

10.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS ON HERITAGE RESOURCES

Heritage resources has been selected as a VC in recognition of the interest of: provincial and federal regulatory agencies who are responsible for the effective management of these resources; scientific interest; First Nations that have an interest in the preservation and management of heritage resources related to their history and culture; and the interest the general public has in its history. Heritage resources includes consideration of archaeological resources (consisting of Aboriginal and Euro-Canadian archaeological sites), built heritage (historical buildings and structures), and palaeontological resources (fossil sites). It also includes submerged heritage resources if present in the marine setting of the Project.

Heritage resources are those resources, both human-made and naturally occurring, related to human and natural activities from the past that remain to inform present and future societies of that past. Heritage resources are permanent, although highly tenuous, features of the environment. If heritage resources are present, their integrity is highly susceptible to construction and ground-disturbing activities. The value of heritage resource sites is measured in terms of the information about the past that might be obtained from studying the materials that remain and where applicable, their spatial relationship and context within the site and landscape. These resources are particularly susceptible to disturbance in terms of losing information that comes from the context of the ground. As a result, removing or disturbing these resources from an *in situ* context without scientifically recording that original context can result in a permanent loss of information, as in many cases, these resources are the only means society has of learning about the past.

10.1 REGULATORY AND POLICY SETTING

Heritage resources in New Brunswick are regulated under the New Brunswick *Heritage Conservation Act*, which is administered by the New Brunswick Department of Tourism, Heritage and Culture (NBDTHC). The *Heritage Conservation Act* states that it is prohibited to knowingly disturb an archaeological or palaeontological site or burial ground without a permit.

The regulatory management of heritage resources is administered within the NBDTHC by its Archaeological Services Branch (for archaeological resources), its Historic Places Section (for built heritage resources), and its Natural Sciences Section (for palaeontological resources).

In the context of an environmental impact assessment, heritage resources are assessed by completing an assessment of the potential environmental effects of a project on heritage resources, via either an archaeological impact assessment (AIA), built heritage resources assessment, or a palaeontological assessment, or combination of these assessments. All heritage assessments completed in New Brunswick must meet regulatory approval including any applicable provincial regulations and guidelines issued under the *Heritage Conservation Act* that define and protect heritage resources in New Brunswick.

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The heritage assessment results are summarized and detailed in reports that are completed for all field research permits issued for the project (e.g., Archaeological Field Research Permit, or Palaeontological Field Research Permit), and must be submitted to the Province for approval in compliance with those permits.

Outside of federal lands, there are no federal regulatory requirements that apply to the protection of heritage resources.

10.2 POTENTIAL ENVIRONMENTAL EFFECTS, PATHWAYS, AND MEASURABLE PARAMETERS

Any project activity that includes surface or subsurface ground or seabed disturbance has the potential to interact with heritage resources, if they are present. Accordingly, construction activities have the greatest potential for interaction with heritage resources, as it is primarily during this phase that ground breaking and earth moving of surface soils or rock will take place, and that any heritage resources in the PDA could be affected. To a lesser extent, decommissioning activities may also interact with heritage resources from earth moving activities and related disturbance associated with removal of marine cables and related infrastructure.

In consideration of these potential interactions, the assessment of Project-related environmental effects on heritage resources is therefore focused on the following potential environmental effect:

- change in heritage resources.

The environmental effect pathways and measurable parameters for the assessment of the environmental effects presented above are provided in 10.1.

Table 10.1 Potential Environmental Effects, Environmental Effects Pathways, and Measurable Parameters for Heritage Resources

Potential Environmental Effect	Environmental Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in heritage resources	<ul style="list-style-type: none"> • Unintended disturbance or alteration of a heritage resource (in whole or in part) from ground disturbance. 	<ul style="list-style-type: none"> • Presence of heritage resource confirms an interaction, and absence indicates that any discovery (unplanned) would be an unplanned event.

10.3 BOUNDARIES

10.3.1 Spatial Boundaries

The Project development area (PDA) is defined in Section 2.1 and is unchanged for the purposes of this assessment. The PDA includes footprint of two new submarine electrical cables, one from Deer Island to Campobello Island (through Head Harbour Passage) and one from Campobello Island to Grand Manan Island (through the Grand Manan Channel). It also includes the footprint of four land-based overhead-to-underground cable riser stations and associated landfall located at Deer Island (at Chocolate Cove), Campobello Island (at Wilsons Beach and Little Whale Cove), and Grand Manan Island (at Long Eddy Point), as well as the footprint of the two existing submarine electrical cables, to be decommissioned at some time in the future when they have reached the end of their service life.

The LAA is the maximum area where Project-specific environmental effects can be predicted and measured with a reasonable degree of accuracy and confidence. For heritage resources, the LAA is the same as the PDA as the only potential interactions between the Project and heritage resources would occur where construction and groundbreaking activities take place.

10.3.2 Temporal Boundaries

The temporal boundaries for the assessment of the potential environmental effects on heritage resources include:

- construction – scheduled to begin in the spring of 2018 and last for approximately 16 months; and
- operation – scheduled to begin in late 2019 and continue for the life of the new submarine cables, currently anticipated to be at least 40 years.

Decommissioning pertains to both the existing subsea cables and the proposed new subsea cables. Decommissioning of the existing subsea cables will occur at some time following the successful completion of the proposed installation of the new subsea cables as per current regulations and requirements. Decommissioning of the proposed new subsea cables will occur following their useful service life, and will be carried out in accordance with regulations in place at that time.

10.4 RESIDUAL ENVIRONMENTAL EFFECTS CHARACTERIZATION AND SIGNIFICANCE DEFINITION

This assessment considers residual effects on heritage resources after the implementation of recommended mitigation. Heritage resources provide valuable contextual information pertaining to past human cultures and their interactions with the surrounding physical environment. Destruction of this information hinders the reconstruction of past human activities at the site-specific level, and at the level of broader regional and inter-regional understanding of cultural and temporal reconstruction.

In this light, a significant adverse residual environmental effect on heritage resources is one that results in a permanent Project-related disturbance to, or destruction of, all or part of a heritage resource (i.e.,

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archaeological, architectural or palaeontological resource) considered by the provincial heritage regulators to be of major importance due to factors such as rarity, undisturbed condition, spiritual importance, or research importance, and that cannot be mitigated or compensated.

The environmental effect of a change in heritage resources is considered significant if the environmental effects of the Project result in unauthorized disturbance to, or destruction of, *in situ* archaeological, built heritage, or palaeontological resource.

Criteria used to characterize and describe residual environmental effects for the assessment of heritage resources are provided in Table 10.2.

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Table 10.2 Characterization of Residual Environmental Effects on Heritage Resources

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual environmental effect.	Positive —an environmental effect that moves measurable parameters in a direction beneficial to heritage resources relative to baseline. Adverse —an environmental effect that moves measurable parameters in a direction detrimental to heritage resources relative to baseline.
Magnitude	The amount of change in measurable parameters or the VC relative to existing conditions.	Negligible —no unauthorized measurable change in heritage resources. Low —a measurable change but one that is lessened by the application of mitigation and authorization of a change through the issuance of a Site Alteration Permit (SAP). High —unauthorized change to heritage resources.
Geographic Extent	The geographic area in which an environmental effect occurs.	PDA —residual environmental effects are restricted to the PDA. LAA —residual environmental effects extend to the LAA or beyond.
Frequency	Identifies when the residual environmental effect occurs and how often during the Project or in a specific phase.	Single event —an environmental effect on heritage resources occurs only once (i.e., disturbance results in the loss of context). Multiple irregular event —the residual environmental effect occurs at no set schedule. Multiple regular event —the residual environmental effect occurs at regular intervals. Continuous —the residual environmental effect occurs continuously.
Duration	The period of time required until the measurable parameter or the VC returns to its existing condition, or the residual environmental effect can no longer be measured or otherwise perceived.	Short-term —the residual environmental effect is restricted to the construction phase. Long-term —the residual environmental effect will extend for the life of the Project. Permanent —heritage resources cannot be returned to their existing condition.
Timing	Considers when the residual environmental effect is expected to occur. Timing considerations should be noted in the evaluation of the residual environmental effect, where applicable or relevant.	Not Applicable —seasonal aspects are unlikely to alter the residual environmental effect on heritage resources. Applicable —seasonal aspects may alter the residual environmental effect on heritage resources.
Reversibility	Pertains to whether a measurable parameter or the VC can return to its existing condition after the project activity ceases.	Reversible —the environmental effect is likely to be reversed when activities cease. Irreversible —the environmental effect cannot be reversed as damage or removal will result in a change to heritage resources.
Ecological and Socioeconomic Context	Existing condition and trends in the area where environmental effects occur.	Unique —area includes features or characteristics that are unique to the LAA or region. Common —area includes features or characteristics that are common to the LAA or region.

10.5 EXISTING CONDITIONS FOR HERITAGE RESOURCES

Archaeological resources, palaeontological resources, and built heritage were considered when describing existing conditions as part of this VC.

10.5.1 Approach and Methods

In advance of the field component of the Archaeological Impact Assessment (AIA) for this Project, baseline conditions were examined through background research, regulatory consultation, and a review of available information on the history of the PDA and surrounding area to determine the presence and nature of known heritage resources. Heritage resources include structures, sites, or things of historical, archaeological, palaeontological, or architectural significance. The desktop survey made use of the following resources:

- the Archaeological Services Sites Database at Archaeological Services Branch (ASB), New Brunswick Department of Tourism, Heritage and Culture (NBDTHC) and any relevant Maritime Archaeological Resource Inventory (MARI) forms for sites within 5 km of the PDA;
- ASB's Archaeological Potential Map for the PDA;
- a review of the Canadian Register of Historic Places (CRHP) and the New Brunswick Register of Historic Places (NBRHP).
- correspondence with a local shipwreck expert;
- consultation with palaeontological expert, Dr. Randall Miller, of the New Brunswick Museum;
- previous archaeological studies conducted near the PDA;
- relevant documents at the New Brunswick Provincial Archives (NBPA); and
- published and unpublished materials cited below.

For information regarding archaeological resources, ASB was contacted to request the most recent Archaeological Potential Map for the PDA and surrounding areas. The Archaeological Potential Map presents information from a variety of heritage related databases, including known shipwrecks, as well as identifies areas with elevated potential for archaeological resources. Typically, the shoreline areas of all watercourses and coastlines are considered by ASB as having either "high" (0–50 m from the watercourse bank or coastline) potential or "medium" (50–80 m from watercourse bank or coastline) potential for Pre-Contact archaeological resources, regardless of the size of the watercourse. Confluences of any two watercourses are considered to have "high" potential for Pre-Contact archaeological resources within 100 m from the watercourse banks. Also included are potential palaeo shorelines that may have been present as early as 13,000 years before present. Together, these areas are referred to as elevated potential zones.

A desktop review for known heritage resources at the landfall locations and for suspected and/or known shipwrecks along the intertidal portion of the submarine electrical power cable route was completed prior to fieldwork. Representatives from ASB were contacted to confirm if there are any known archaeological sites in proximity to the landfall locations and cable riser stations and to seek information on any known or suspected shipwrecks that are located along the proposed new cable routes. In addition, a local shipwreck expert, Mr. Eric Allaby, was contacted to confirm if he is aware of any shipwrecks that have occurred within the vicinity of the Project.

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Detailed routing of the Project's marine corridor was further investigated by reviewing data from a Sidescan Sonar System (SSS), marine magnetometer surveys, and bathymetric maps collected by Canadian Seabed Research (CSR 2017). Details relating to the type of equipment used for the marine-based surveys can be found in CSR's final report (CSR 2017). Minimum SSS standards as required by New Brunswick Archaeological Services (Appendix F of the Archaeological Guidelines (2012)) were used for all SSS footage collected for the Project.

A list of archaeological project manuscripts and reports on file at ASB for projects and research conducted in and around the PDA was provided by representatives at ASB (Brown, T., pers. comm., 2016). While no archaeological assessments have previously taken place within the various PDAs, several assessments have been undertaken on Deer Island (Bishop 1981; Black 1984a; Black and Gilbert 2005; Davis 1980; Gilbert 2011; Leonard 2015; and Stephens 1986), Campobello Island (Davis 1980; Owen 1894; URS Group Inc. 2013), and Grand Manan Island (Acer 1998; Black 1984b; Blair 1995a; Blair 1995b; Blair 1999; Jacques Whitford 2007).

The field component of the AIA on land involved an archaeological field survey (walkover) of four non-linear facilities associated with the expansion of existing riser and transition stations at landfall sites on Deer Island, Campobello Island, and Grand Manan. Also included was the survey of the terrestrial portion of the linear corridor where the new cables will be located and connect to the cable riser stations, including any areas where horizontal direction drilling or open cut trenching activities will take place along the inshore areas. All landfall areas were assessed during maximum low tide to allow for full coverage of the intertidal zones. The four landfall sites assessed include:

- Chocolate Cove, Deer Island, NB;
- Wilsons Beach, Campobello Island, NB;
- Little Whale Cove, Campobello Island, NB; and
- Long Eddy Point, Grand Manan, NB.

The PDA was assessed via a walkover in consideration of the results of the Archaeological Potential Map data (ASB 2016) and following the *Guidelines and Procedures for Conducting Professional Archaeological Assessments in New Brunswick* (the Guidelines) (ASB 2012), as well as the professional judgement of the Stantec Archaeology Team. Walking pre-defined transects within the PDA, any areas of elevated potential for archaeological resources were identified. Where they occurred, these areas were delineated and labeled as "Polygons" using handheld GIS devices with 1-3 m accuracy. Polygons are typically identified for additional archaeological mitigation (e.g., shovel testing).

All significant archaeological finds and features were recorded and catalogued following professional standards, and as defined in the Guidelines (Archaeological Services 2012). Only those artifacts which met the definition of an archaeological site were collected. Members of the Stantec Archaeology Team undertook preliminary analysis of any artifacts recovered. If warranted, the opinion of other professional archaeologists was sought.

In addition to the walkover, the AIA also involved archaeological mitigation through shovel testing at any areas identified as having elevated archaeological potential and delineated as polygons within the Project PDA. The shovel testing program was supervised and completed under the direction of a provincially

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permitted archaeologist, and completed as required under the Guidelines (ASB 2012). This work was conducted in the Fall of 2017 and the results are described below.

10.5.2 Description of Existing Conditions

The sections below describe the existing conditions for archaeological resources, built heritage (buildings and structures), and palaeontological resources.

10.5.2.1 General Setting

The Project is located within the Fundy Coastal Ecodistrict which consists of the southern coastline of New Brunswick from Passamaquoddy Bay in the west to Shepody Bay in the east, including Campobello Island, Deer Island, and Grand Manan Island (NBDNR 2007).

Bedrock Geology

The bedrock of the Fundy Coastal Ecodistrict is home to both New Brunswick's oldest and youngest lithologies. The oldest rocks are comprised of 900 million-year-old Precambrian marble, quartzite, and siltstone and occur in and around the city of Saint John. The youngest rocks are represented by 200 million-year-old (Ma) Late Triassic mafic volcanics, mainly basalt, and occur on Grand Manan Island. The bedrock at Chocolate Cove, Deer Island is predominately Early Silurian (437 Ma) igneous green lithic tuff and breccia (Miller 2017). Wilsons Beach, Campobello Island consists of predominately Early Silurian igneous and minor sedimentary bedrock in the form of felsic tuff, siltstone, and sandstone. Little Whale Cove, Campobello Island consists of predominately Early Silurian igneous and minor sedimentary bedrock in the form of lithic and crystal tuff. The bedrock at Long Eddy Point, Grand Manan, consists of Late Triassic (200 Ma) igneous columnar and amygdaloidal basalt (Miller 2017).

Topography and Landscapes

The landscape in the ecodistrict fluctuates between flat, low-lying salt marshes and gently rolling hills between 30 and 80 m elevation to steep, and rugged cliffs between 100 and 300 m elevation. The Bay of Fundy coastline also boasts several pristine gorges including Little Salmon River where the watercourse tumbles 30 m over the cliff edge at its mouth. The cool waters of the Bay of Fundy play a large role in the climate of the ecodistrict and help to create the moisture-laden air that is responsible for the persistent fog and abundant precipitation (NBDNR 2007).

Surficial Geology

The surficial geology within the PDA of all three islands is characterized by zone R, which is comprised of Pre-Quaternary rocks of various lithologies and ages. This typically includes weathered and partially-disintegrated glacially-moulded surfaces with some instances of glacially-scoured and polished surfaces (Rampton 1984).

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Traditional Use of Land and Resources

Archaeological evidence from Debert, Nova Scotia, and Pennfield, New Brunswick, indicates that the first peoples to inhabit modern day New Brunswick likely arrived in the region at the end of the Pleistocene (McMillan and Yellowhorn 2004; Suttie et al. 2013).

The PDA lies in the traditional territory of the Peskotomuhkati First Nation who lived throughout the islands of the Bay of Fundy and mainland of both New Brunswick and Maine. The name *Peskotomuhkat* translates into “pollock-spearer”, and reflected the cultural importance of both pollock and spear fishing. The ancestral capitol of their territory was in the modern-day location of St. Andrews, New Brunswick and was known as *Qonasqamkuk* (Passamaquoddy-Maliseet Language Portal 2016). The Peskotomuhkati people were continuously moved off the land by European settlers who came to the area until they were eventually limited to a reservation in Washington County, Maine. Currently, the Peskotomuhkati people have no legal status in Canada.

According to Ganong (1899), the original names for Deer Island, Campobello Island and Grand Manan Island can be derived from the Peskotomuhkati language. Deer Island and Grand Manan were known as *Edokemeneek* and *Munasnook* respectively; however, no translation is provided (NBPA 2016; Hamilton 1996; Rayburn 1975). Campobello Island was originally known as *Abah'gust*, translating to “parallel to the land” (NBPA 2016).

Settlement

Permanent settlement by Euro-Canadians did not begin in this area until the mid to late 18th Century (NBPA 2016). There may have been early French/Acadian occupations before the 18th Century, however no documented archaeological sites from this time period have been identified on any of the islands (Ganong 1899). The entirety of Deer Island was granted to Thomas Farrell in 1808 who had been living on the island periodically since the 1770's. The most intense period of new Euro-Canadian occupation of these islands began at the end of the American Revolutionary War when thousands of Loyalists (Americans who wished to remain within the British Empire), emigrated to British North America for the promise of land to replace that which they had lost in the newly formed United States. Post offices were established in 1869 in Lord's Cove and 1913 in Lambertville. By 1871, the population of Deer Island had grown to over 1,000 people (NBPA 2016).

In 1770, Campobello Island was granted to Captain William Owen (1737-1778) of the Royal Navy, who named the island after Lord Campbell. By 1871, the population of the island was approximately 1,100 people. It later became the summer home of United States President, Franklin Delano-Roosevelt. In 1964, the Roosevelt-Campobello International Park was established (NBPA 2016).

The first permanent settlement of Grand Manan was established in 1784 when Moses Gerrish gathered a group of settlers to an area of Grand Manan he called Ross Island (Ingersoll 2003). In 1845, a post office was established in the northern part of Grand Manan Island and by 1871 there were a number of fishing settlements on Grand Manan with approximately 1,500 people living there. In 1898, Grand Manan was the port of entry fishing station with one post office, eight stores, one saw and box mill, and several churches (NBPA 2016).

10.5.2.2 Archaeological Resources

A search of the archaeological sites database at ASB indicated there are no recorded land-based archaeological sites at the landfall locations of the PDA on Deer, Campobello or Grand Manan islands. There is one record of a Pre-Contact artifact being recovered during scallop dragging in the waters off the eastern shore of Indian Island, between Deer Island and Campobello Island, several kilometres south of the proposed submarine cable route. Based on the artifact typology, it was interpreted as approximately 5,000 years old. ASB has suggested that this may indicate submerged landforms that contain archaeological sites in this area. A preliminary review of palaeo-reconstruction on sea level behaviour suggests this is unlikely.

Land-based

A review of the Archaeological Potential Map for the Project confirmed that there are no known Pre-Contact archaeological sites located within the PDA (Archaeological Services 2016) and there are no areas of the PDA that cross potential palaeo shorelines.

While no archaeological resources have been identified to date within the PDA, there are dozens of recorded Pre-Contact archaeological sites identified along the shorelines and interiors of all the islands in the area, including those involved with the Project. These sites demonstrate a long and intense use of these islands by the Aboriginal populations that have resided in the area since the retreat of the glaciers. Further, the lack of known resources may be more a factor of the lack of survey within the PDA, rather than an indication of no archaeological sites at those locations.

With respect to Historic period resources, a review of the Archaeological Potential Map for the Project (Archaeological Services 2016) revealed that there are no known Historic period archaeological sites located in the PDA. While no documented sites were identified in the general area of the Project, it should be noted that European explorers have been visiting the islands in this area as early as the 16th Century. References to the islands are noted in the journals of Samuel de Champlain and the maps of early Portuguese fishermen, and it is possible that there were early (17th Century) French occupations on the Islands. Information on early (17th Century) settlement in this area is scarce, although there are numerous references to French occupations on several of the islands during those early years of European contact with this region (Ganong 1899).

Chocolate Cove

An Archaeological Impact Assessment (AIA) for land-based portions of the PDA began with a walkover survey at Chocolate Cove on the southeastern coast of Deer Island in November 2016 (Figure 10.1). The area within the proposed modification to the cable riser station is situated atop an elevated rocky knoll with open, well-drained, and relatively flat terrain consisting of grasses, sedges, and low shrubs. It is also situated within a heavily disturbed area that was altered during construction of the existing cable riser station and access road. Prior to these disturbances, however, the area may have been conducive to use by Aboriginal pre-contact peoples living in the area due to the strategic vistas the area provides for



Source Data: Base data provided by Service New Brunswick. Imagery provided by GeoNB Enhanced Imagery (2010). Archaeological data provided by the Government of New Brunswick, Archaeological Services.

Archaeological Features - Deer Island

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observing activity throughout the marine and island environments that surround it. While mitigation through shovel testing is not practical because of these disturbances, monitoring during Project construction by a qualified archaeologist is recommended for the groundbreaking phases of the proposed addition to the cable riser station. Within the land-based portion of the proposed cable route, two other areas of elevated archaeological potential were identified at Chocolate Cove and labeled as polygons VJB-ARCH-007 and KRH-ARCH-009 (Figure 10.1).

The PDA within the intertidal zone at Chocolate Cove was assessed during maximum low tide and no heritage resources were observed within the PDA. However, historic period artifacts and potentially Pre-Contact period artifacts were observed on the surface of the intertidal zone approximately 75 m to the west of the PDA at the base of the trail used to access the intertidal zone (Figure 10.1). Based on ASB requirements, the location of these artifacts was registered as an archaeological site and a Maritime Archaeological Resource Inventory (MARI) form was completed using the temporary site designation 2016NB107-01. The site boundaries are limited to the extent of the surface-collected artifacts. A total of seven artifacts were collected including:

- a water rolled, possible Pre-Contact chert flake;
- a possible Pre-Contact core;
- a Historic clay tobacco pipe stem;
- Historic willow pattern ceramic sherd;
- Historic ironstone ceramic sherd;
- Historic coarse red earthenware sherd; and
- a possible Pre-Contact or Historic abrader/sharpening stone (whetstone) of undetermined age.

All artifacts were collected and catalogued. Given the high degree of shoreline erosion, it is possible that the artifacts found in the intertidal zone originated from further up the embankment. That shoreline area where the artifacts were recovered is not part of the PDA, nor is the area of the embankment above the shoreline part of the PDA for the Project.

While the heritage resources identified were located outside the PDA, it is possible that if an archaeological site which could be the source of this material were sufficiently large, it could extend into the PDA. Therefore, two areas within the PDA, labeled as polygons VJB-ARCH-007 and KRH-ARCH-009, had been recommended for additional examination (e.g., shovel testing) to determine if archaeological resources are located within the PDA.

The shovel testing program at Chocolate Cove was completed on October 19, 2017. The shovel testing grid at polygon VJB-ARCH-007 included five shovel test pits (STPs) spaced at 5 m intervals as per the Guidelines (ASB 2012). All five STPs in this area were excavated and four STPs were found to be negative; that is, no artifacts, features, or deposits of heritage significance were identified. The one positive STP contained several pieces of refined white earthenware which is a type of ceramic material that is of low heritage value due to its ubiquity as well as the fact that it ranges in date from 1805 up to and including the present (Miller et al. 2000: 13).

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The shovel testing grid at polygon KRH-ARCH-009 included four STPs spaced at 5 m intervals. All four STPs were excavated and three STPs were found to be negative; that is, no artifacts, features, or deposits of heritage significance were identified. The one positive STP, again, contained a small piece of refined white earthenware, but the heritage value of this type of ceramic material is considered to be low.

Since the completion of the 2016 and 2017 AIAs, the location of the proposed cable riser stations have been slightly altered from that which was assessed during the 2016 and 2017 field surveys at Chocolate Cove. As such, it is recommended that mitigation in the form of an additional AIA be completed prior to any ground breaking construction activities within the final revised PDAs for all cable riser stations.

Wilsons Beach

The AIA for the landfall portion at Wilsons Beach on northwestern coast of Campobello Island, was undertaken in December 2016 (Figure 10.2). The PDA is situated on an elevated rock-knob with open, well-drained, low grass, shrub, and exposed bedrock terrain that slopes gently down in a northeast direction (10-15 degrees). A small grove of semi-mature spruce trees lie immediately west of the PDA, and excellent views are provided in many directions. One area of elevated archaeological potential was identified during the assessment at this location. This area was delineated and labeled as polygon VJB-ARCH-015. It includes most of the footprint for the proposed addition to the cable riser station, and an additional investigation (i.e., shovel testing) was recommended, the results of which are described below.

The cable landfall portion of the PDA at Wilsons Beach, including the intertidal zone, was assessed during maximum low tide and no heritage resources were observed on the surface of these locations. The remnants of timbers from the old wharf that was in use as early as 1945 (NBDNR 1945-A8190-058) are visible on the beach west of the PDA but no mitigation is warranted as a result of the presence of these timbers.

No heritage resources were observed at the Wilsons Beach cable landfall site. A portion of the beach that was snow-covered during the 2016 survey has since been re-assessed in October 2017 during snow-free conditions. No heritage resources were observed during the re-assessment of that portion, and no additional investigations are warranted for the Wilsons Beach cable landfall location.



Source Data: Base data provided by Service New Brunswick. Imagery provided by GeoNB Enhanced Imagery (2010).

Archaeological Features - Wilsons Beach, Campobello Island

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The shovel testing program conducted over the Wilsons Beach proposed cable riser station footprint was completed on October 18, 2017. The shovel testing grid at polygon VJB-ARCH-015 included six shovel test pits (STPs) spaced at 10 m intervals as per the Guidelines (ASB 2012). All six STPs in this area were excavated and all six were found to be negative; that is, no artifacts, features, or deposits of heritage significance were identified.

Since the completion of the 2016 and 2017 AIAs, the location of the proposed cable riser stations have been slightly altered from that which was assessed during the 2016 and 2017 field surveys at Wilsons Beach. As such, it is recommended that mitigation in the form of an additional AIA be completed prior to any ground breaking construction activities within the final revised PDAs for all cable riser stations.

Little Whale Cove

The AIA for the landfall portion at Little Whale Cove on the southeastern coast of Campobello Island, was undertaken in December 2016 (Figure 10.3). The area is situated on rocky terrain sloping gently down toward the east with tall and dense regenerate shrubs. One area of elevated archaeological potential was identified that encompasses most of the addition to the proposed cable riser station (VJB-ARCH-016). This polygon was recommended for shovel testing to determine if subsurface archaeological resources are present at this location. All other areas within the PDA were determined to have low potential for archaeological resources and there is no recommendation for additional assessment or mitigation. The cable landfall portion of the PDA at Little Whale Cove, including the intertidal zone, was assessed during maximum low tide and no heritage resources were observed on the surface of these locations.

The shovel testing program conducted over the proposed cable riser station footprint at Little Whale Cove was completed on October 18, 2017. The shovel testing grid at polygon VJB-ARCH-016 included six shovel test pits (STPs) spaced at 10 m intervals as per the Guidelines (ASB 2012). All six STPs in this area were excavated and all six were found to be negative; that is, no artifacts, features, or deposits of heritage significance were identified.

Since the completion of the 2016 and 2017 AIAs, the location of the proposed cable riser stations have been altered from that which was assessed during the 2016 and 2017 field surveys at Little Whale Cove. As such, it is recommended that mitigation in the form of an additional AIA be completed prior to any ground breaking construction activities within the final revised PDAs for all cable riser stations.

Long Eddy Point

The AIA for the landfall portion at Long Eddy Point on the northern tip of Grand Manan Island was undertaken in November 2016 (Figure 10.4). The area is characterized by a rock-knob landform feature with minimal vegetation coverage that had previously been blasted away and leveled off to construct the existing cable riser station. The PDA between the existing cable riser station and the intertidal zone consists of a very steep and rocky drop to the beach. The intertidal zone itself is composed entirely of cobble beach. No heritage resources were observed and the area exhibits low potential for heritage resources due a large degree of disturbance from historical bedrock blasting adjacent to the existing cable riser station facility and the steepness of the cliff down to the cobble beach.

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Since the completion of the 2016 and 2017 AIAs, the location of the proposed cable riser stations have been altered from that which was assessed during the 2016 and 2017 field surveys at Long Eddy Point. As such, it is recommended that mitigation in the form of an additional AIA be completed prior to any ground breaking construction activities within the final revised PDAs for all cable riser stations.



Source Data: Base data provided by Service New Brunswick. Imagery provided by GeoNB Enhanced Imagery (2010).

Archaeological Features - Little Whale Cove, Campobello Island



Source Data: Imagery and base data provided by Service New Brunswick.

Archaeological Features - Grand Manan Island

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Marine-based

A search conducted by ASB did not identify any known or suspected shipwrecks within the intertidal zone (or along any portion of the proposed submarine portion of the electrical power cable route). In addition, a local shipwreck expert, Mr. Eric Allaby, stated that he is not aware of any shipwrecks in the areas being considered for the Project. He further stated that most wrecks were the results of ships crashing into shoreline rocks and breaking up, with the ships being further destroyed by the actions of the sea, leaving very little in terms of an archaeological site to be further explored. He was aware of the current landfall locations for the existing cables and does not have any record of shipwrecks at those locations. He is also not aware of any accounts of ships sinking further off shore in such a manner as to leave a shipwreck that might be encountered by the Project. He further commented that if this were the case, it is likely that scallop draggers would have encountered such wrecks and he was not aware of any that have (Allaby, E., pers. comm., 2015).

Grand Manan Channel

For marine-based portions of the PDA along the Grand Manan Channel from Little Whale Cove on Campobello to Long Eddy Point on Grand Manan, data from a Sidescan Sonar System (SSS) was reviewed by the Stantec Archaeology Team for the presence of any heritage resources-related features of note within the PDA (CSR 2017). Given the extreme conditions in this area with very strong tidal currents and the lack of any submerged shorelines, the only potential heritage resources that could be identified in their areas were shipwrecks. Based on the background research and comments presented above from Mr. Eric Allaby, there was little potential for these along the proposed route. The review of the SSS data confirmed this as no heritage resources were observed during this review and no further assessment or mitigation is required for this location.

Head Harbour Passage

For marine-based portions of the PDA along Head Harbour Passage from Chocolate Cove, Deer Island to Wilsons Beach, Campobello Island, SSS data were reviewed for the presence of any heritage resources-related features of note within the PDA (CSR 2017). As with the Grand Manan Channel portion, the extreme conditions related to very strong tidal currents and rugged sub-surface topography, the only potential heritage resources that could be identified in these areas were shipwrecks. Based on the background research and comments presented above from Mr. Eric Allaby, there was little potential for these along the proposed route. The review of SSS data confirmed this as no heritage resources were observed during this review and no further assessment or mitigation is required for this location.

10.5.2.3 Built Heritage

There are no buildings on any of the proposed landfall or cable riser station locations on any of the islands. Furthermore, a search of the Canadian Register of Historic Places (CRHP 2016) and the New Brunswick Register of Historic Places (NBRHP 2016) found that as far as these records go, there were never any built structures at these locations that were registered as historic buildings. A review of historic aerial photography from 1945 confirms that no built structures were present at that time (NBDNR 1945-

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A8190-058). Therefore, potential environmental effects of the Project on features of built heritage will not be assessed further in this report.

10.5.2.4 Palaeontological Resources

A review of published maps and reports by Dr. Randall Miller, Curator Emeritus for the Geology and Palaeontology Section of the Natural Science Department for the New Brunswick Museum, indicates that the PDA is located entirely on bedrock of Silurian igneous and minor sedimentary rocks (Deer Island and Campobello Island) and Triassic igneous rock (Grand Manan). There are no fossils reported from these rocks and it is unlikely that any would be found. Based on Dr. Miller's report, no fossil localities are reported or expected within the PDA (Miller 2017). Therefore, potential environmental effects of the Project on palaeontological resources will not be assessed further in this report.

10.6 PROJECT INTERACTIONS WITH HERITAGE RESOURCES

Table 10.3 identifies, for each potential environmental effect, the physical activities that might interact with the heritage resources VC and result in an identified environmental effect. These interactions are indicated by check marks and are discussed in detail in Section 10.7, in the context of environmental effects pathways, standard and Project-specific mitigation/enhancement, and residual environmental effects. A justification for no environmental effect is provided following the table as applicable.

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Table 10.3 Project-Environment Interactions with Heritage Resources

Physical Activities	Potential Environmental Effect
	Change in Heritage Resources
Construction	
Landfall construction	✓
Modification to cable riser stations	✓
Cable installation in Head Harbour Passage and Grand Manan Channel	✓
Clean-up and revegetation	–
Inspection and energizing the Project	–
Emissions and wastes	–
Land-based transportation	–
Marine transportation	–
Employment and expenditure	–
Operation	
Vegetation management	–
Access road maintenance	–
Energy transmission	–
Infrastructure inspection, maintenance, and repair	–
Emissions and wastes	–
Land-based transportation	–
Marine transportation	–
Employment and expenditure	–
Decommissioning	
Decommissioning of existing cables	–
Reclamation	–
Emissions and wastes	–
Land-based transportation	–
Marine transportation	–
Employment and expenditure	–
Notes:	
✓ = Potential interaction	
– = No interaction	

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Activities listed under construction that are not anticipated to interact with heritage resources include: emissions and wastes, employment and expenditure, clean-up and revegetation, and inspection and energization. Clean-up and revegetation may involve back blading, but will occur within the existing previously disturbed construction footprint and thus, no new ground disturbing activities will occur. Emissions and wastes, employment and expenditure, and inspection and energization for the Project will not involve ground-breaking activities. Therefore, no environmental effects with heritage resources will occur from these activities, and given the lack of interaction with heritage resources, they are not discussed further in this VC.

It is anticipated that there will be no new ground-breaking activities taking place during the operation phase of the Project that could interact with heritage resources beyond those that would have already occurred during construction. In the unlikely event that a heritage resource is discovered during this activity, NB Power would implement the Heritage Resource Discovery Contingency Plan in their PSEMP and contact the appropriate regulating agency to assess the discovery and develop appropriate mitigation. Given their lack of interaction with heritage resources, activities during operation are not discussed further in this VC.

Decommissioning activities will involve i) decommissioning of existing cables, and ii) eventual decommissioning of proposed cables. While there is potential for some ground-breaking during this phase of the Project, this will be limited to areas previously investigated and/or disturbed during the construction phase of the Project. As such, potential adverse effects to heritage resources are not anticipated during this phase of the Project. Thus, the decommissioning phase of the Project are not considered further in this assessment.

10.7 ASSESSMENT OF RESIDUAL ENVIRONMENTAL EFFECTS ON HERITAGE RESOURCES

Construction activities as identified in Table 10.3 are the only Project activities with potential to result in residual environmental effects of the Project on heritage resources.

10.7.1 Analytical Assessment Techniques

The assessment of potential environmental effects on the heritage resources VC was conducted using a combination of field-collected data and desktop information. Information on the location of known archaeological sites and areas of elevated archaeological potential was obtained from the Archaeological Services Branch. An archaeological impact assessment (AIA) was conducted throughout the land-based portions of the PDA as described above. Side-Scan sonar data was reviewed for the marine portions of the proposed cable route.

10.7.2 Change in Heritage Resources

10.7.2.1 Project-Environmental Effects Pathways

During the construction phase, the Project has the potential to cause adverse environmental effects resulting in a change in heritage resources without first implementing any mitigation. Activities that could result in a potential interaction with heritage resources include: landfall construction, modification to cable riser stations, and cable installation in Head Harbour Passage and Grand Manan Channel.

Archaeological resources, where present, are typically located in the upper soil layers of the earth. Therefore, potential interactions between these resources and the Project will most likely take place during construction, specifically as ground disturbing activities are carried out for the cable installation and modifications to riser structures.

Any potentially adverse environmental effects on heritage resources due to construction activities will be permanent, as no archaeological site can be returned to the ground in its original state. Cable trenching, horizontal directional drilling (HDD), and site preparation, particularly grubbing, for the Project will largely be carried out by mechanical means and have the potential to interact with heritage resources through ground disturbance.

10.7.2.2 Mitigation

Prior to undertaking construction activities for the Project, NB Power will reduce the potential environmental effects on heritage resources by implementing the following mitigation measures:

- If the locations of the proposed Project features are altered from those reviewed during the 2016 and 2017 AIAs and palaeontology assessment, NB Power will undertake additional assessments of the new locations, and implement any recommended mitigation prior to the initiation of ground breaking construction activities.
- Archaeological monitoring during the on land construction phase may be required, which will be determined after the additional assessments for the new locations is completed.
- The PSEMP to be developed for the Project will include a heritage resources discovery response plan that will include a chance find protocol for the unanticipated discovery of heritage resources during construction.

10.7.2.3 Characterization of Project Residual Environmental Effects

For the purposes of characterizing the residual environmental effects for a change in heritage resources, it is anticipated that the entire PDA will be developed for the Project. The construction phase of the Project represents the greatest potential for interaction with heritage resources, should any be present, and any ground breaking and earth moving activities of surface soils and rock have the potential to adversely affect the nature and integrity of heritage resources.

In the event that heritage resources are discovered in the PDA, the *Heritage Conservation Act* stipulates a duty to report the discovery of heritage resources and requires a permit to collect these resources. For heritage resources, the recovery and collection of these resources, should any be encountered, and

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presenting them to the Archaeological Services Branch (ASB) of New Brunswick, will mitigate potential environmental effects to these resources.

The residual environmental effects of the Project, should there be an encounter with heritage resources during the construction phase of the Project, would be adverse. However, with the implementation of the mitigation described above, this interaction is unlikely, and if it were to occur, would be minimized by the implementation of the heritage resources discovery response plan in the PSEMP.

10.8 SUMMARY OF PROJECT RESIDUAL ENVIRONMENTAL EFFECTS

Adverse interactions between the Project and the heritage resources VC will be limited to the construction phases of the Project.

Table 10.4 summarizes the environmental effects assessment and prediction of residual environmental effects resulting from those interactions between the Project and heritage resources rated as having a potential interaction in Table 10.3.

Table 10.4 Summary of Project Residual Environmental Effects on Heritage Resources

Residual Environmental Effect	Residual Environmental Effects Characterization								
	Project Phase	Direction	Magnitude	Geographic Extent	Duration	Frequency	Timing	Reversibility	Ecological and Socioeconomic Context
Change in heritage resources	C	A	L	PDA	LT	S	N/A	I	U
<p>KEY See Table 10.2 for detailed definitions</p> <p>Project Phase C: Construction O: Operation D: Decommissioning</p> <p>Direction: P: Positive A: Adverse</p> <p>Magnitude: N: Negligible L: Low H: High</p> <p>Geographic Extent: PDA: Project Development Area LAA: Local Assessment Area</p> <p>Duration: ST: Short-term; LT: Long-term P: Permanent</p> <p>Frequency: S: Single event IR: Irregular event R: Regular event C: Continuous</p> <p>Timing: A: Applicable N/A: Not applicable</p> <p>Reversibility: R: Reversible I: Irreversible</p> <p>Ecological/Socioeconomic Context: U: Unique C: Common</p>									

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Based on the above, should construction activities encounter an archaeological resource, the residual environmental effects of the Project would be considered adverse. However, based on the existing conditions and with the implementation of mitigation, the magnitude is predicted to be low, because any heritage resources located in the PDA will be preserved and their context documented for future generations to study. The geographic extent is limited to the PDA, where construction and ground disturbing activities will be undertaken. The duration and frequency are predicted to be a short-term single event since they will only occur during construction. Timing is not applicable because all ground disturbing related construction activities have the potential for adverse environmental effects regardless of when they are carried out, and seasonality has no bearing on whether heritage resources are present or whether they could be affected. The environmental effects are characterized as irreversible for heritage resources, because no archaeological site can be returned to the ground in its original state. The ecological and socioeconomic context is assessed as being unique given that in general heritage resources are considered unique, given their relative scarcity.

10.9 DETERMINATION OF SIGNIFICANCE

With the implementation of the proposed mitigation, the Project is not anticipated to have any residual adverse environmental effects to heritage resources. All archaeological mitigation will be carried out under provincial legislation and authorization and with full knowledge of First Nations.

In consideration of the above, and considering the nature of the interactions between the Project and heritage resources as well as the planned implementation of known and proven mitigation as well as adherence to applicable Acts, Regulations, and Guidelines, the residual environmental effects of the Project on heritage resources during all phases are predicted to be not significant. This conclusion has been determined with a high level of confidence based on a comprehensive understanding of the potential environmental effects of construction activities on heritage resources gained through a comprehensive evaluation of the background research, archaeological assessment (walkover), and the professional, regulated, systematic implementation of any additional mitigation required by provincial regulatory officials within the PDA, and the effectiveness of mitigation measures discussed in Section 10.7.1.2.