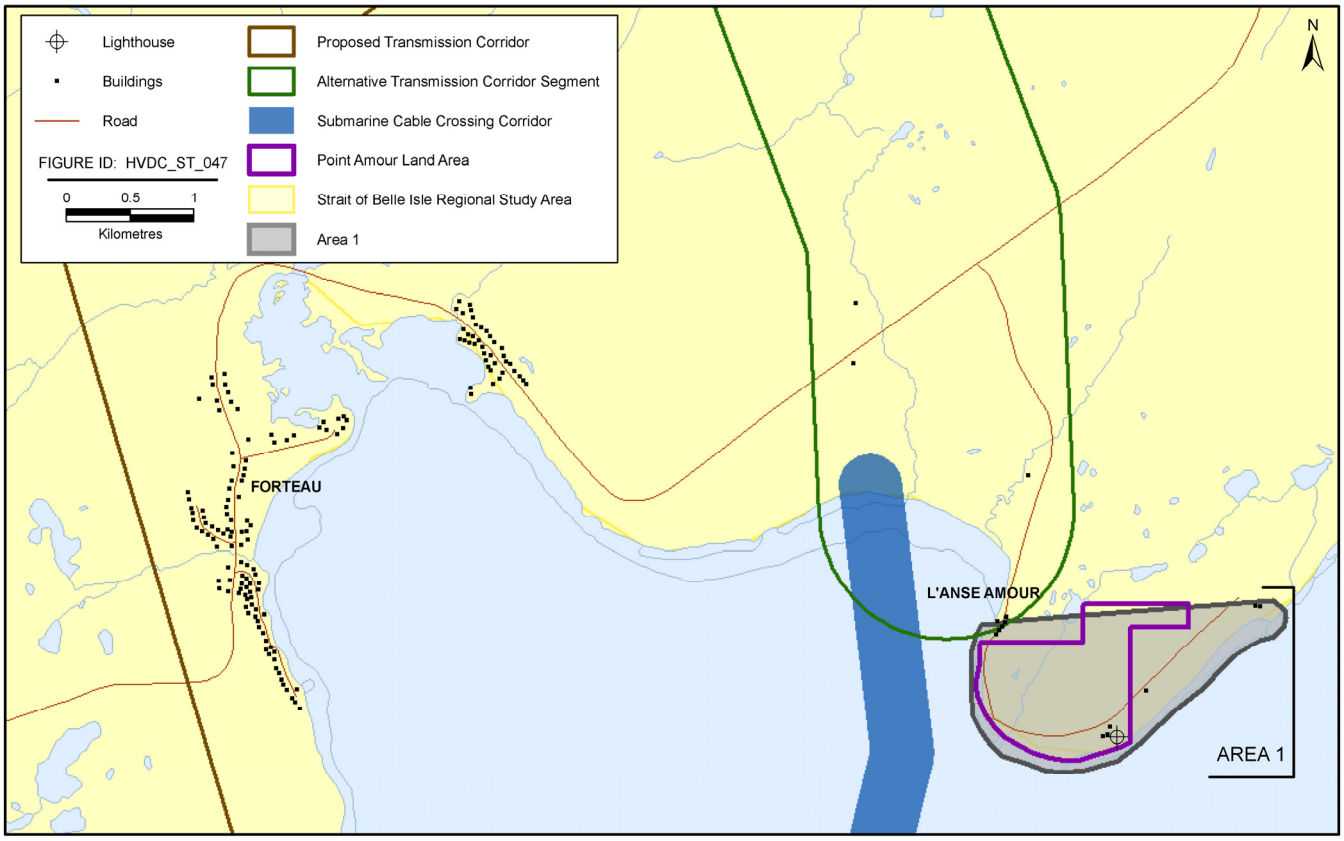
On the other side of the Island in Gros Morne National Park, intense studies of graptolites, trilobites and conodonts have been used to recognize the boundary between the Cambrian and the Ordovician. Deposition is continuous and for that region, the World Stratotype and the Gold Spike is set in the rocks at Green Point in the Green Point Formation of the Cow Head Group (Barnes 1988). This level is controlled by conodonts and occurs just below outcrops of early graptolites.

It is interesting to note that these two boundaries, although now present in Newfoundland, originally developed on different continental plates.

Palaeontological Resources Research

Fossils of similar ages but from different environments occur in many of the tectonic zones shown in Figure 3-9. The same phyla occur in all zones but are represented by different genera and species and therefore were studied in conjunction with the geology of each zone.

Figure 3-9 L'Anse Amour Outcrop Containing Archeocyathids



3.4.4 Palaeontological Resources in Labrador

Consideration of the potential for Palaeontological Resources to occur in the Study Area in Labrador is based largely on Wardle et al. (1997). The Study Area included lands largely underlain by igneous rocks that make up the core of the North American continent. The only sedimentary rocks (i.e., those with some potential for palaeontological resources) within the portion of the Project Area near the Churchill River and within Lake Melville are sandstone and conglomerate strata of the Neoproterozoic Double Mer Formation. The Double Mer Formation is a continental deposit in which a massive amount of material accumulated quickly in a rift valley. As all evidence of early life is restricted to ocean contexts, the palaeontological potential of this continental deposit is negligible and fossils have not been recorded here (Williams et al. 1985, Internet site; Gower 1986); the likelihood that such resources are present is low.

Other than stromatolites that are formed by cyanobacteria and are found through most of the PreCambrian deposits, the only fossils reported from Labrador are those of Cretaceous cover rocks found in the Labrador Trough north of the Study Area (Wardle et al. 1997).

The portion of the HVdc transmission corridor from Gull Island to the south Labrador coast passes over Precambrian or very early Cambrian rocks and only travel over sedimentary rocks near the Churchill River. These rocks are very coarse-grained conglomerates and there have been no fossils reported from that particular area. The Cambrian rocks on the coast belong to the Humber Zone.

3.4.5 Palaeontological Resources in the Humber Zone (Labrador Coast and Northern Peninsula)

The fossils of the Humber Zone were laid down in rocks on the edge of the North American plate. The early sediments are Cambrian in age lapping against the PreCambrian, mostly intrusive Grenvillian rocks of the Long Range Mountains and southern Labrador below. On the Labrador coast, the Forteau Formation, which is of Cambrian age (Figure 3-8), occurs in the cliffs and on the beach below the lighthouse at L'Anse Amour (see Area 1: Figure 3-9).

These outcrops of red limestone (Colman-Sadd and Scott 1994) include rare reef-building fossils referred to as Archeocyathids (Fong 1967; James and Dubrenne 1980a; Dubrenne and James 1981). These animals are the first reef-building fossils to appear in geological time other than cyanobacteria, which formed stromatolites (James and Kobluk 1978; James and Dubrenne 1980b).

What makes the Archeocyathids at L'Anse Amour so special is that on the beach they occur in the same position in the shallow water as that in which they would have originally grown (Fong 1967; James and Dubrenne 1980a; Dubrenne and James 1981). Although these fossils do occur in a few other places in the world, it is only here that they are seen in the relative position in which they were formed.

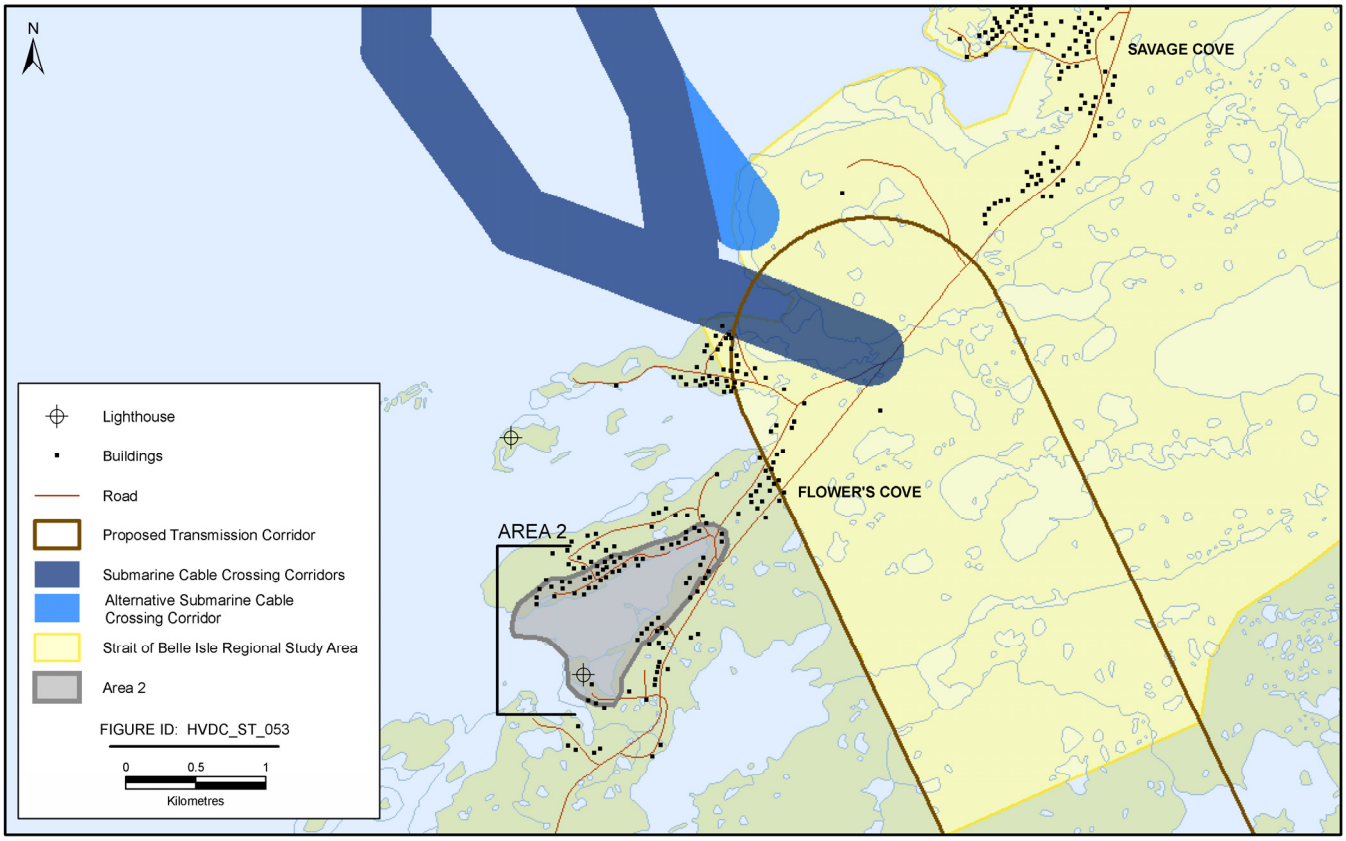
The HVdc transmission corridor continues south over geological deposits of the St. George's group and the Cow Head Group until it crosses the Long Range Mountains just north of Gros Morne National Park. Much of this area is covered by glacial deposits, bog, soil, and vegetation. These two groups lie stratigraphically above the Cambrian rocks. The St. George's Group was laid down in fairly shallow water, with the formations within the group alternating between shallower and slightly deeper water deposits. The sediments of the St. Georges's Group, in the north of the peninsula show considerable dolomitization, caused by fluids rising through the deposits changing the limestone to dolomite. In the south, in the area of the Port au Port Peninsula, the Group is often undolomitized and remains as limestone, allowing better samples for study from the same formations as those that occur in the north of the Northern Peninsula. Studies of the trilobites and the conodonts show that these deposits contain genera that existed in shallower water. The St. George's Group contains palynomorphs, conodonts, graptolites (in the shales), ostracodes, brachiopods, horn corals, cephalopods and trilobites. There is an important exposure on Table Point where orthocone cephalopods are found that is protected by the Table Point Ecological Reserve.

The Cow Head Group is approximately the same age as those laid down in deeper water offshore, with material raining down the slope and often showing genera, which preferred deeper water. At times, this material may have been shaken down by strong earthquakes, as some of the blocks in the Cow Head Conglomerate are as big as houses or larger. The Cow Head Group contains similar fossil groups of similar age to the St. George's Group but different genera and species that preferred deeper water. Palynomorphs and conodonts from both these Groups have been used to identify the state of thermal maturation of these rocks for oil companies.

The most important and accessible outcrops of these fossiliferous limestones and dolomites actually occur close to or along the coast and at the Daniels Harbour Mine.

In the area of the proposed transmission corridor, the southern side of Flowers Cove (see Area 2: Figure 3-10) contains rather special outcrops of thrombolites (clotted structures), large algal mounds that can be seen on both sides of the bay (Colman-Sadd and Scott 1994; Kennard and James 1986). The corridor then passes inland over areas often covered by bog.

Figure 3-10 Flower's Cove Area



Fossils of Overlap Rocks

The area south of White Bay is made up of marine and volcanic Silurian rocks of the Sops Arm Group, which contains macrofossils, including brachiopods and crinoids that have been distorted by metamorphism due to later intrusion of granites in the area. The crinoids are well enough preserved to show that the rocks are Silurian in age. On the south shore of White Bay, the sediments within the volcanic rocks of the Natlins Cove Formation include low-grade marble that contains conodonts that concisely date the Sops Arm deposits. These marine Silurian rocks in the area of the HVdc transmission corridor are overlain by lacustrine and fluviatile rocks of the carboniferous Deer Lake and Howley Groups. These Carboniferous rocks contain coal seams and the original routing of the Newfoundland Railway was positioned near coal that was used to power the railway. There are some plant fossils described from these beds but none would be impacted by the proposed transmission corridor. South of Grand Falls, Silurian shales and sandstones in the area of the proposed corridor do not include any known important fossil-containing outcrops.

Fossils of the Dunnage and Gander Zones

In the Gander Zone, the proposed HVdc transmission corridor crosses mostly metamorphosed quartz-rich siliciclastic rocks and intrusive igneous rocks. These formations rarely contain fossils and a search of the literature has not produced evidence of fossils in the area of the proposed transmission corridor.

The Dunnage Zone is composed of the rocks that once made up the closing sea floor of the Iapetus Ocean. Southeast of the Red Indian Line, which marks the suture, the sediments were formed in the deep cold ocean on

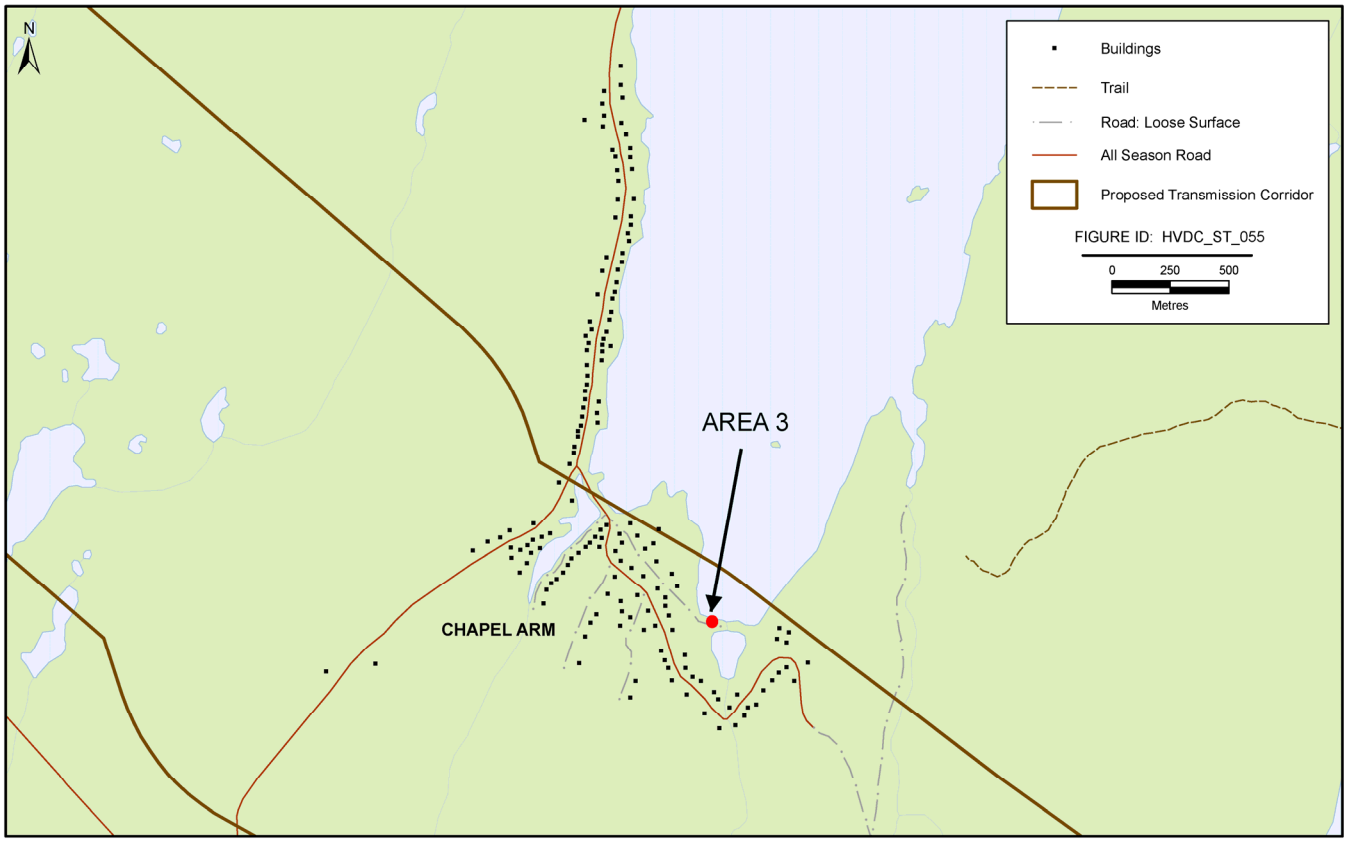
the European/African side of the Iapetus Ocean, known as the Exploits subzone. These sediments and their fossils have been studied in detail in great exposures along the northeast coast. Graptolites from shales and conodonts from carbonates and chert have enabled the rocks to be finely dated and the depositional environment to be determined. To the north and west of the Red Indian Line, which follows the fault to the east of Red Indian Lake, and northeast through the islands along the coast (the Notre Dame subzone), studies of graptolites and conodonts have determined that many of the fossils were deposited in island arc conditions.

The Cobbs Arm limestone on New World Island and limestones within the Cutwell Group on Long Island are both limestone conglomerates that slid down the slope around volcanic islands. These limestones are associated with graptolitic shales. In the Beaumont area on Long Island, fossils were obtained from blocks in lava flows. The Cutwell Group also contains poorly preserved, undescribed cephalopods. The fossils show that the environment was more oceanic (i.e., more open, cooler water) than those found in similar rock types at Cow Head. Although the proposed HVdc transmission corridor crosses the area of the Red Indian Line, it does not affect any areas with important outcrops. Most research was conducted to the north on coastal outcrops (O'Brien and Szybinski 1989). These inland exposures containing graptolitic shales and the exposures containing conodonts in the Catchers Pond Group and the Victoria Lake Group are not in the area of the proposed transmission corridor.

Fossils of the Avalon Zone (The Isthmus and Avalon Peninsula)

In the Chapel Arm area (see Area 3: Figure 3-11) there is an outcrop on the shore near the houses within the Adeytown Group near the Precambrian (Ediacaran)/Cambrian Boundary in the area of the HVdc transmission corridor containing "small shelly fossils".

Figure 3-11 Chapel Arm Area



These are very small shells of various shapes of unknown affinity (Landing et al. 1988). There is a similar, more accessible and larger outcrop, in Normans Cove across the bay from the pillow lavas so the outcrop on the coast near Chapel Arm does not need protection.

There are outcrops of Precambrian (Ediacaran) rocks of the Conception Group along the HVdc transmission corridor. In some places around the coast of the Avalon Peninsula, rocks of this age are seen to contain well-preserved, very ancient Ediacaran fauna fossils.

The Precambrian fossils of Mistaken Point, which occur in the Conception Group, are well known (Misra 1969). Fossils of this age are known in England, Australia, China and the USA, as well as those of the Avalon Peninsula. Such fossils are well studied. Most of the fossils of the Mistaken Point belong to a new phylum in the last few years since Misra's (1969) early work published. They are now well protected in an Ecological Reserve at Mistaken Point. There are other valuable outcrops within the Conception Group on the Avalon Peninsula that are outside the proposed HVdc transmission corridor; the oldest of these fossils have been chemically dated at 585 million years. During the construction of the highway, these rocks were exposed but no outcrops containing these fossils were discovered. The likelihood of discovering more of these fossils in the area of the proposed HVdc transmission corridor is low.

Intrusions

There are igneous intrusions throughout Central Newfoundland but they do not contain fossils. Much of the proposed transmission corridor covers these areas in Central Newfoundland.

3.4.6 Conclusion

The geology of Newfoundland crosses the Island in a southwest–northeast direction. This means that the geology of the central part of the Island can also be seen in outcrops along the northeast coast. Most of the studies of fossils in the central mobile belt (the Dunnage and Gander Zones) of Newfoundland have been carried out along the readily accessible northeast coastline. Those outcrops that are inland and contain fossils, which have been used to confirm the biostratigraphy of inland formations, are not found in the area of the proposed transmission corridor.

Other than one location at L'Anse Amour in southern Labrador (see Area 1: Figure 3-9), a location at Flowers Cove on the Great Northern Peninsula (see Area 2: Figure 3-10) - which is located just outside the Study Area - and one location at Chapel Arm, Trinity Bay (see Area 3: Figure 3-11), the proposed transmission corridor avoids most important fossiliferous outcrops in other parts of the Island and in Labrador.

4.0 DISCUSSION

Study results are summarized and discussed separately for each portion of the Labrador - Island Transmission Link Study Area, including: 1) Labrador; 2) Strait of Belle Isle; and 3) Newfoundland.

4.1 Labrador

The results of the Historic and Heritage Resources research for Labrador, including background research, fieldwork and archaeological potential mapping are discussed below, along with the results of Palaeontological Resources research for the Study Area and a summary of data gaps.

4.1.1 Background Research

Historic and ethnographic evidence indicates a relatively high potential for Aboriginal and historic European settlement at the coastal extremes of the Study Area in Labrador, particularly at the Strait of Belle Isle, where the pre-contact and post-contact human history is both long and complex, including a long pre-contact sequence of occupations, and early Contact-Period occupation. To a lesser extent, Upper Lake Melville also has a long and complex history of human occupation.

The earliest evidence for human activity in the province is found along the Strait of Belle Isle. Numerous archaeological sites investigated over decades of research have revealed evidence for a Maritime Archaic Amerindian occupation beginning at a very early date, followed by Intermediate Period and late pre-contact Amerindian settlement, along with occupation by Palaeo-Eskimo peoples from the north.

The Contact Period here also begins early. Seasonal Basque occupation in the 16th and 17th centuries has been investigated extensively at Red Bay to the northeast of the Study Area, although other Basque whaling stations were established elsewhere along the coast. Important Contact-Period Aboriginal sites have also been identified at Red Bay. The 18th century French and Jersey occupations of Labrador have not yet been investigated in detail, although some research has been undertaken on one 18th century English shore station. In short, the archaeological inventory for this region was known to be both large and rich even before the study reported herein was completed.

The archaeological inventory is also relatively large for Upper Lake Melville, where the definitive Intermediate and late-pre-contact archaeological sequence for central Labrador was defined at North West River. There are presently over 60 registered sites in the North West River/Sheshatshiu area alone. This includes the historic 18th and 19th century fur trade post at North West River, for which there are also documentary records, including the post journals in the HBC archives. Contemporary Aboriginal sites have been recorded at many places in Upper Lake Melville, particularly at Sebaskachu Bay and the mouth of the Kenamu River.

Prior to assessment of the Lower Churchill Hydroelectric Generation Project, no archaeological research had been undertaken along the Churchill River itself, and its potential for pre-contact archaeological sites had not been established. Available historic and ethnographic literature nevertheless indicated the potential for historic HBC trading posts, historic Innu camps and evidence for late 19th to 20th century Settler tilts and trapping activity.

In upland areas between Gull Island and the Strait of Belle Isle, the potential for pre-contact sites was similarly unclear before the 1990s. However, extensive Innu land-use data indicated that the Eagle Plateau was and is an important harvesting area, with travel routes leading north, south and east along major rivers such as the Kenamu, St. Augustin and St. Pauls, linking the plateau region to Upper Lake Melville, the south coast of Labrador and the Lower North Shore of Quebec. Historic and ethnographic literature indicated little potential for early historic European sites, as Europeans initially rarely ventured into the deep interior. However, by the late 19th century, Settlers from Upper Lake Melville were trapping along the Kenamu River, and hunters and trappers from the south coast, between the Strait of Belle Isle and Sandwich Bay, were active in the eastern portion of the Eagle Plateau. Prior to the Project-related Historic and Heritage Resources assessments, little archaeological research had been conducted to verify this potential, although several simultaneous projects have since identified interior sites in the general area, including Intermediate Period pre-contact sites, one early historic Innu site and evidence of recent and contemporary Innu and Settler hunting and trapping.

4.1.2 Summary of Testing Effort and Results

Assessment of the Labrador portion of the Labrador - Island Transmission Link corridors between 1998 and 2009 involved investigating 312 testing locations. Of these, 242 were assessed by means of sub-surface testing, with a total of 13,482 testpits excavated. In all, 155 of these testing locations lie within the current Study Area and at these, 6,116 testpits were dug.

Broadly-speaking, testing locations are well-distributed among the various sub-areas in Labrador. Within the upper Churchill River Estuary and Lake Melville sub-area, testing locations are widely distributed, with particular concentrations at Sebaskachu Bay, the Mud Lake area, the mouth of Traverspine River, the Muskrat Island area, McKenzie River and Muskrat Falls. North of the lower Churchill River, between Muskrat Falls and Gull Island, testing effort was concentrated at Muskrat Falls and the Gull Lake–Gull Rapids area, but also includes testing locations distributed along the preserved high-elevation terrace frontages on the dunefield terraces north of Churchill River. In the uplands, testing effort has been concentrated on the major river crossings, including the Kenamu and Little Drunken Rivers, Riviere Joir, St. Augustin River, St. Paul's River and Riviere Bujeault.

At the Strait of Belle Isle, assessment effort was concentrated on the marine terraces at Forteau Point, L'Anse Amour and, to a lesser extent, at Fox Cove, though the high potential of the Straits area in general had been well established in previous research, and testing here was therefore not as high a priority.

The distribution of testing locations among the mapped potential Zone Types is not even, but was not intended to be. Approximately 50 percent of all testing effort was focused on Zone Type 01 and Zone Type 02 locations on major waterways.

Pre-contact Sites

Except for one site near Muskrat Falls, no pre-contact sites have been identified within the Study Area in the Churchill River Estuary and Upper Lake Melville. However, dozens of pre-contact sites have been recorded elsewhere in this sub-area, including rich concentrations of sites at North West River and Sheshatshiu, and smaller site clusters near Happy Valley and Mud Lake. The overwhelming majority of these are dated to the Intermediate Period, though some evidence for Late Maritime Archaic and late pre-contact Amerindian occupations has also been identified.

In the Churchill Valley, from Muskrat Falls to Gull Island, pre-contact sites within the Study Area have been identified at only the two Churchill River crossings (at Muskrat Falls and at the bottom of Gull Rapids). These sites have been typologically dated to the Intermediate Period as well, and they belong to a series of Intermediate site clusters, most lying outside the Study Area, recorded at regular 20 to 25 km intervals along the lower Churchill River. Investigation of the high terraces north of Churchill River has yet to reveal evidence for earlier occupation in the Churchill Valley.

No pre-contact sites have been identified within the corridor on the uplands between Gull Island and the Strait of Belle Isle, although several pre-contact sites, all typologically dated to the Intermediate Period, have been recorded elsewhere, on the Eagle Plateau and the upper Kenamu River.

The only large concentrations of pre-contact sites known to exist within the Study Area are those situated on marine terraces between Forteau Point and West St. Modeste along the Strait of Belle Isle. These include three site recorded during assessment of the Labrador - Island Transmission Link. The many other sites recorded within this section of the Study Area pertain to various phases of the lengthy pre-contact archaeological sequence in southern Labrador, including Maritime Archaic, Early and Late Palaeo-Eskimo, late pre-contact Amerindian and Inuit.

Broadly-speaking, these results are consistent with previous findings. Many pre-contact sites had previously been recorded near the Strait of Belle Isle section of the Study Area and these attest to diverse periods of occupation. Pre-contact sites in Upper Lake Melville are also common and, although most date to the Intermediate Period, the preceding and subsequent periods of Amerindian occupation are also represented. Pre-contact sites in the interior uplands are less abundant and, in fact, none of those recorded to date lie within the Study Area. Those recorded elsewhere are at strategic locations on major lakes and rivers, and all date to the Intermediate Period. In recent years, largely as a result of assessment conducted for the Lower Churchill Hydroelectric Generation Project and Labrador - Island Transmission Link, it has become increasingly apparent that the great majority of interior pre-contact sites in the region date to the Intermediate Period and that this represents the period of most intensive pre-contact occupation in the central Labrador interior (Schwarz 2007).

Historic Sites

Many historic sites have been identified in the general vicinity of the Study Area, including the HBC post at North West River and the outpost at Sandy Banks, and various historic Innu sites in Sebaskachu Bay and Mud Lake. Within the Study Area, approximately 20 sites with Historic-Period components have been identified, the majority of which are situated along the coastal strip of the Strait of Belle Isle. Of the total, only one historic site – a 19th century quarry associated with construction of the lighthouse at Pointe Amour – was identified as part of the Labrador - Island Transmission Link assessment. Therefore, there is little new evidence bearing on the historic archaeology of the Study Area.

Contemporary Sites

Many contemporary sites have been found within the Study Area in Labrador, including tilts/cabins, trapping locations, and locations that represent campsites or other miscellaneous land-use activities. Most of the campsites are likely associated with Innu land-use and these are generally found either along major waterways, or along roads and highways. Tilts and cabins are associated with riverfront, lakefront and coastal locations. Evidence of trapping is commonly found at the mouths of both minor brooks and major tributaries, but can also be associated with access roads.

4.1.3 Archaeological Potential Mapping

Archaeological potential mapping at 1:50,000-scale has been completed for the entirety of the current Labrador - Island Transmission Link Study Area. In Labrador, this includes the potential (alternative) electrode line corridors to Lake Melville, the proposed transmission line corridor from Gull Island, and the regional area along the Strait of Belle Isle. The method employed was the same as in previous potential mapping studies for the Lower Churchill Hydroelectric Generation Project and the Labrador - Island Transmission Link, whereby topographically-defined Zone Types are mapped, and sampling effort and site yield are then compared to generate archaeological potential ratings for each Zone Type.

Although potential ratings for these Zone Types have been derived in previous studies, the process is an iterative one, which can be repeated each time new field data are collected. For this study, field data from the most recent assessments in 2008 and 2009, and also from previous field studies from 1998 to 2006, were compiled to verify potential ratings for the Labrador - Island Transmission Link Study Area.

All relevant previous testing effort was considered in this analysis, including testing locations that formerly lay within transmission line corridors but no longer do. A review of the rate of recovery (sites per testing locations) for each of the Zone Types confirms the above-average Historic and Heritage Resources potential of Zone Type 01 in the Labrador portions of the Study Area, consisting primarily of strategic locations on the banks of major rivers, Zone Type 05 (preserved marine or riverine terraces in strategic locations) and Zone Type 07 (coastal plain). The remaining Zone Types display average or lower-than average potential for Historic and Heritage Resources.

Considering the length of the Study Area in Labrador and the diversity of the terrain it traverses, potential ratings are relatively consistent for each Zone Type within the entirety of the Study Area. The sole exception is Zone Type 07. In upper Lake Melville, where the coastal plain is extensive and high-potential Zone Type 05 terraces may be distinguished and mapped at 1:50,000, this Zone Type is rated as having “Moderate” potential. However, in the Strait of Belle Isle, where Zone Type 07 zones include many Type 05 and Type 06 zones, which cannot be mapped at this scale, the archaeological potential of this Zone Type is rated “High”. Where high-potential zones (and recorded archaeological sites) are clearly present but cannot practically be mapped at this scale, it is appropriate to default to the higher potential rating in this case.

Zones of High potential within the Labrador portion of the Study Area are shown on Figures 4-1 and 4-2.

4.1.4 Palaeontological Resources

A review of the geological mapping for the Study Area and relevant literature indicates that, due to the age and type of the rock formations in the Churchill River Valley and in the Lake Melville area, the overall potential for Palaeontological Resources is low. Conditions along the HVdc transmission corridor from Gull Island to the Strait of Belle Isle indicate a similar level of potential. However, at the coast in the Strait of Belle Isle, one area of importance has been highlighted near L’Anse Amour (see Area 1: Figure 3-9).

Figure 4-1 High Potential Zones: Upper Lake Melville to Muskrat Falls (Labrador) and Muskrat Falls to Gull Island (Labrador)

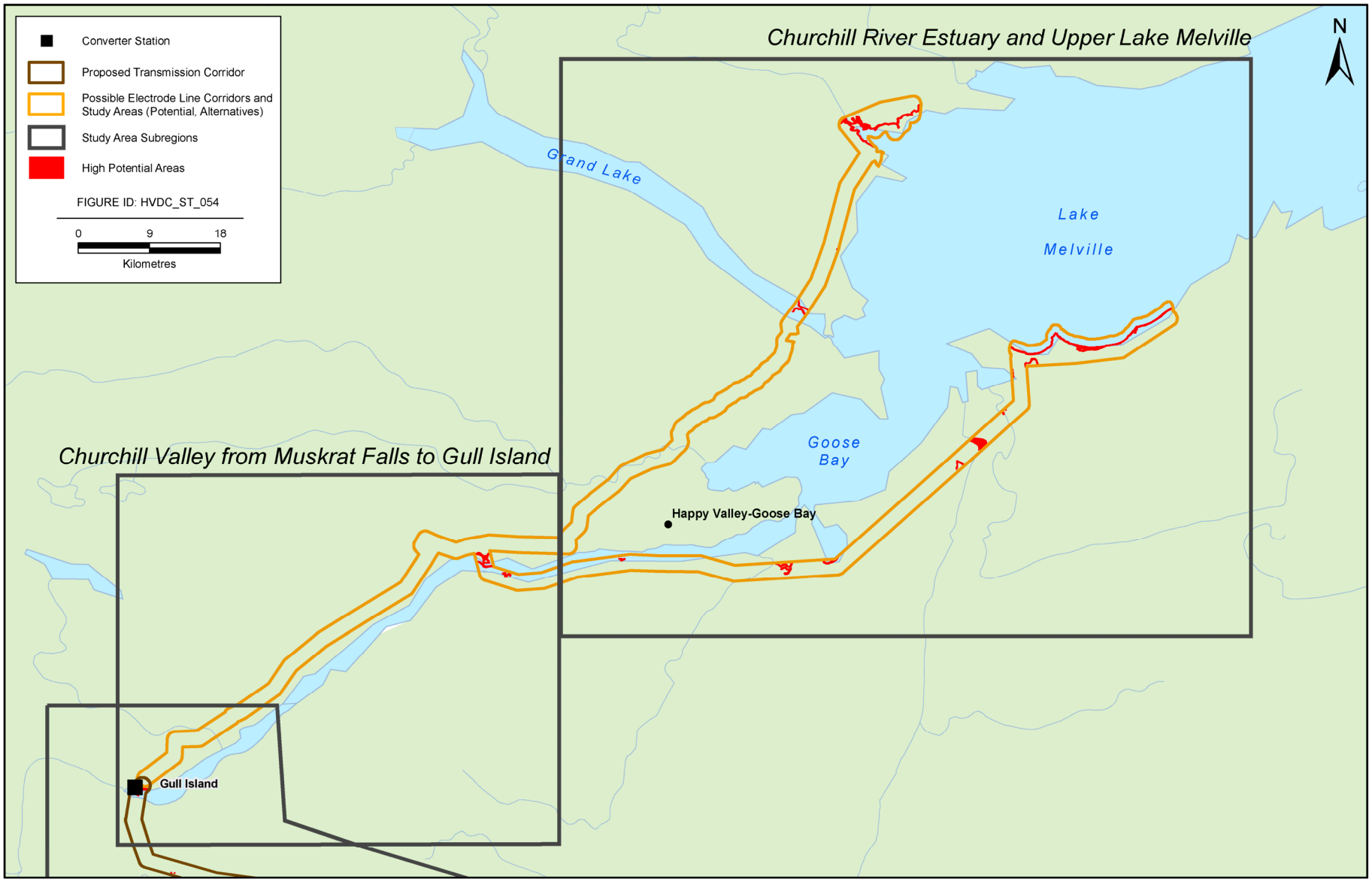
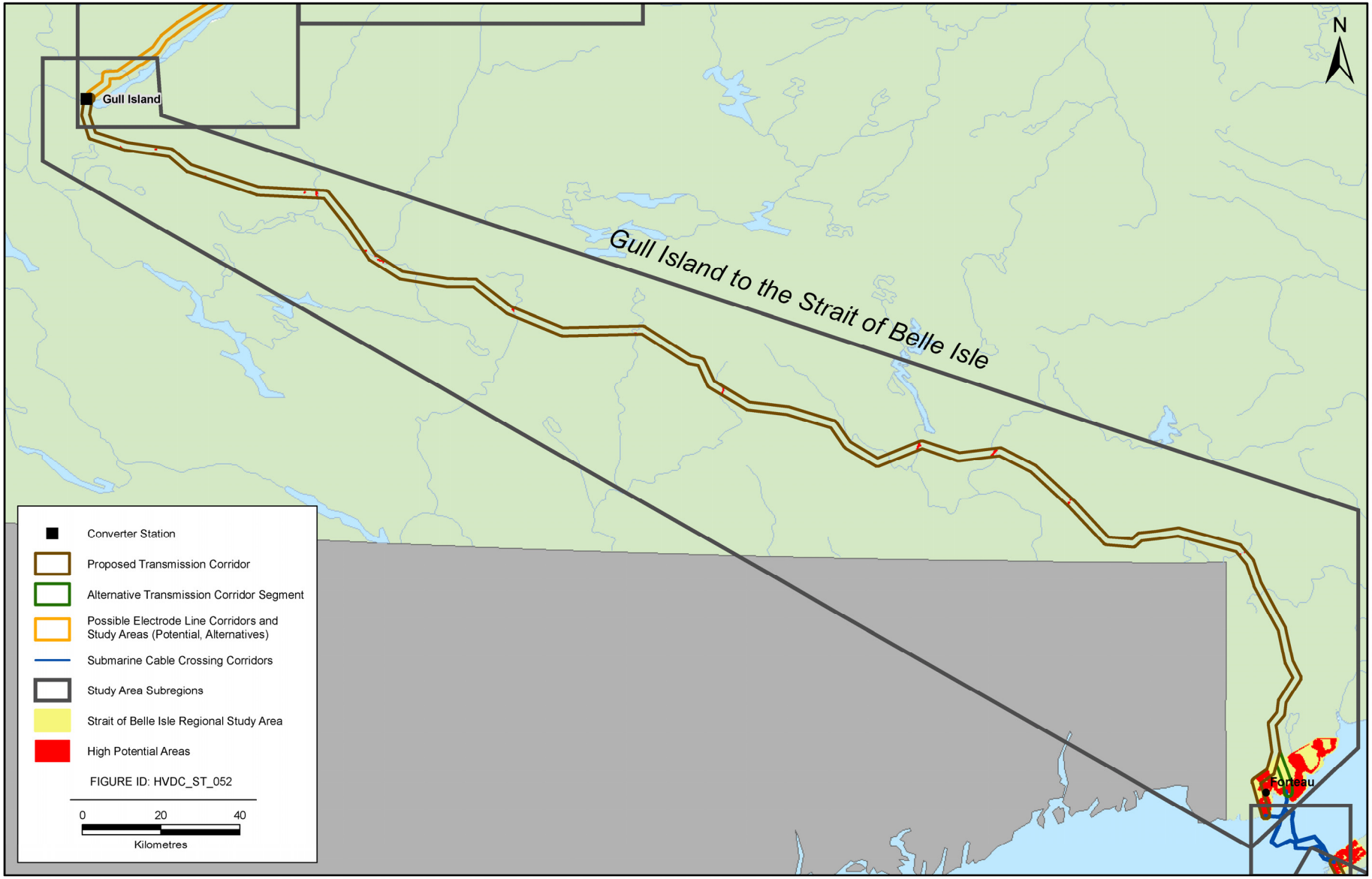


Figure 4-2 High Potential Zones: Gull Island to the Strait of Belle Isle (Labrador)



4.1.5 Information Availability and Data Gaps

The principal gap in background research data is the present lack of available data on Quebec Innu land-use. The Eagle Plateau is an area of shared harvesting used by Innu from Sheshatshiu and from the communities on the Lower North Shore of Quebec, and data from Labrador alone provide only a partial and incomplete picture of traditional and contemporary Innu land-use.

Before the 2006 Project-related Historic and Heritage Resources research, the central Labrador interior, especially the uplands between Gull Island and the Strait of Belle Isle, had seen little assessment effort. To some extent, this was also true of the high terraces north of Churchill River. Intensive effort in 2006 rectified this, and even though some of these testing locations now lie outside the Study Area, many are still located within the corridor, and interior testing locations are now reasonably well-distributed along the corridor and among different Zone Types. There are no significant data gaps in the survey coverage for Labrador.

The most curious aspect of the site inventory is the lack of pre-contact or historic sites in the interior portions of the Study Area, even at the major waterways and river crossings. Sites of these periods have been found to the north of the corridor, on the Eagle Plateau and the Kenamu River, so they are present in the region as a whole. Many upland waterways traversed by the transmission corridor are major rivers, known travel routes in the recent past and historic periods. It is likely that these were travel routes in the Pre-contact Period as well, since those pre-contact sites known for the upper Kenamu River and Eagle Plateau all lie on one of these traditional Innu travel routes, from upper Lake Melville to the Eagle Plateau and south to the Lower North Shore of Quebec. Sites on travel routes may be located not merely at strategic locations, but spaced at intervals representing one day's travel. This was probably the case on the lower Churchill River itself, where pre-contact sites were found in clusters spaced 20 to 25 km apart. It is therefore possible that the transmission corridor happens to avoid any historic or pre-contact site locations, and that the corridor simply does not intersect these waterways at the appropriate places. It is also possible that sites are present within the corridor but simply have not yet been encountered in assessment.

The majority of sampled Zone Types consist of Type 01 and Type 02 shorelines along major waterways. Approximately 50 percent of all relevant testing locations belong to these two Zone Types. The significantly higher yield of archaeological and ethnographic sites in Type 01 zones validates the strategic location criteria employed to define this Zone Type. Approximately 15 percent of relevant testing locations belong to each of Zone Types 6 and 7, while less than 10 percent of sampling locations are found within each of Zone Types 05, 08, and 09. Zone Types 10 and 12 each represent only 0.3 percent of sampling effort.

The various Zone Types clearly have not been sampled equally, or in proportion to their frequency within the Study Area. However, the relative archaeological potential of most Zone Types has been established in previous studies and the objective for this assessment was to sample Zone Types of known high potential, not to achieve a stratified random sample. The wide variation in sampling effort for this study is not considered to represent a data gap.

The only Zone Type for which archaeological potential remains somewhat uncertain is Zone Type 12 (Esker). Eskers are assigned moderate potential, based on their general theoretical potential rather than any empirical results from Labrador. The archaeological potential of eskers in Labrador remains somewhat unclear, in part because relatively little effort has been directed toward investigating them. Though sites associated with eskers have been identified in Labrador, the strength of any association between eskers and enhanced archaeological

potential has yet to be verified in this region. The level of sampling of Type 12 zones in this study is low, but this reflects the fact that eskers are rare in the Study Area. This is not a data gap that can be rectified within this particular Study Area; the archaeological potential of eskers in Labrador will only be determined following research in other areas where this Zone Type is more commonly present. The level of information for this study component is considered adequate for the EA of the Project.

4.2 Strait of Belle Isle (Marine Environment)

Historic and Heritage Resources research in the Strait of Belle Isle is discussed below, along with a summary of data gaps.

4.2.1 Background Research

Review of historic literature and archaeological reports describing the known cultural-historical sequence for Strait of Belle Isle indicates that the waterway separating the Island portion of the province from Labrador was a high-traffic area for European shipping and fisheries-related activities from the early 16th century. While Vikings undoubtedly cursed these waters some 500 years earlier, and likely made landfall on both shores, no sub-marine evidence of this, sunken vessels or otherwise, has been recorded to date. Nevertheless, given the understanding of the nature and extent of later fisheries and shipping, it was evident that the marine environment of the Strait of Belle Isle has potential for historic resources, most notably shipwrecks, and possibly historic aircraft as well. It is equally possible that the foreshore where the cable will depart Labrador and come ashore on the Island may also have been used intermittently from the 16th century on for various types of fisheries-related buildings and structures.

Despite this possibility, no archaeological materials have been observed or reported for the marine environment by local residents and no objects of historic significance were identified during Project-related marine studies conducted in 2007, 2008 and 2009. Even though there are shipwrecks reported for the general Strait of Belle Isle area, locational data and marine surveys indicate that none are situated within the current Study Area. However, one registered shipwreck – the *HMS Raleigh*, EiBf-30 - is known for the foreshore area on the Labrador side of the Strait of Belle Isle near Pointe Amour.

Given that the shoreline on both sides of the Strait of Belle Isle has been emerging since deglaciation rather than submerging, the potential for archaeological materials from the Pre-contact Period (i.e., stone tools and chipping debris) to be encountered in the marine environment of the Project Area is considered low.

4.2.2 Summary of Survey Effort and Results

As noted, no archaeological fieldwork was conducted in the marine environment of the Strait of Belle Isle for the current Historic and Heritage Resources assessment. However, the extensive seabed data compiled in 2007, 2008 and 2009 by companies under contract to Nalcor Energy were systematically gathered and reviewed; thus, it is considered comprehensive and completely applicable for archaeological research. No materials or sites of Historic and Heritage Resources significance were identified.

4.2.3 Information Availability and Data Gaps

For the purposes of this study, the background research completed for the marine environment of the Strait of Belle Isle is considered adequate, with no data gaps apparent. With the exception of the near-shore area of the marine environment on either side of the Strait of Belle Isle, the survey coverage is considered adequate for the EA of the Project.

It is possible that materials deposited from fisheries infrastructure situated along the shoreline during the Historic Period are present within the corridor but are buried beneath sediments and have not yet been encountered or observed. As the final transmission line route for the marine environment is selected, monitoring during excavation of the specific near-shore area would determine if this is the case and thus reduce the likelihood of any Project interactions with any cultural materials present.

4.3 Island of Newfoundland

Historic and Heritage Resources research on the Island of Newfoundland, including background research, field assessment and potential mapping are outlined below, along with the results of the Palaeontological Resources assessment and a summary of data gaps.

4.3.1 Background Research

Background research of historic and ethnographic material suggests a relatively high potential for Aboriginal and historic European occupations along coastal sections of the Project Area and in locations where the Project corridor crosses or tracks major interior waterways and harvesting areas. Areas of note in this regard would include the coastal strip of the Strait of Belle Isle at the proposed cable-landing site near Mistaken Cove, and several of the near-coastal lakes and ponds on the Northern Peninsula, including Round Lake and Portland Creek Pond. Sea level changes in the Portland Creek Pond areas could indicate higher potential at elevations back from and above the current shoreline.

Given the long-standing, documented use of the region, the potential for Historic and Heritage Resources is moderate to high within the regional Study Area at the Strait of Belle Isle, and moderate to low along the majority of the route extending south in the interior of the Northern Peninsula. Similarly, in the Central and Eastern Interior of Newfoundland, background research indicates many of the interior waterways, such as Birchy Lake and the Exploits Rivers, have potential for pre-contact and historic Aboriginal materials, as well as early and later historic European occupations.

While the potential of the Avalon Peninsula portion of the Labrador - Island Transmission Link Study Area is perhaps lower, the presence of known pre-contact sites in the interior hinterland, and documentation from the early Historic Period describing Beothuk and European travel corridors across the Isthmus of Avalon between Trinity and Placentia Bays, does suggest that there is some potential for Historic and Heritage Resources in the region. As well, the considerable European populations along the coastal strip of those two bays that gradually grew during the 17th through to the 19th century, almost certainly resulted in an increase in use of the interior for fishing, hunting, and other resource harvesting activities.

Prior to the present Study, the archaeological inventory within the Project Study Area on the Island was limited to four registered sites, including two of Aboriginal origin on an island in the Exploits River near Badger, and two

on the Avalon Peninsula. One of the latter is the remains of a 19th century telegraph station at Bull Arm on the Isthmus, and the other consists of a section of a Maritime Archaic Indian biface discovered on a small island in Soldiers Pond.

4.3.2 Summary of Testing Effort and Results

Assessment of the Island portion of the Labrador - Island Transmission Link Study Area in 2008 and 2009 involved the ground investigation of 145 testing locations. Of these, 96 were assessed by means of sub-surface testing, and 1,513 testpits were excavated. Out of this total, 137 testing locations lie within the current transmission corridor and 1,380 testpits were dug at these locations.

Broadly-speaking, testing locations are well-distributed among the various sub-areas on the Island. On the Northern Peninsula, for example, testing locations are widely distributed, with particular concentrations at the coast and major interior waterways, including Mistaken Cove, Round Lake and Ten Mile Lake, Middle Pond and Lady Worcester Brook and Portland Creek Pond and Inner Pond. Further south along the corridor in Central Newfoundland, testing was concentrated at Birchy Lake, Upper Sheffield Brook, the Exploits River near Badger, the Gander and Southwest Gander Rivers and at the outflow of Dead Wolf Brook. Several locations on the Isthmus of Avalon were also tested, as were a number of locations of potential further southeast along the corridor. Testing was also conducted around the shoreline of Soldiers Pond, where a Maritime Archaic Indian artifact was located in the 1960s.

The distribution of testing locations among the mapped potential Zone Types is not even, but was not intended to be. Nearly 85 percent of all testing effort was focused on Zone Type 01 and Zone Type 02 locations on major waterways.

Pre-contact Sites

Along the Island portion of the Labrador - Island Transmission Link, there are six registered pre-contact sites within the corridor: two are on the Northern Peninsula; three are in Central Newfoundland; and one is on the Avalon Peninsula. Of the total, five were identified during assessment of the Labrador - Island Transmission Link corridor in 2008, and one was located during a geological survey of the Soldiers Pond area in the 1960s. This site is the only one of the total that can be ascribed cultural affiliation, which, based on the material and artifact type, appears to date to the Maritime Archaic Period. Due to the limited findings at the other pre-contact sites, it is not possible to determine culture or age.

For the recently identified West Coast corridor option, 13 pre-contact sites are registered for the corridor, including sites of Maritime Archaic Indian, Palaeo-Eskimo and Late Pre-contact Indian cultural affiliation. Given the corridor's proximity to the coast and waterways, these findings are consistent with the results of other research previously conducted on the west coast of the Island, both to the north and south. Indeed, in general, the distribution of pre-contact sites along the Newfoundland portion of the corridor is as anticipated, with sites concentrated on coastal shorelines, and also distributed along major interior waterways.

The only site difficult to predict or explain is the Maritime Archaic biface from Soldier's Pond. Contextual information is unfortunately lacking for this discovery, but it is possible that this piece, a finished artifact, is simply a stray find resulting from upland hunting activities and that it did not pertain to a habitation site at all.

Historic Sites

On the Island portion of the Labrador - Island Transmission Link, there are five registered historic sites within the corridor. Two of these are situated at the proposed cable-landing site at Mistaken Cove/Yankee Point on the Northern Peninsula and were identified during the 2008 assessment. Two other previously identified historic sites are the two Beothuk sites recorded on Two Mile Island near Badger. The fifth is the historic telegraph station situated on the isthmus of the Avalon Peninsula at the bottom of Bull Arm. These five sites are widely separated in space, time, and cultural affiliation and there is no discernable "pattern" of historic occupation, other than that historic European sites may be anticipated in coastal settings, and Beothuk habitation sites may be anticipated along the Exploits River.

Except for the telegraph station, a somewhat unique site, no evidence for historic European occupation was recovered from interior testing locations on the Island. Although European settlers have harvested resources in the interior, including wood, furbearing mammals and game, and have done so relatively intensively from the 18th century, archaeological evidence for these activities has generally been elusive.

Ethnographic Sites

Only two ethnographic sites are registered for the Island portion of the Labrador - Island Transmission Link corridor, both of which were identified during the 2008 assessment. One is situated on Round Lake on the Northern Peninsula and consists of remains associated with the once extensive logging industry that existed in that region of the province. The second site is the remains of two cabins situated on the shoreline of Gander River, which may have been used for fishing and hunting during the second half of the 20th century. No contemporary sites are registered for the West Coast corridor option.

4.3.3 Archaeological Potential Mapping

The observations on archaeological potential mapping for Labrador in Section 4.1.3 apply equally to the Island portion of the assessment.

Archaeological potential mapping at 1:50,000-scale has been completed for the entirety of the current Project corridors. On the Island this includes the regional area at the Strait of Belle Isle and the proposed and alternate transmission line and electrode line corridors. The method employed was the same as in previous potential mapping studies for the Lower Churchill Hydroelectric Generation and Labrador - Island Transmission Link projects, whereby topographically-defined Zone Types are mapped, and sampling effort and site yield are then compared to generate archaeological potential ratings for each Zone Type.

Although potential ratings for these Zone Types have been derived in previous studies, the process is an iterative one, which can be repeated each time new field data are collected. For this study, field data from the most recent 2008 assessment on the Island have been combined with data from previous field studies from 1998 to 2006 to verify potential ratings for the Project corridor.

All relevant previous testing effort was considered in this analysis, including testing locations that formerly lay within transmission line corridors but no longer do. A review of the rate of recovery (sites per testing locations) for each of the Zone Types confirms the above-average historic resources potential of Zone Type 01 (in this Project Area, consisting primarily of strategic locations on the banks of major rivers), Zone Type 05 (preserved

marine or riverine terraces in strategic locations) and Zone Type 07 (coastal plain). The remaining Zone Types display average or lower-than average potential for historic resources, though the sample sizes are small.

Zones of High potential within the Island portion of the Study Area are shown on Figures 4-3, 4-4 and 4-5.

4.3.4 Palaeontological Resources

On the Island portion of the Project, two sites of palaeontological importance have been identified. One is located at Flower's Cove in the Strait of Belle Isle area (see Area 2: Figure 3-10) and the other is at Chapel Arm at the bottom of Trinity Bay (see Area 3: Figure 3-11).

4.3.5 Information Availability and Data Gaps

For the purposes of this study, the background research completed for the Island portion of the Project assessed is considered adequate, with no data gaps apparent.

For the purposes of this Stage 1 Assessment, the survey coverage of the greater part of the Project corridor is considered adequate EA of the Project. However, it is possible that sites are present within the corridor but simply have not yet been encountered in Stage 1 testing.

Historic and pre-contact sites have been recovered from both coastal and interior portions of the Study Area on the Island. In the interior, pre-contact or historic Aboriginal sites have been recorded on four of the major waterway crossings, including the Torrent River drainage, Portland Creek Pond, Birchy Lake and the Exploits River. Other waterways, such as the Gander, Southwest Gander, Triton Brook and Terra Nova River have yet to yield sites within the Study Area. It is possible, as in Labrador, that sites along rivers may be clustered at travel stops, and that on rivers where sites have not been recorded the corridor simply does not intersect these waterways at the appropriate places. It is also possible that sites are present within the corridor but simply have not yet been encountered in Stage 1 testing. In either case, at this stage of assessment there are no notable or inexplicable data gaps in the site inventory.

As in Labrador, the supporting data are considered sufficient for archaeological potential mapping on the Island and no data gaps have been identified.

Figure 4-3 High Potential Zones: Northern Peninsula (Newfoundland)

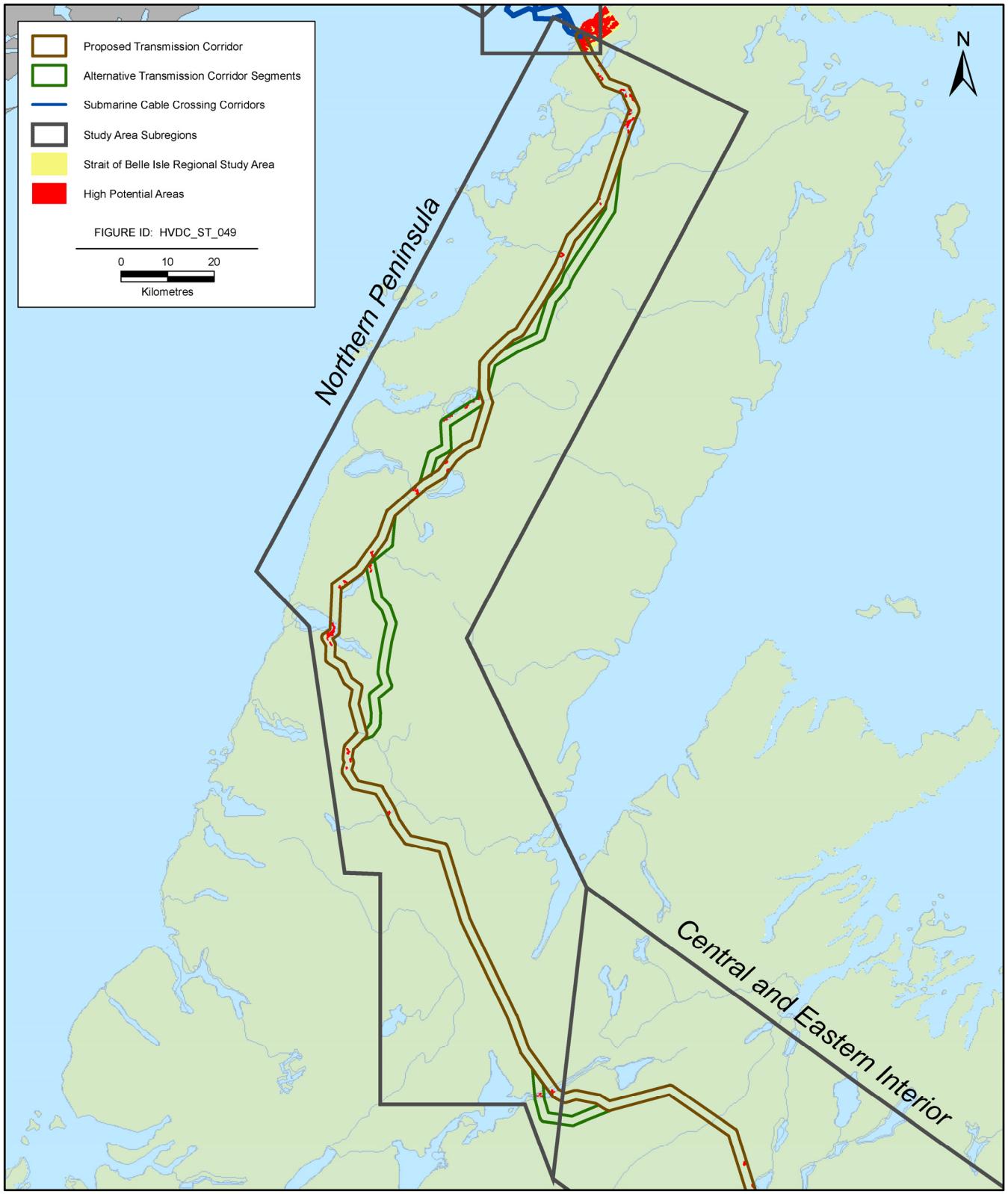


Figure 4-4 High Potential Zones: Central and Eastern Interior (Newfoundland)

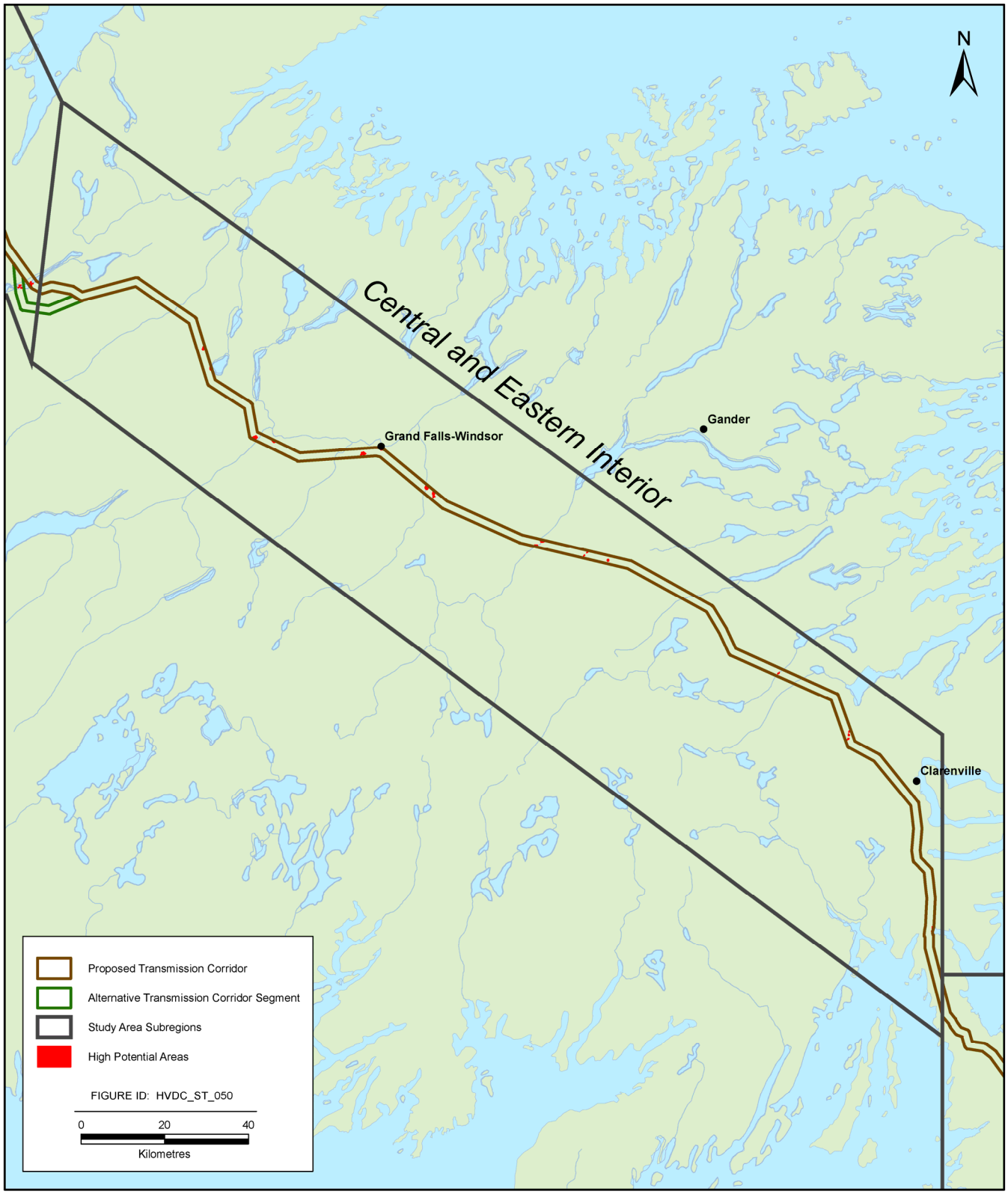
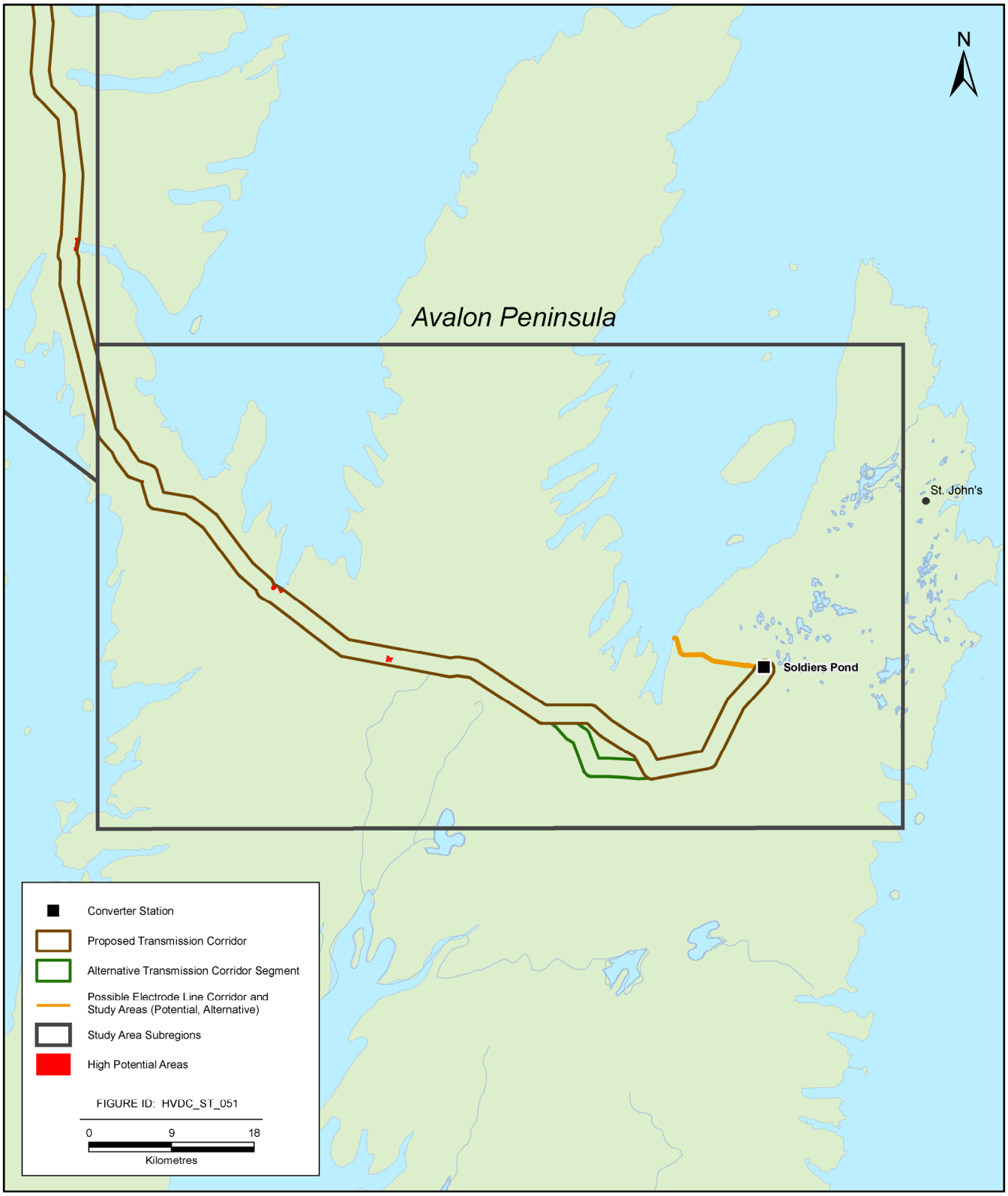


Figure 4-5 High Potential Zones: Avalon Peninsula (Newfoundland)



5.0 SUMMARY AND CONCLUSIONS

Nalcor Energy is proposing to develop the Labrador – Island Transmission Link, a HVdc transmission system extending from central Labrador to the Island of Newfoundland's Avalon Peninsula.

Project planning and design are (as of the time at which this Component Study was completed) at a stage of having identified a 2 km-wide corridor for the on-land portion of the proposed transmission line, regional Study Areas on either side of the Strait of Belle Isle, 500 m wide corridors for the proposed Strait of Belle Isle cable crossings, as well as various alternative corridor segments in particular areas.

In anticipation of an eventual EA, Nalcor Energy carried out Historic and Heritage Resources research for the Project. For the purposes of this Component Study, and in accordance with current regulatory policy and guidelines (Government of Newfoundland and Labrador 1992), Historic and Heritage Resources include sites and objects of historic and archaeological, cultural and spiritual and paleontological (i.e., fossils) importance.

The Historic and Heritage Resources research includes various study components carried out by Nalcor Energy and its predecessors between 1998 and 2010, involving personnel and field teams from Jacques Whitford Environment Limited, IEDE, IELP, Minaskuat and Stantec Consulting Ltd. Research has been undertaken in relation to the Project by the proponent over this 12 year period, including work focused on the proposed Labrador - Island Transmission Link itself (for which the proposed corridors have evolved over time), as well as in relation to the proposed Lower Churchill Hydroelectric Generation Project in Labrador, for which much of the associated archaeological assessment and results are applicable for the current Project and study. All of these relevant studies and results are incorporated into this Component Study.

Overall, the 1998 to 2009 field research involved investigation at 457 testing locations relevant to the transmission Project's EA, of which 436 were assessed on the ground. Of those assessed on the ground, 119 were investigated by visual inspection only, while 15,095 testpits were excavated at the remaining 317 testing locations, for an average of 48 testpits per sub-surface testing location. Of this total, 7,496 testpits and 292 ground testing locations lie within the currently defined Study Area. As a result of this effort, 54 sites containing Historic and Heritage Resources or evidence of land-use were recorded. It was confirmed that 12 sites date to the Pre-contact Period, three to the Historic Period, and 39 include recent/contemporary components (campsites, cabins, tilts and trapping locations). The Pre-contact Period sites are concentrated on the Labrador side of the Strait of Belle Isle, but are also found at major interior waterway crossings, including at the Churchill River, Torrent River, Portland Creek Pond, Birchy Lake and the Exploits River. This adds to the 112 sites (106 archaeological and 6 ethnographic) previously recorded within the Study Area, the vast majority of which are concentrated on the Labrador side of the Strait of Belle Isle, with others are located on the west coast of the Northern Peninsula and in the Deer Lake area.

This study contributes to, and concludes with, the mapping of archaeological potential along the proposed and alternative transmission and electrode line corridors. Empirical data on archaeological testing effort and site frequency were employed to map defined zones of High, Medium and Low potential within the Study Area. Potential mapping will be used in the Project's EA, as well as in ongoing Project planning and design, including the eventual selection of a specific route for the proposed transmission and electrode lines. Maps of

archaeological potential along the proposed transmission line corridors are presented in Appendix F of this report.

A review of the geological mapping for the Study Area and relevant literature indicates that, due to the age and type rock formations, the potential for Paleontological Resources is low along most of the proposed and alternative transmission and electrode line corridors. As a result of the analysis, three areas of potential importance have been highlighted, including one at L'Anse Amour in Southern Labrador, one at Flower's Cove on the Northern Peninsula and another at Chapel Arm in Central and Eastern Newfoundland.

The type and level of information provided on archaeological and paleontological sites and resources through this Historic and Heritage Resources Study is considered adequate for the Project's EA and for informing the ongoing planning and design, and eventual routing.

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7.0 GLOSSARY AND ACRONYMS

A or Ae horizon	Soil horizons are specific layers in the soil. The A horizon is the topmost level of sediment beneath the organic (e.g., moss, leaf litter) layer. There are many variations but in northern forest soils, a common type is "Ae," a bleached grey horizon. The B horizon lies beneath the A horizon
Aboriginal	A broad term generally referring to those peoples who have inhabited North America since before European contact
Ac	Alternating current
Amerindian	A broad term sometimes used to refer to the aboriginal inhabitants of North America, excepting the Arctic-adapted Inuit and Palaeo-Eskimo peoples. In Newfoundland and Labrador, it may refer to the Paleo-Indian, Maritime Archaic, Intermediate and Recent Indian occupations, as well as to the historic Beothuk and the historic and contemporary Innu and Mi'kmaq people
Archaeological Site	A location that contains the material remains of human land-use in the past. Technically, only those sites that date to the historic or pre-contact periods and that are assigned Borden numbers are true archaeological sites. Sites with more recent remains are considered ethnographic sites and are assigned Ethno numbers by the PAO
Artifact	A discrete object deliberately manufactured or modified by human activity
asl	Above sea level
Baseline Study	A study of the existing or pre-project environment
Bedrock	A general term for the rock, usually solid, that underlies soil or other unconsolidated superficial material
B horizon	A soil horizon is a specific layer in the soil. The B horizon lies beneath the A horizon and is commonly referred to as 'subsoil'. It may be characterized by concentrations of minerals. In northern forest soils, the B horizon is often rich in iron and is orange, red or reddish-black in colour
Blank	A very early stage in the manufacture of a flaked stone artifact, usually a partly-worked piece of chert or other stone, made at a quarry for later use elsewhere. A blank can resemble a thick, wide biface and may serve as the basis for manufacturing almost any type of stone tool
BP	Before present. In radiocarbon dating, "Present" is arbitrarily fixed at the year 1950 AD
Biface	In pre-contact archaeological sites, a lithic artifact chipped on both opposite sides is referred to as a biface, or bifacially-flaked tool
Borden Number	Archaeological sites in Canada are registered under a nationwide site registration system known as the Borden System, which assigns each site a unique Borden number. In Newfoundland and Labrador, the PAO assigns these numbers. Only true archaeological sites (those predating the mid-20th century) receive a Borden number. More recent ethnographic sites are assigned an Ethno number

Calcareous	Composed of or containing calcium carbonate. Most commonly refers to limestone
Calcifilic	Pertaining to plants, which are adapted to living in calcium-rich (or calcareous) soils
Canadian Shield	A U-shaped area of Precambrian rock which covers half of Canada, extending west from the Labrador coast, around Hudson Bay to the basin of the Mackenzie and north from the Great Lakes to Hudson Bay and the Arctic
Chert	A fine-grained silica-rich sedimentary rock, often selected by pre-contact peoples for manufacturing chipped stone tools
Component	In an archaeological site, a component is a period of occupation. A site occupied at various times, for example, once 3,000 years ago and again less than 25 years ago, may be said to have a pre-contact component and a contemporary component
Contemporary Site	A location that contains the material remains of human land-use in the recent past (by convention, post-dating the mid-20th century). As a category of land-use sites, "contemporary" and "recent" may be used interchangeably with "ethnographic". Contemporary or recent sites may be important in interpreting the history of human land-use in a region, but are not considered true archaeological sites, and are not assigned Borden numbers. Contemporary/recent sites are assigned Ethno numbers by the PAO
Corridor	A linear study area from within which a specific transmission line routing and right-of-way are eventually selected
CRM	Cultural Resource Management. This term can refer to a wide range of practices associated with managing and preserving cultural resources, including archaeological resources, as well as interpreting them to the general public
Dc	Direct current
Debitage	In Labrador pre-contact sites, the lithic waste flakes left over from the manufacture of stone tools. The discovery of debitage is often the first indication that a pre-contact component is present at a site
Dolomite	A sedimentary rock similar to limestone and rich in magnesium carbonate
Dorset	The final period in the Palaeo-Eskimo occupation of the Island of Newfoundland and the Labrador coast, dating approximately 2,500 to 550 BP
Drumlin	An oval hill, often composed of till, formed by flowing glacial ice
Esker	A long, narrow, often winding ridge of coarse gravels deposited by a stream flowing under glacial ice
Ethnographic site	A location that contains the material remains of human land-use in the recent past (by convention, post-dating the mid-20th century). As a category of land-use sites, "ethnographic" may be used interchangeably with "contemporary". Ethnographic sites may be important in interpreting the history of human land-use in a region, but are not considered true archaeological sites, and are not assigned Borden numbers. Ethnographic sites are assigned Ethno numbers by the PAO
Ethno Number	The registration number assigned to an ethnographic (contemporary) site by the PAO

Felsic	Igneous rocks or minerals that are light in color, indicating relatively high levels of quartz and feldspars. The most common felsic rock is granite
Flake	In pre-contact archaeological sites, a flake is a sharp-edged piece of fine-grained rock left over from making stone tools. See debitage
GIS	Geographic Information System or Geospatial Information System. A system for storing, analyzing and managing spatial data
Gneiss	A coarse-grained, banded metamorphic rock, often with the same mineral composition as granite
GPS	Global Positioning System
Grenville Province	The Precambrian geological unit that encompasses all of southern Labrador
Groswater	A period in the Palaeo-Eskimo occupation of the Island of Newfoundland and the Labrador coast, dating approximately 2,800 to 2,100 BP
HBC	Hudson's Bay Company
Historic Site	In Newfoundland and Labrador, an archaeological site dating between the initial period of European contact with Aboriginal peoples (approximately 500 BP) but before the mid-20th century
Historic and Heritage Resources	In the context of environmental assessment, these include palaeontological, architectural and archaeological resources, but may also include ethnographic sites or other material evidence of past human land-use
Holocene	The geological period extending from the end of the Pleistocene glacial period (approximately 10,000 years BP) down to the present day. The history of human occupation in Newfoundland and Labrador falls entirely within this period
HRIA	Historic Resources Impact Assessment
HROA	Historic Resources Overview Assessment
HVdc	High voltage direct current
In situ	In situ archaeological remains are those that are undisturbed and still found in the same place as when they were originally deposited through past human activities
Intermediate Indian	The middle period of the Amerindian occupation of Labrador, including the interior, from approximately 3,500 to 2,000 BP
Iterative	Literally, repetitious. In this study, the term refers to an analytical process that is undertaken, reviewed, modified and repeated in sequence
km	Kilometre
Late Pre-contact	The final pre-contact Amerindian occupation of Newfoundland and Labrador after the Intermediate period, beginning approximately 2,000 BP. This period is also referred to as "Recent Indian" in some archaeological literature
LIA	Labrador Inuit Association

Lithic	Literally, a term referring to stone. In the context of historic resources, lithic usually refers to stone tools and debitage found on archaeological sites once occupied by pre-contact peoples
Livyer	Literally, a person who resides in a place all year. A permanent settler in Newfoundland or Labrador (as opposed to a seasonal migratory fisherman)
Locus (pl. Loci)	Literally, a "place". In archaeological literature, a locus is a discrete concentration of artifacts and features that forms one part of a larger archaeological site
m	Metre
m^2	Square metre
Maritime Archaic	The first major period in the Amerindian occupation of the province, dating approximately 8,000 to 3,500 BP in Labrador, and before 6,000 to 3,200 BP on the Island
Metamorphic	In geology, normally refers to recrystallized minerals; rocks that have been transformed in the past by extreme temperature and/or pressure
Palaeo-Eskimo	A term referring to a series of occupations of Newfoundland and Labrador by Arctic-adapted peoples arriving from the north. Though also deriving from the north, the Palaeo-Eskimo peoples were not directly ancestral to the later Thule occupation
Palaeo-Indian	A term which refers to a variety of early Amerindian cultures in North America, from approximately 13,000 to 8,000 years BP. The initial human occupation of southeastern Labrador occurred approximately 8,000 BP at the end of the Palaeo-Indian period
PAO	Provincial Archaeology Office of the Government of Newfoundland and Labrador
Post-glacial	Pertaining to the time period after a retreat of glacial ice. In this study, post-glacial refers to the Holocene period, after the end of the last glaciation, approximately 10,000 BP
Potential Rating	In historic resources assessment, the potential rating of a particular zone or a whole Zone Type indicates the likelihood of finding archaeological sites or other historic and heritage resources there
Precambrian	The first and longest geological period in the Earth's history, dating from the formation of the Earth approximately 4.5 billion years ago to the widespread appearance of hard-shelled animals 540 million years ago
Pre-contact	The period of Aboriginal occupation in Newfoundland and Labrador that occurred before significant contact with Europeans, approximately 500 years BP
Pre-Dorset	The first major period in the Palaeo-Eskimo occupation of the Labrador coast, dating approximately 3,700 to 2,800 BP
Preform	An early stage in the reduction and manufacture of a flaked stone artifact. A preform may resemble a finished projectile point but will be larger, thicker and more roughly-worked
Projectile point	The cutting and piercing end of a projectile, such as a spear, harpoon, dart or arrow. In pre-contact archaeological sites, projectile points are normally made of chert or other fine-grained stone

Ramah chert	Not a true chert but a metamorphosed quartzite found on the Torngat coast of Labrador. Prized by pre-contact peoples for manufacturing chipped stone tools and widely traded across eastern North America in the pre-contact period
Recent Indian	The final pre-contact Amerindian occupation of Newfoundland and Labrador after the Intermediate period, beginning approximately 2,000 BP. The "Recent Indian" period arbitrarily ends at the time of European contact, approximately 500 years BP, but the same people continued to inhabit Labrador and are directly ancestral to the Innu, while "Recent Indian" people on the Island of Newfoundland were ancestral to the Beothuk
Testpit	In archaeological assessment, a testpit is usually a small pit excavated by shovel and hand tools. Large number of testpits may be excavated within a single testing location. Testpitting is usually the only way to locate those archaeological sites that are not visible on the surface
The Project	The proposed Labrador - Island Transmission Link extending from central Labrador to the Island of Newfoundland's Avalon Peninsula
The Study Area	The HVdc transmission line corridors and the associated potential electrode lines. These corridors were the focus of Historic and Heritage Resources assessment and potential mapping
Transmission Line	Wires and structures that transmit electricity
Thule	The initial period of occupation in Labrador by Arctic-adapted people directly ancestral to the Inuit
UXO	Unexploded ordinance
Watershed	The region or area drained by a river or stream
Winterhousing	The historical practice of living for part of the year in the interior, in order to harvest wood and other resources
Zone	In the context of this study, a zone is a landform with particular slope, vegetation and drainage features, and specifically one that has been identified and mapped within the Survey Area. The characteristic features will determine which Zone Type a zone belongs to and this will determine its potential rating. These will also determine whether testing locations will be chosen within that zone as part of the archaeological assessment
Zone Type	All of the zones, which share certain characteristics of slope, or drainage, or vegetation, are assigned to a particular Zone Type. Zone Types are assigned archaeological potential ratings, in part based on the probability of finding archaeological sites within zones of that Zone Type. For the purposes of archaeological assessment, 12 Zone Types have been identified within the Survey Area