6.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS ON THE TERRESTRIAL ENVIRONMENT

The terrestrial environment VC includes consideration of terrestrial wildlife, wildlife habitat, vegetation communities, and wetlands. These components constitute a VC due to:

- the importance placed on them by the people of New Brunswick (including First Nations), who recognize their environmental, cultural, and socioeconomic value;
- the potential environmental effects of the Project on vegetation, wetlands, and wildlife;
- the regulations and policies protecting vegetation, wetlands, and wildlife; and
- the relationship between the terrestrial environment and other VCs, such as the aquatic environment, and traditional land and resource use by Aboriginal persons.

In addition to consideration of all vascular plants and wildlife species regardless of their conservation status, vegetation communities also include consideration of ecological communities of management concern (ECMC) and vascular plant species at risk (SAR) and species of conservation concern (SOCC).

6.1 REGULATORY AND POLICY SETTING

6.1.1 Vegetation and Wildlife Species

With respect to vegetation and wildlife, this VC focuses particularly on terrestrial SAR and SOCC. Terrestrial SAR species include those listed as *extirpated, endangered*, *threatened*, or *special concern* by the federal *Species at Risk Act* (*SARA*), the New Brunswick *Species at Risk Act* (NB *SARA*), or by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC assesses and designates the status of species and recommends this designation for legal protection under *SARA*. On lands under provincial jurisdiction, federal *SARA* goals are typically reflected through provincial legislation, policy, and guidelines.

While some species included as terrestrial SAR in this assessment currently have regulatory protection under Schedule 1 of the federal *SARA* or the *Prohibitions Regulation* of NB *SARA*, the definition above also includes those terrestrial species on the NB *SARA List of Species at Risk Regulation* and those listed by COSEWIC that are candidates for further review and may become protected within the timeframe of this Project. This has been requested by Environment and Climate Change Canada (ECCC) for past projects.

SARA serves several purposes: to prevent the extirpation or extinction of wildlife species; to provide recovery strategies for species that are *extirpated, endangered*, or *threatened* due to human activity; and to manage species of special concern so they do not become threatened or endangered. Under *SARA*, it is forbidden to kill, injure, harass, destroy the residence of, destroy the critical habitat of, capture or take an individual designated as *extirpated*, *endangered*, or *threatened* on federally regulated lands or on designated critical habitat elsewhere.

Under Section 79 of *SARA*, Ministerial notification is required if a project "*is likely to affect a listed wildlife species or its critical habitat*". This notification must identify the adverse environmental effects of a project on the listed wildlife species and its critical habitat and, if the project is carried out, measures that would be taken to avoid or lessen those effects, along with monitoring commitments.

Species at risk in New Brunswick are protected under the NB *SARA*, which shares many similarities with the federal *SARA*. The New Brunswick *SARA* is governed by the New Brunswick Department of Energy and Resource Development (NBDERD) and applies to only those species listed within its Schedule A. The prohibitions state that, "*no person shall kill, harm, harass or take any individual that is listed as an extirpated species, an endangered species or a threatened species*".

Terrestrial SOCC are those species that are not listed under federal or provincial legislation but are considered rare in New Brunswick, or the long-term sustainability of their populations has been evaluated as tenuous. SOCC are defined here as species ranked *S1* (*critically imperiled*), *S2* (*imperiled*), or *S3* (*vulnerable*) in New Brunswick by the Atlantic Canada Conservation Data Centre (AC CDC) (AC CDC 2017a). Unlike SAR, terrestrial SOCC are not afforded any direct protection by either federal or provincial legislation. SOCC are included in this VC as a precautionary measure, reflecting observations and trends in their provincial population status, and are often important indicators of ecosystem health and regional biodiversity. Rare species are often an indicator of the presence of unusual and/or sensitive habitat; their protection as umbrella species can confer protection on their associated unusual habitats and co-existing species.

The *Migratory Birds Convention Act* (*MBCA*) protects and conserves migratory bird populations, individuals, and their nests within all lands in Canada. All birds are covered under the *MBCA* in Canada, with the exception of some bird families (i.e., cormorants, pelicans, grouse, quail, pheasants, ptarmigan, osprey, hawks, owls, eagles, falcons, vultures, kingfishers, crows, ravens, jays and starlings). The *MBCA* is the enabling statute for the *Migratory Birds Regulations*. Section 6 of the *Migratory Birds Regulations* states that without the authorization of a permit, the disturbance, destruction, or taking of a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird, or possession of a migratory bird, carcass, skin, nest, or egg of a migratory bird are prohibited. As there are no authorizations to allow construction-related effects on migratory birds and their nests, best management practices and guidelines (e.g., Migratory Birds Convention Act: A Best Management Practice for Pipelines (Canadian Energy Pipeline Association and Stantec 2013), Incidental Take Avoidance Guidelines (ECCC 2017a)) are available to facilitate compliance with the *MBCA*.

6.1.2 Wetlands

Consistent with federal and provincial policies on wetland conservation (Government of Canada 1991; NBDNRE and NBDELG 2002), in this assessment, wetlands are defined as land permanently or temporarily submerged or saturated by water near the soil surface, for long enough that the area maintains aquatic processes. These aquatic processes are characterized by plants that are adapted to saturated soil conditions, wet or poorly drained soils, and other biotic conditions found in wet environments.

A federal mandate for wetland conservation is provided by The Federal Policy on Wetland Conservation (Government of Canada 1991). Policy goals are intended to apply on federal lands and waters or to federal programs where wetland loss has reached critical levels. They also apply to federally designated wetlands, such as Ramsar sites, of which there are none affected by the Project.

Wetlands in New Brunswick are managed by the New Brunswick Department of Environment and Local Government (NBDELG), and their management is guided by the New Brunswick Wetlands Conservation Policy (NBDNRE and NBDELG 2002). This policy aims to protect wetlands through securement, stewardship, education and awareness, and to maintain wetland function within New Brunswick. Legislation that supports the policy includes the New Brunswick *Clean Water Act* and the associated *Watercourse and Wetland Alteration* (*WAWA) Regulation*, and the New Brunswick *Clean Environment Act* and the associated *Environmental Impact Assessment Regulation* (EIA Regulation).

NBDELG maintains the official map of known wetlands in the province; it is available to the public on the GeoNB website (SNB 2011). As of November 2011, NBDELG considers the GeoNB map to represent the extent of “regulated” wetlands within the province. Any wetlands labelled as “Provincially Significant Wetlands” (PSW) in this database are subject to a greater level of protection, as outlined in the New Brunswick Wetlands Conservation Policy (NBDNRE and NBDELG 2002).

The *WAWA Regulation* applies to all wetlands of 1 hectare (ha) or greater in size, or any wetland contiguous to a watercourse. Pending changes to the wetland policy implementation, this assessment has been conducted according to current requirements (i.e., wetlands that are greater than 1 ha in size or are contiguous with a watercourse are regulated as per the *New Brunswick Clean Water Act*).

6.2 POTENTIAL ENVIRONMENTAL EFFECTS, PATHWAYS, AND MEASURABLE PARAMETERS

Activities and components could potentially interact with vegetation, wildlife, wildlife habitat, and wetlands to result in adverse environmental effects on vegetation communities, wildlife habitat, vascular plant or wildlife SAR and SOCC, and wetland area or function. In consideration of these potential interactions, the assessment of Project-related environmental effects on the terrestrial environment is therefore focused on the following potential environmental effects:

- change in vegetation or wildlife; and
- change in wetland area or function.

The environmental effects pathways and measurable parameters for the assessment of the environmental effects presented above are provided in Table 6.1.

Table 6.1 Potential Environmental Effects, Environmental Effects Pathways, and Measurable Parameters for Terrestrial Environment

Potential Environmental Effects	Environmental Effect Pathways	Measurable Parameter(s) and Units of Measurement
Change in vegetation or wildlife	• Vegetation clearing and ground disturbance during construction and during vegetation maintenance may affect vegetation or wildlife, including SAR/SOCC, if they are present, and would change vegetation communities (possibly including ECMC) and habitat for wildlife (e.g., through change and possibly fragmentation). • Sensory disturbance related to construction activities can lead to avoidance by wildlife species. • Collisions with construction equipment and potential electrocutions during operation are possible causes of mortality for avian species.	• Loss of vascular plant or wildlife SAR or SOCC (number of individuals or populations). • Loss of vegetation communities (ha). • Loss or alteration of wildlife habitat (ha). • Fragmentation of interior forest (ha). • Habitat avoidance (ha). • Loss or alteration of ECMC (ha). • Mortality of plants or wildlife (number of individuals). • Mortality of wildlife (number of individuals).
Change in wetland area or function	• Ground disturbance during construction and during vegetation maintenance may change wetland area or function.	• Loss of wetland area (ha). • Change in wetland function (as measured by various functions).

6.3 BOUNDARIES

6.3.1 Spatial Boundaries

The PDA is defined in Section 2.1 and includes the marine footprint of the two new submarine electrical cables and the two existing electrical cables, both from Deer Island to Campobello Island and from Campobello Island to Grand Manan Island, the associated landfall locations, and the cable riser stations. Specifically for the terrestrial environment, the PDA consists of the terrestrial portion of the PDA and includes the footprint of the terrestrial portions of the cables and four land-based overhead-to-underground cable riser stations located at Chocolate Cove (Deer Island), Wilson's Beach (Campobello Island), Little Whale Cove (Campobello Island), and Long Eddy Point (Grand Manan Island) but excludes the marine portion of the PDA. For the remainder of this VC section, the terrestrial environment PDA will simply be referred to as the PDA.

The LAA for each VC is the maximum area within which environmental effects from the Project activities and components can be predicted or measured with a reasonable degree of accuracy and confidence. The LAA can be thought of as the "zone of influence" of the Project on a particular VC, and thus can vary from one VC to the next. For the terrestrial environment, the LAA includes the PDA and a 500 m buffer around the PDA.

The PDA and LAA for the terrestrial environment VC are illustrated in Figure 6.1 to Figure 6.4, for each landfall location.

6.3.2 Temporal Boundaries

The temporal boundaries for the assessment of the potential environmental effects on the terrestrial environment include:

- construction – scheduled to begin in the spring of 2018 and last for approximately 16 months
- 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 cables and the proposed cables. Decommissioning of the existing cables would 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 submarine cables would occur following the useful service life of the submarine cables, and would be carried out in accordance with regulations in place at that time.

U:\133547270\gis\figures\report\eia\6-terrestrial\133547740-0601_ChocolateCove_DeerIsland.mxd

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

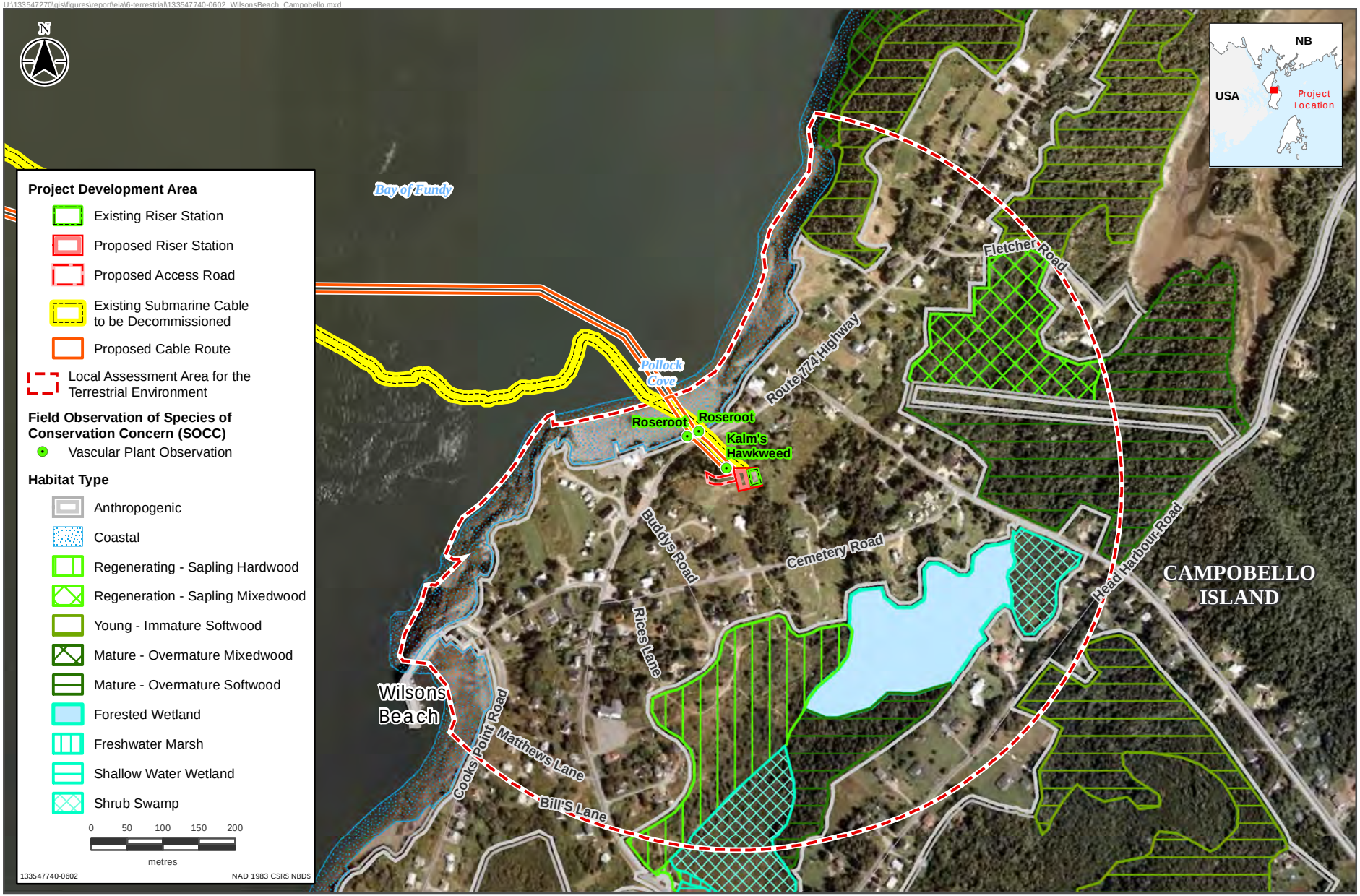
Local Assessment Area for the Terrestrial Environment
Chocolate Cove Landfall Site, Deer Island, New Brunswick

Stantec

133547740 - Fundy Isles - NB Power

Figure 6.1

U:\133547270\gis\figures\report\eia\6-terrestrial\133547740-0602_WilsonsBeach_Campobello.mxd



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

Local Assessment Area for the Terrestrial Environment
Wilsons Beach Landfall Site, Campobello Island, New Brunswick

Stantec

133547740 - Fundy Isles - NB Power

Figure 6.2

U:\133547270\gis\figures\report\eia\6-terrestrial\133547740-0603_LittleWhaleCove_Campobello.mxd

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

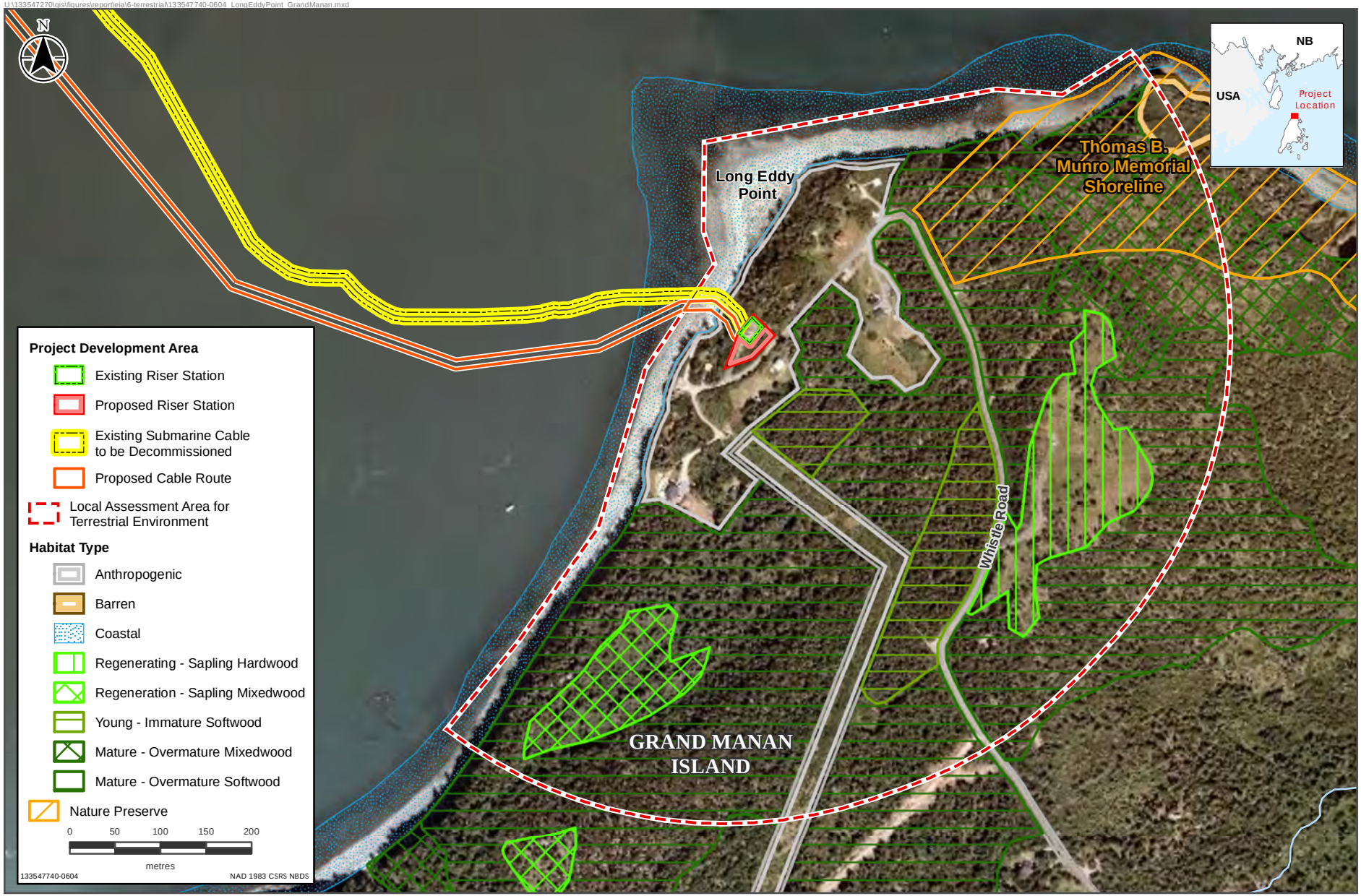
Local Assessment Area for the Terrestrial Environment
Little Whale Cove Landfall Site, Campobello Island, New Brunswick

Stantec

133547740 - Fundy Isles - NB Power

Figure 6.3

U:\133547270\gis\figures\report\eia\6-terrestrial\133547740-0604_LongEddyPoint_GrandManan.mxd



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

Local Assessment Area for the Terrestrial Environment
Long Eddy Point Landfall Site, Grand Manan Island, New Brunswick

Stantec

133547740 - Fundy Isles - NB Power

Figure 6.4

6.4 SIGNIFICANCE DEFINITION AND RESIDUAL ENVIRONMENTAL EFFECTS CHARACTERIZATION

For the purposes of this environmental effects assessment, a significant adverse residual environmental effect of the Project on a change in vegetation or wildlife is defined as a Project-related environmental effect that results in one or more of the following:

- a decline in abundance or change in distribution of species (evaluated by either the alteration of vegetation communities they inhabit, a reduction in wildlife dispersal or migration, or direct mortality of individuals) such that their long-term survival within the ecodistrict is substantially reduced
- a non-permitted contravention of any of the prohibitions stated in Sections 32-36 of *SARA* or Section 28 of NB *SARA*
- in the case of any terrestrial SAR, non-compliance with the management plans (developed as a result of Section 65 of *SARA* or Section 20 of NB *SARA*) currently in place
- alteration of ECMC such that they experience a change in function, and can no longer support any special populations they contain.

A significant adverse residual environmental effect of the Project on change in wetland area or function is defined as a Project-related environmental effect that results in one or more of the following:

- an unauthorized permanent net loss of wetland function
- the loss of important function (i.e., one that would result in a significant environmental effect on another VC that relies upon wetlands) at the ecodistrict level.

Descriptors used to characterize residual environmental effects for the assessment of terrestrial environment are defined in Table 6.2.

Table 6.2 Characterization of Residual Environmental Effects on the Terrestrial Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual environmental effect.	**Positive** – a residual environmental effect that moves measurable parameters in a direction beneficial to vegetation, wildlife, wildlife habitat, or wetlands relative to baseline. **Adverse** – a residual environmental effect that moves measurable parameters in a direction detrimental to vegetation, wildlife, wildlife habitat, or wetlands relative to baseline.
Magnitude	The amount of change in measurable parameters or the VC relative to existing conditions.	**Negligible** – no measurable change from existing conditions (i.e., pre-Project). **Low** – a change from existing conditions that is within the range of natural variability and does not adversely affect the ongoing viability of vegetation communities, SAR and SOCC, wildlife populations, or wetland function within the surrounding ecodistrict. **Moderate** – measurable change from existing conditions that is outside the range of natural variability but does not adversely affect the ongoing viability of vegetation

Table 6.2 Characterization of Residual Environmental Effects on the Terrestrial Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
		communities, SAR and SOCC, wildlife populations, or wetland function within the surrounding ecodistrict. **High** – measurable change from existing conditions that exceeds the limits of natural variability and adversely affects the ongoing viability of vegetation communities, SAR and SOCC, wildlife populations, or wetland function within the surrounding ecodistrict.
Geographic Extent	The geographic area in which a residual environmental effect occurs.	**PDA** – residual environmental effects are restricted to the PDA. **LAA** – residual environmental effects extend into the LAA. **Ecodistrict** – residual environmental effects extend into the surrounding ecodistrict.
Frequency	Identifies how often the residual environmental effect occurs and how often during the Project or in a specific phase.	**Single event** – occurs once. **Multiple irregular event** – occurs at no set schedule. **Multiple regular event** – occurs at regular intervals. **Continuous** – 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 –** residual environmental effect restricted to the duration of the construction phase. **Medium-term –** residual environmental effect extends through one to 20 growing seasons (i.e., half way through the operation phase and representing several generations for many species). **Long-term** – residual environmental effect extends beyond 20 growing seasons. **Permanent** – residual environment effect does not end.
Reversibility	Pertains to whether a measurable parameter or the VC can return to its existing condition after the project activity ceases.	**Reversible** – the residual environmental effect is not permanent and the measurable parameter will recover to baseline conditions after activity completion. **Irreversible** – the residual environmental effect is likely permanent.
Timing	Timing considerations should be noted when it is important in the evaluation of the residual environmental effect.	**Applicable** – the residual environmental effect is likely to be affected by what season activities occur in. **Not Applicable** – the residual environmental effect is unlikely to be affected by what season activities occur in.
Ecological and Socioeconomic Context	Existing condition and trends in the area where residual 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.

6.5 EXISTING CONDITIONS FOR TERRESTRIAL ENVIRONMENT

6.5.1 Vegetation and Wetlands

6.5.1.1 Approach and Methods

A report on known historical observations of plant SAR and SOCC within 5 km of the PDA was obtained from the AC CDC (AC CDC 2015, Appendix B). These results were used to assist the selection of field survey methods.

Vascular plant and wetland surveys were conducted by Stantec terrestrial ecologists within the land-based portions of the PDA (as defined at the time of the survey) and a 30 m buffer on August 24 and 25, 2016. Small portions of the current PDA (i.e., access road upgrades) may not have been covered by the survey but will be surveyed prior to construction if the final access road upgrade designs fall outside the previously surveyed areas. Any information that differs from the previously submitted information in this EIA report will be communicated to NBDELG in a supplemental report for consideration by the TRC.

All vascular plant species encountered were recorded and a vascular plant species list was compiled for the Project. A global positioning system (GPS) location was recorded for each incidence of vascular plant SAR or SOCC observed, along with any pertinent information for each plant, such as population size. Any plants for which the identification in the field was uncertain were collected and later identified with the assistance of a dissecting microscope and vascular plant identification manuals. The area was also concurrently surveyed for wetlands, although no wetlands were observed.

Land use data were obtained from the New Brunswick Department of Energy and Resource Development (NBDERD) for the PDA and LAA. Forest stands within the LAA were classified into one of three maturity classes: regeneration – sapling, young – immature, or mature – overmature, and one of three species composition classes: hardwood, mixedwood, or softwood. Stands with both hardwood and softwood species equaling less than 70% of total tree cover are considered mixedwood. NBDERD wetlands within the LAA were classified to class and type using the Canadian Wetland Classification System (CWCS; NWWG 1997). Within the CWCS, there are five wetland classes: bog, fen, swamp, marsh, or shallow water. Wetland type distinguishes wetland communities based on one of eight groups of dominant vegetation.

6.5.1.2 Overview of Existing Conditions

Vegetation

The PDA for the terrestrial environment includes the landfall sites, including on shore portions of the marine cable and cable riser station modifications. The various landfall sites are located on the southeastern coast of Deer Island, the northwestern and eastern coasts of Campobello Island, and the northern coast of Grand Manan. The PDA is within the Fundy Coastal Ecodistrict, the only ecodistrict in the Fundy Coast Ecoregion.

The Fundy Coastal Ecodistrict encompasses the Bay of Fundy coastline and New Brunswick islands within the Bay of Fundy, from Passamaquoddy Bay near the border with Maine, to Shepody Bay at the border with Nova Scotia. The cold water of the Bay of Fundy moderates the climate of the ecodistrict, resulting in cool and often foggy summer weather, and milder winter weather than in more northern areas of the province. Although there are some notable coastal marshes and bogs within the ecodistrict, the coastline is largely rocky, with a number of different bedrock types represented (NBDNR 2007).

The Fundy Coast Ecodistrict is 76% forested and is dominated by coniferous forest cover, mainly by a mix of red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), black spruce (*P. mariana*), white spruce (*P. glauca*), and tamarack (*Larix laricina*). At lower elevations, the vegetation is predominantly coniferous coastal forests, then transitions to mixed or deciduous forests over the warmer inland terrain. Common hardwoods found in the region are red maple (*Acer rubrum*), and birches (*Betula* spp.) (NBDNR 2007).

The PDA includes four coastal sites. At each site, the cable route lands on a beach or rocky coastal feature, which transitions to a forested or treed rural or infrastructure area, terminating at a planned expansion of an existing cable riser station. The submarine cables would make landfall and connect to each of the land-based cable riser stations either through horizontal directional drilling (HDD) or open cut trenching (OCT) methods, depending on the local geology and construction conditions. For the purpose of this VC, OCT is assumed to be used as it would result in a larger disturbance of ground than HDD; in this manner, the assessment is conservative. Land use data for the PDA and LAA are presented as both hectares (ha) and percentages in Table 6.3. Detailed land use data for each landing site is presented in Table C.1 in Appendix C.

Table 6.3 Land Use Data in the PDA and LAA

Land Use	PDA (ha)	PDA (%)	LAA (ha)	LAA (%)
Anthropogenic	0.60	41.75	67.71	29.96
Transmission Line	0.36	24.88	6.37	2.82
Barren	-	-	1.95	0.86
Coastal	0.35	24.51	16.22	7.18
Regenerating - Sapling Hardwood	-	-	25.23	11.16
Regenerating - Sapling Mixedwood	-	-	5.07	2.24
Regenerating - Sapling Softwood	-	-	1.25	0.55
Young - Immature Hardwood	0.01	0.41	16.95	7.50
Young - Immature Mixedwood	-	-	5.52	2.44
Young - Immature Softwood	-	-	7.65	3.38
Mature - Overmature Hardwood	-	-	1.48	0.66
Mature - Overmature Mixedwood	0.12	8.46	20.52	9.08
Mature - Overmature Softwood	-	-	44.01	19.47
Shrub Swamp	-	-	2.73	1.21
Treed Swamp	-	-	3.37	1.49
Total	**1.43**	**100.00**	**226.02**	**100.00**

During vegetation surveys, 150 vascular plant species were observed within the PDA (Table C.2, Appendix C). Of these, none are SAR, and two are SOCC: Kalm's hawkweed (*Hieracium kalmii, S1*) and roseroot (*Rhodiola rosea, S3*). Both of these species were observed at the Wilsons Beach site, on the northwestern coast of Campobello (Figure 6.2).

Kalm's hawkweed is a perennial herbaceous plant in the Aster Family (Asteraceae), with yellow flowers arranged in several heads on a long stalk that can grow to over a metre in height (Gleason and Cronquist 1991; Hinds 2000). Four individuals of this species were observed within an existing electrical power line RoW between the existing cable riser station and Route 774, within the land-based PDA for the new cables.

Roseroot is a succulent plant in the Stonecrop Family (Crassulaceae) with yellowish dioecious flowers that often mature into bright red fruit (Gleason and Cronquist 1991; Hinds 2000). This plant was observed in two locations on a rock outcrop located between Route 774 and Wilsons Beach. Approximately 35 shoots were observed 4 m west of the edge of the land-based PDA for the new cables, and another 15 shoots were observed within the PDA of the existing line to be decommissioned.

Wetlands

No wetlands were observed or delineated within the PDA during field surveys conducted in August 2016. Although there are GeoNB-mapped and New Brunswick Hydrographic Network (NBHN)-mapped wetlands within the LAA, they are all at a minimum of 200 m from the PDA and were not surveyed. Wetland types within the LAA include treed swamp and shrub swamp.

6.5.2 Wildlife

6.5.2.1 Approach and Methods

Wildlife field surveys focusing on breeding birds in the terrestrial environment were conducted by Stantec avian biologists in June of 2016. These surveys included area searches within the PDA. Incidental observations of other wildlife species were made over the course of these, and other, terrestrial surveys. Supplemental information for other wildlife occurring within the LAA and surrounding area were obtained from various data sources and supplemented by incidental observations in the field when other wildlife were present while other focused surveys were being carried out. Birds in the marine environment are discussed in Section 7.0, assessment of environmental effects on the marine environment.

Information Sources

Historical records of wildlife having been observed within the LAA and surrounding area were obtained, where available, from various sources including the Atlantic Canada Conservation Data Centre (AC CDC), the North American Breeding Bird Survey (BBS), the Maritimes Breeding Bird Atlas (MBBA), the Atlantic Canada Nocturnal Owl Survey (ACNOS), and the Christmas Bird Count (CBC).

Atlantic Canada Data Conservation Centre

The AC CDC is a registered charity that was established in 1997, and has the following mission statement: "*To assemble and provide objective and understandable data and expertise about species and ecological communities of conservation concern, including those at risk, and to undertake field biological inventories in support of decision-making, research, and education in Atlantic Canada*" (AC CDC 2017b). AC CDC data, including SAR, SOCC, and managed areas, were obtained within 5 km of the PDA (AC CDC 2015).

North American Breeding Bird Survey

The BBS began in 1966 and is now one of the longest-running breeding bird surveys in North America. The BBS database is extensive and can be used to determine long-term population trends of breeding bird species in Canada. A search of the BBS database was conducted to obtain records of bird species observed near the PDA (ECCC 2017b).

Maritimes Breeding Bird Atlas

The second MBBA (2006-2010) was a five-year project to update the distribution and abundance of all bird species breeding in the three Maritimes provinces. The first MBBA was conducted from 1986-1990. The MBBA database provides information including species presence, breeding evidence, and relative abundance in a given 10 km by 10 km area (known as an "atlas square"). Data were obtained for the atlas squares 19FK66 (Campobello Island), 19FK67 (Campobello and Deer Island), and 19Fk76 (Grand Manan Island), which encompass the Project. The AC CDC data include MBBA data from other nearby atlas squares as well.

Atlantic Canada Nocturnal Owl Surveys

The ACNOS was initiated in 2001 to help monitor trends in the abundance of relatively common owls. The survey seeks to monitor the region's owl populations and gather information about the distribution of owls in Atlantic Canada.

The ACNOS database from Bird Studies Canada, accessed via the NatureCounts website (BSC 2015), provides basic information about the presence of owl species detected from specific points on survey routes (called "survey stops") in each year. Data are available from 2001 to 2007. There were no ACNOS data returned within 5 km of the Project.

Christmas Bird Count

The CBC, started in 1900, is North America's longest-running citizen science project. Each count happens over a single day between December 14 and January 5 each year, and is carried out within a 24 km diameter circle. This count documents overwintering bird species. There is one CBC circle that overlaps the LAA: Grand Manan Island.

Field Survey Methods

The land-based portion of the PDA includes four sites that are of similar habitat. At each site, the cable route lands on a beach or rocky coastal feature, which transitions to a forested or treed rural or infrastructure area, terminating at a planned expansion of an existing cable riser station. Breeding bird surveys in the form of area searches were conducted at each of the four landfall sites on June 10, 2016 (Long Eddy Point) and June 28, 2016 (Little Whale Cove, Wilsons Beach, and Chocolate Cove). Area searches involve walking the PDA and recording species, number and breeding evidence for all species encountered. The area searches were completed over 1.5 hours at each of the four sites. The breeding status of each species was determined using the methodology employed by the "Atlas of Breeding Birds of the Maritimes Program" (Stewart 2015). Species identified but not exhibiting signs of breeding (such as flyovers) were classified as non-breeders. Species observed or heard singing in suitable nesting habitat was classified as possible breeders. Species exhibiting the following behaviours were classed as probable breeders:

- Courtship behaviour between a male and female;
- Birds visiting a probable nesting site;
- Birds displaying agitated behaviour; and
- Male and female observed together in suitable nesting habitat.

Species were confirmed as breeding if any of the following items or activities were observed:

- Nest building or adults carrying nesting material;
- Distraction display or injury feigning;
- Recently fledged young;
- Occupied nest located; and
- Adult observed carrying food or faecal sac for young.

An evening survey was also conducted on June 10, 2016, targeting common nighthawk (*Chordeiles minor*), following the desktop identification of potential habitat near the PDA at the Grand Manan site. This survey consisted of a 10-minute point survey near the existing substation at Long Eddy Point, with broadcasting of calls periodically during the last 5 minutes if no birds are detected during the first 5 minutes of silent listening.

6.5.2.2 Overview of Existing Conditions

Birds

Information sources including the AC CDC, MBBA, BBS, and the CBC, and field surveys conducted by Stantec in 2016 indicate that a total of 191 bird species have been recorded near the LAA (i.e., within 5 km of the land-based portions of the PDA, or within the MBBA squares within which the Project is located). Of the bird species historically recorded, 21 are SAR (as noted in bold text in Table C.3, Appendix C), and 52 are SOCC (Table C.3, Appendix C). All other species are considered *S4* (apparently secure) or *S5* (secure) by the AC CDC.

Several species of marine bird SAR were identified by the various data sources, including:

- harlequin duck;
- Barrow's goldeneye;
- horned grebe;
- red knot;
- buff-breasted sandpiper; and
- red-necked phalarope.

Due to their limited interaction with the terrestrial environment, these species are not discussed further in this section, but are discussed in Section 7.0, assessment of environmental effects on the marine environment.

Field Surveys

During breeding bird surveys conducted in June 2016, a total of 37 bird species were noted within the PDA (Table 6.4), including two SOCC (common eider, a sea duck; and black guillemot, a marine bird). Bird data by survey location are provided in Table C4, Appendix C.

Table 6.4 Bird Species Observed During Field Surveys in 2016

Common Name	Scientific Name	AC CDC S-rank[1]	Highest Breeding Evidence[2]
common eider	*Somateria mollissima*	*S3B,S4M,S3N*	Confirmed
ruffed grouse	*Bonasa umbellus*	*S5*	Confirmed
mourning dove	*Zenaida macroura*	*S5B,S5M,S4N*	Confirmed
ruby-throated hummingbird	*Archilochus colubris*	*S5B,S5M*	Probable
black guillemot	*Cepphus grylle*	*S3*	Confirmed
ring-billed gull	*Larus delawarensis*	*S3S4B,S5M*	Observed
herring gull	*Larus argentatus*	*S5*	Possible
great black-backed gull	*Larus marinus*	*S5*	Possible
double-crested cormorant	*Phalacrocorax auritus*	*S5B,S5M*	Observed
osprey	*Pandion haliaetus*	*S4S5B,S5M*	Confirmed
belted kingfisher	*Megaceryle alcyon*	*S5B,S5M*	Possible
alder flycatcher	*Empidonax alnorum*	*S5B,S5M*	Confirmed
blue-headed vireo	*Vireo solitarius*	*S5B,S5M*	Confirmed
American crow	*Corvus brachyrhynchos*	*S5*	Confirmed
common raven	*Corvus corax*	*S5*	Confirmed
black-capped chickadee	*Poecile atricapillus*	*S5*	Confirmed
red-breasted nuthatch	*Sitta canadensis*	*S5*	Confirmed
golden-crowned kinglet	*Regulus satrapa*	*S5*	Confirmed
hermit thrush	*Catharus guttatus*	*S5B,S5M*	Confirmed
American robin	*Turdus migratorius*	*S5B,S5M*	Confirmed
gray catbird	*Dumetella carolinensis*	*S4B,S4M*	Confirmed

Table 6.4 Bird Species Observed During Field Surveys in 2016

Common Name	Scientific Name	AC CDC S-rank[1]	Highest Breeding Evidence[2]
European starling	*Sturnus vulgaris*	*SNA*	Confirmed
cedar waxwing	*Bombycilla cedrorum*	*S5B,S5M*	Confirmed
purple finch	*Haemorhous purpureus*	*S4S5B,SUN,S5M*	Confirmed
American goldfinch	*Spinus tristis*	*S5*	Confirmed
ovenbird	*Seiurus aurocapilla*	*S5B,S5M*	Probable
black-and-white warbler	*Mniotilta varia*	*S5B,S5M*	Confirmed
common yellowthroat	*Geothlypis trichas*	*S5B,S5M*	Confirmed
American redstart	*Setophaga ruticilla*	*S5B,S5M*	Confirmed
northern parula	*Setophaga americana*	*S5B,S5M*	Confirmed
magnolia warbler	*Setophaga magnolia*	*S5B,S5M*	Confirmed
yellow warbler	*Setophaga petechia*	*S5B,S5M*	Confirmed
chestnut-sided warbler	*Setophaga pensylvanica*	*S5B,S5M*	Confirmed
black-throated green warbler	*Setophaga virens*	*S5B,S5M*	Confirmed
song sparrow	*Melospiza melodia*	*S5B,S5M*	Confirmed
white-throated sparrow	*Zonotrichia albicollis*	*S5B,S5M*	Confirmed
dark-eyed junco	*Junco hyemalis*	*S5*	Confirmed

Note: SOCC are presented in underlined text.

[1] *S1* = critically imperiled, *S2* = imperiled, *S3* = vulnerable, *S4* = apparently secure, *S5* = secure, *SNA* = not applicable (typically exotic species), *S#S#* = a numeric range rank indicates any range of uncertainty about the status of the species (AC CDC 2017a).

[2] As available from the MBBA or field data, whichever was higher. As defined in Stewart (2015).

Of the 37 species recorded, 30 have been confirmed as breeding in or around the PDA, two are recorded as probable breeders, and three are recorded as possible breeders.

Species richness (defined as the number of different species recorded within a habitat type) was calculated for each of the habitat types (as identified in the available NBDERD forest inventory data) in which birds were recorded within the LAA (Table 6.5), and includes species observed incidentally. It should be noted, however, that the PDA and surrounding areas are highly fragmented, and do include some coastal marine and pelagic birds observed within coastal intertidal areas.

Table 6.5 Bird Species Richness

Land Use	Area within the LAA (ha)	Species Richness (number of species)
Anthropogenic	67.71	20
Transmission Line	6.37	15
Barren	1.95	-
Coastal/Marine	16.22	7
Regenerating - Sapling Hardwood	25.23	1
Regenerating - Sapling Mixedwood	5.07	-
Regenerating - Sapling Softwood	1.25	-
Young - Immature Hardwood	16.95	7
Young - Immature Mixedwood	5.52	-
Young - Immature Softwood	7.65	-
Mature - Overmature Hardwood	1.48	-
Mature - Overmature Mixedwood	20.52	3
Mature - Overmature Softwood	44.01	-
Shrub Swamp	2.73	-
Treed Swamp	3.37	-
Total	**225.46**	**37**

Bird Species at Risk

Fifteen terrestrial bird SAR have been identified through desktop data sources which have the potential to be found near the LAA. These are described below. None of these species were recorded during field surveys in June 2016. Discussion of the six marine bird SAR identified through the desktop data sources is provided in Section 7, assessment of environmental effects on the marine environment.

Common Nighthawk

The common nighthawk (*Chordeiles minor*) is considered *threatened* under Schedule 1 of *SARA* and under NB *SARA*, and is ranked *S3B,S4M* by the AC CDC (AC CDC 2016). The BBS (ECCC 2017b) reports that this species is in decline at a Canada-wide and New Brunswick-wide level. The exact causes of the decline of this species are not well understood; however, it may be related to the widespread decline in insect populations which this species relies upon for food. This theory is supported by the widespread declines observed among many other insectivorous bird species (COSEWIC 2007a).

Common nighthawks are most commonly observed in a wide range of open, vegetation-free habitats including beaches, recently cleared forests, rocky outcrops, and grasslands (SARA 2015). The species has probably benefited from newly-opened habitats created by the forestry industry (COSEWIC 2007a). Suitable habitat for common nighthawk exists within the PDA and LAA. There is one AC CDC record of a historical observation of common nighthawk, within the Chocolate Cove 10 km X 10 km atlas square

(19FK57) (AC CDC 2015). Surveys targeting this species were conducted after potentially suitable nesting habitat was identified on the landing site on Grand Manan; no individuals were observed.

Chimney Swift

The chimney swift (*Chaetura pelagica*) is a small slender bird, with long, narrow wings. The breeding range of this species is limited to eastern North America, with approximately one quarter of the breeding range located in Canada (COSEWIC 2007b). This species is considered *threatened* under Schedule 1 of *SARA* and under NB *SARA*. The AC CDC lists this species as *S2S3B, S2M* indicating the breeding population of this species is considered between imperiled and vulnerable, and the migrating population is considered imperiled in New Brunswick (AC CDC 2016).

The chimney swift is primarily associated with urban and rural areas where chimneys are available for nesting and roosting. Chimney swift formerly nested in hollow trees; however, they now nest almost exclusively in anthropogenic structures due to the relative scarcity of hollow trees (COSEWIC 2007b). This species is an aerial insectivore, and often concentrates near water where insects are abundant (COSEWIC 2007b). AC CDC records include a record of a 2004 observation of chimney swift in Herring Cove Provincial Park on Campobello Island and a record of a 2013 observation near North Head, Grand Manan (AC CDC 2015). There have been additional records in North Head, available from eBird.org. No suitable nesting habitat for this species was noted in the PDA, and no observations of chimney swift were made in the PDA during the field surveys.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is listed as *endangered* under NB *SARA*, and *S4* by the AC CDC (AC CDC 2016). It has no *SARA* status. The BBS (ECCC 2017b) reports that this species has been increasing in population in Canada and at the province level in New Brunswick. The main factors which were once responsible for the species decline include trapping, shooting and poisoning of the birds, as well as the use of the pesticide DDT which contributed to reproductive failure. Continuing threats to this species include lead poisoning from ammunition in hunter-shot prey, collisions with motor vehicles and stationary structures, and destruction and alteration of their habitat (Cornell Lab of Ornithology 2017).

Bald eagles prefer nesting sites near open water. During winter, individuals from the resident population are often found in the southwestern part of the province, where they have access to the Bay of Fundy for fishing. While AC CDC (2015) identified bald eagle as having been historically recorded within 5 km of the PDA, locations have not been provided as it is considered a location-sensitive species. Suitable habitat for this species is located within the LAA, although no nests or individuals were observed during field surveys in 2016.

Red-headed Woodpecker

The red-headed woodpecker (*Melanerpes erythrocephalus*) is a medium-sized species which ranges from the prairie provinces east to New England in the United States. In Canada, its range includes southern Saskatchewan, Manitoba, Ontario, and Québec. This species is listed as *threatened* under

Schedule 1 of *SARA*. It has no NB *SARA* rank and is ranked as *SNA* in New Brunswick by the AC CDC as it is considered "accidental" and not endemic to New Brunswick (AC CDC 2016).

Red-headed woodpeckers are associated with a variety of habitats including oak and beech stands, grasslands and pastures, and forest edges, including roadsides (COSEWIC 2007c). The AC CDC has a historical record of an immature bird observed during fall migration on October 21, 2011 near a lighthouse on Grand Manan Island (AC CDC 2015). Suitable habitat for this species is found within the LAA; however, this species is not endemic to New Brunswick.

Peregrine Falcon

The peregrine falcon (*Falco peregrinus*) is a crow-sized raptor which breeds in all Canadian provinces and territories with the exception of Prince Edward Island, Nunavut, and Newfoundland. This species is listed as *special concern* under Schedule 1 of *SARA*, and *endangered* under NB *SARA*. The AC CDC lists peregrine falcon as *S1B,S3M* (AC CDC 2016), indicating the breeding populations of this species are considered critically imperiled in New Brunswick, while the migrating populations are considered vulnerable.

Peregrine falcons are most often associated with elevated habitats (preferably 50 to 200 m) which include cliff ledges or crevices, but also occasionally ledges of tall buildings or bridges (COSEWIC 2007d). While AC CDC (2015) identified a historical record of peregrine falcon within 5 km of the PDA, locations have not been provided as it is considered a location-sensitive species. Potentially suitable breeding habitat was identified in the PDA; however, no individuals were observed during field surveys in 2016. It is unlikely that this species nests within or close to the PDA.

Olive-sided Flycatcher

The olive-sided flycatcher (*Contopus cooperi*) is a stout, medium-sized passerine which breeds in scattered locations throughout most of forested Canada (COSEWIC 2007e). This species is listed as *threatened* under Schedule 1 of *SARA* and NB *SARA*. The AC CDC lists the olive-sided flycatcher as *S3B, S3M* (AC CDC 2016), indicating that the breeding and migrating populations of this species are considered vulnerable in New Brunswick.

Olive-sided flycatchers are most often associated with open areas, where they are found foraging for flying insects, and perching in tall live trees (COSEWIC 2007e). This species has been recorded during the MBBA on Deer Island and Grand Manan Island, but not recorded during field surveys in 2016. Suitable habitat for this species was not noted in the PDA during field surveys in 2016; however, it may exist in the LAA.

Eastern Wood-pewee

The eastern wood-pewee (*Contopus virens*) is ranked as *special concern* by COSEWIC and NB *SARA*. It has no *SARA* status. The AC CDC ranks this species as *S4B, S4M* indicating both the breeding and migratory populations in New Brunswick are apparently secure (AC CDC 2016). The BBS (ECCC 2017b) reports that this species is in decline at a Canada-wide and New Brunswick-wide level. The main factors thought to be responsible in the decline of the eastern wood-pewee have not been clearly identified, due

largely to a lack of research. Possible threats include loss of habitat, and degradation of habitat quality, changes in availability in flying-insect prey, and changes in forest structure due to white-tailed deer over-browsing (COSEWIC 2012a).

During breeding, the eastern wood-pewee is generally associated with the mid-canopy layer within forest clearings and edges of hardwood and mixed forest stands (COSEWIC 2012a). In migration periods, this species utilizes a variety of habitats including edges, and clearings (COSEWIC 2012a). Most AC CDC historical records of eastern wood-pewee are from the north end of Grand Manan (AC CDC 2015). No eastern wood-pewee were observed in the PDA during field surveys in 2016; however, potentially suitable habitat may be found adjacent to the PDA.

Bank Swallow

The bank swallow (*Riparia riparia*) is ranked as *threatened* by COSEWIC, and has no *SARA* or NB *SARA* status or schedule. The AC CDC ranks bank swallow as *S2S3B, S2S3M* (AC CDC 2016). The BBS (ECCC 2017b) reports that this species is in decline in Canada and at the province level in New Brunswick. The main factors thought to be responsible for the decline of this species include the loss of breeding and foraging habitat and the loss of food sources through the widespread use of pesticides (COSEWIC 2013).

Bank swallows breed in a wide variety of natural and anthropogenic sites including riverbanks, aggregate pits, road cuts, and vertical sand banks or stock piles of soil. Nesting sites are generally situated adjacent to open terrestrial habitat used for aerial foraging (COSEWIC 2013). AC CDC records from this century are from Grand Manan. No suitable nesting habitat for bank swallow was noted in the PDA during field surveys in 2016.

Barn Swallow

The barn swallow (*Hirundo rustica*) is a mid-sized passerine that is closely associated with rural human settlements. This species is the most widespread swallow in the world, and is known to breed in all provinces and territories in Canada (COSEWIC 2011). The barn swallow is ranked as *threatened* by COSEWIC and NB *SARA*, and *S2B, S2M* by the AC CDC (2016), indicating that the breeding and migrating populations of this species are considered imperiled in New Brunswick. It has no *SARA* rank at this time.

Following European settlement of North America, barn swallows shifted from nesting in caves and on ledges to nesting largely in man-made structures. This insectivorous species prefers open habitats for foraging such as pastoral lands, shorelines, and cleared rights-of-way. Most MBBA records are pre-1990, with one record from the second MBBA in the Eel Brook Lake atlas square in Grand Manan. There have been other AC CDC (eBird.org) records on Deer Island, Campobello Island, and Grand Manan. No suitable nesting habitat was noted for this species in the PDA, nor was it observed in the PDA during field surveys.

Bicknell's Thrush

The Bicknell's thrush (*Catharus bicknelli*) is a medium-sized thrush, which has one of the most restricted breeding ranges among North American forest-breeding birds (COSEWIC 1999). This species is limited to high elevations of mountain ranges in southeastern Canada, as well as some coastal lowland areas. Bicknell's thrush is listed as *threatened* under Schedule 1 of *SARA* and under NB *SARA*. The AC CDC lists this species as *S2B,S2M* (AC CDC 2016), indicating the breeding and migratory populations of this species are imperilled.

Bicknell's thrush is a habitat specialist, and is generally associated with undisturbed dense habitat areas, or mid-successional disturbed areas of balsam fir-dominated habitat. It may make use of dense spruce-fir stands in coastal areas. There is only one recent historical record from the second MBBA, from the Grand Manan atlas square. No breeding habitat for this species was identified in the PDA during field surveys in 2016; however, some may exist in the LAA.

Wood Thrush

The wood thrush (*Hylocichla mustelina*) is listed as *threatened* by COSEWIC and NB *SARA*, and *S1S2B, S1S2M* by the AC CDC (AC CDC 2016). The BBS (ECCC 2017b) reports that this species is in decline in Canada and in NB. It has no *SARA* status at this time. The main factors thought to be responsible in the decline of this species include habitat degradation and fragmentation due to over-browsing by white-tailed deer and human development (COSEWIC 2012b). High rates of nest predation and parasitism by species such as brown-headed cowbird are also contributing to the decline of the wood thrush.

Wood thrush nest mainly in second-growth and mature forests, both deciduous and mixed wood, with saplings and well-developed understory layers. No wood thrush were observed during field surveys in 2016. AC CDC records include 2 from eBird.org, on Deer Island and Grand Manan. No suitable habitat for wood thrush was noted within the PDA; however, some may exist in the LAA.

Prothonotary Warbler

The prothonotary warbler (*Protonotaria citrea*) is a wood warbler species which, in Canada, breeds only in deciduous swamp forests in southwestern Ontario (COSEWIC 2007f). This species is listed as *endangered* under Schedule 1 of *SARA*. It has no rank under NB *SARA*, and is listed as *SNA* by the AC CDC (2016) as it is considered an accidental and not endemic to New Brunswick. The AC CDC historical record is from May 2013, recorded at a bird feeder along Whistle Road on Grand Manan Island (AC CDC 2015).

No suitable breeding habitat for prothonotary warbler was noted in the PDA, and this species is not endemic to New Brunswick.

Canada Warbler

Canada warbler (*Cardellina canadensis*) is a small and brightly coloured passerine. Approximately 80% of the entire breeding range of this species is located in Canada (COSEWIC 2008), where it can be found breeding in every province and territory except Newfoundland and Labrador and Nunavut. Canada

warbler is ranked as *threatened* on Schedule 1 of *SARA* and under NB *SARA*, and *S3B, S3M* by the AC CDC (2016), indicating that the breeding and migrating populations of this species are considered vulnerable in New Brunswick.

Canada warblers breed in a wide range of forest types, including hardwood, softwood, and mixedwood forests. It is often associated with moist mixedwood forest and riparian shrub forests on slopes and ravines (COSEWIC 2008). The presence of a well-developed shrub layer also seems to be associated with preferred Canada warbler habitat. There are AC CDC (MBBA) historical records on Grand Manan and Deer Islands. No suitable habitat or Canada warblers were observed in the PDA during field surveys in 2016. Suitable habitat for this species, such as shrub swamps, is found within the LAA.

Bobolink

Bobolink (*Dolichonyx oryzivorus*) is ranked as *threatened* by COSEWIC and NB *SARA*, and *S3B, S3M* by the AC CDC (2016). It has no *SARA* rank at this time. The BBS (ECCC 2017b) indicates that this species is in decline at a Canada-wide and province-wide level. The main threats to this species include land-use change, especially the loss of meadows and hay fields, and the early mowing of hay fields in which the species is nesting.

Bobolink originally nested in the tall-grass prairie of the mid-western U.S and south central Canada. As this habitat was converted to agricultural land, and forests of eastern North America were cleared to hayfields and meadows, the range of bobolink expanded (COSEWIC 2010a). Bobolink presently nest in a variety of forage crop habitats, and natural grassland habitats including wet prairie, graminoid peatlands, and abandoned fields dominated by tall grasses. There is one MBBA historical record from Grand Manan, and several other AC CDC (ebird.org) historical records during late spring on Campobello and Grand Manan islands. There is little to no suitable habitat for this species in the PDA.

Rusty Blackbird

The rusty blackbird (*Euphagus carolinus*) is listed as *special concern* on Schedule 1 of *SARA* and under NB *SARA*. The AC CDC (2016) ranks the rusty blackbird as *S3B, S3M*. The BBS (ECCC 2017b) reports that this species is in decline Canada-wide and at the provincial level in New Brunswick. The main factor thought to be associated with the decline of rusty blackbirds is the conversion of its main wintering grounds (forests in Mississippi Valley flood plains) into agricultural lands or human habitation (COSEWIC 2006). Other factors include destruction of wetlands within the species breeding range, and the spread of dominant, competing, species such as the red-winged blackbird.

The rusty blackbird nests in boreal forests, generally near the shores of forest wetlands, slow-moving streams, beaver ponds, and pasture edges (COSEWIC 2006). This species' main diet in its breeding range consists primarily of aquatic invertebrates, and occasionally salamanders and small fish. There is only one AC CDC historical record (eBird.org) on Grand Manan in spring. No suitable habitat for rusty blackbird is found within the PDA, though some may exist within the LAA.

Other Wildlife

AC CDC data for the Project indicate historical records of the monarch butterfly (*Danaus plexippus*) within 5 km of the PDA, but no details on timing or location of the observation. This species is listed as *special concern* under *SARA* and NB *SARA*, and as *endangered* by COSEWIC (AC CDC 2016). It is typically found near milkweed (*Asclepias spp.*) plants, as this is a primary food source for the larval life stage (COSEWIC 2010b). No milkweed was observed in the PDA or surrounding area, so it is unlikely that this species would be found within the PDA, other than potentially in migration.

The islands of New Brunswick generally support fewer native wildlife species relative to mainland areas (Grand Manan Tourism and Chamber of Commerce 2014), and the relatively small size of the terrestrial environment PDA reduces the likelihood of encountering wildlife signs.

Incidental observations of other wildlife were made by field staff while conducting surveys, including vegetation and wetland surveys. Excluding birds, three wildlife species (or evidence thereof) were observed by field staff in the LAA, including:

- white-tailed deer (*Odocoileus virginianus*)
- snowshoe hare (*Lepus americanus*)
- red squirrel (*Tamiasciurus hudsonicus*)

Each of these wildlife species are listed as *S5* by the AC CDC, indicating their populations are considered secure, or “common, widespread, and abundant in the province” (AC CDC 2017a).

6.5.3 Ecological Communities of Management Concern

6.5.3.1 Approach and Methods

Data on Ecological Communities of Management Concern (ECMC) were compiled from several sources, including AC CDC (2015), NBDERD (2015), and the Nature Trust of New Brunswick (NTNB 2016a).

6.5.3.2 Overview of Existing Conditions

Ecological Communities of Management Concern (ECMC) are communities that fulfill special management objectives on Crown land in New Brunswick or have been identified as supporting unique ecological features, either through field work, or by local conservation organizations (e.g., Environmentally Significant Areas (ESA)). The LAA contains two ECMC: the Clark Gregory Nature Preserve, and the Thomas B. Munro Memorial Shoreline Nature Preserve.

The Clark Gregory Nature Preserve is located at Chocolate Cove on Deer Island. This nature preserve is composed of two, separate areas totalling 29 ha, and contains several habitats, including mature forest, shrub swamp, and coastal rock cliffs (NTNB 2016b). The southwestern corner of the larger of the two areas is within the PDA. One rare vascular plant, small-flowered bittercress (*Cardamine parviflora* var. *arenicola*, *S1*) was reportedly observed in 2000, within the preserve on a coastal rock slope, approximately 22 m northeast of the existing cable (AC CDC 2015; NTNB 2016b).

Thomas B. Munro Memorial Shoreline Nature Preserve is a 25.7 ha area located on Grand Manan Island, approximately 200 m northeast of the Long Eddy Point landfall site. This preserve includes almost 1,700 m of shoreline and adjacent forest habitat, and includes a walking trail (NTNB 2016c).

Several other ECMC are located near the Project, but well beyond the terrestrial environment LAA and are not discussed. These include: Roosevelt Campobello International Park, Herring Cove Provincial Park, Whale Beach Pond Ducks Unlimited site, and Abraham's Plain Bog ESA on Campobello Island; and Meredith Houseworth Memorial Seashore at Whale Cove on Grand Manan Island. The Grand Manan Migratory Bird Sanctuary is located 14 km south of the PDA, on the south coast of Grand Manan Island in Long Pond Bay.

6.6 PROJECT INTERACTIONS WITH THE TERRESTRIAL ENVIRONMENT

Table 6.6 identifies the physical activities that may interact with a change in vegetation or wildlife or a change in wetland area or function and result in the identified environmental effect. These interactions, identified with a checkmark (✓) are discussed in further detail in Section 6.7, in the context of environmental effects pathways, standard and Project-specific mitigation/enhancement, and residual environmental effects. Justification for those Project activities that have been determined to have no interactions with a change in vegetation or wildlife or a change in wetland area or function (i.e., those physical activities that do not have a checkmark in Table 6.6) is provided following the table.

Table 6.6 Project-Environment Interactions with the Terrestrial Environment

Project Phases and Physical Activities	Potential Environmental Effects	
	Change in vegetation or wildlife	Change in wetland area or function
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

Change in Vegetation or Wildlife

Cable installation in Head Harbour Passage and Grand Manan Channel is not expected to have any interactions with the terrestrial environment because it does not include landfall construction (a separate activity) and is entirely marine in nature. Therefore, no interactions are expected between cable installation in Head Harbour Passage and Grand Manan Channel on the terrestrial environment.

Inspection and energizing would occur following other construction activities such as landfall construction and modification to riser structures, and would occur over a short period of time within areas that were previously disturbed during these other Project activities. Therefore, no interactions are expected between inspection and energizing and the terrestrial environment.

Land-based transportation during construction or operation, may result in vehicular collisions with wildlife; however, these interactions are considered accidental events and are addressed as such in Section 14.0.

Marine transportation during any phase would be restricted to the marine environment, and would not interact with the terrestrial environment.

Employment and expenditure in any phase is not expected to have any interactions with the terrestrial environment as these activities are not physical in nature.

During operation, infrastructure inspection, maintenance, and repair are not anticipated to interact with the terrestrial environment in a substantive way. This Project activity would occur periodically using existing roads and in previously disturbed areas, and would not result in further disturbance to the terrestrial environment.

Energy transmission and the presence of power lines could result in collisions and electrocutions of birds. These are considered accidental events and are addressed as such in Section 14.0.

Therefore, in light of the lack of interaction of the physical activities listed in Table 6.7 for which no interaction was expected, the potential environmental effects of the Project on a change in vegetation or wildlife during all phases is rated not significant with a high degree of confidence. Those activities are therefore not discussed further in this VC section.

Change in Wetland Area or Function

No interactions with wetlands are anticipated during any activity or phase of the Project, as no wetlands were identified within the PDA, and based on NBHN and GeoNB wetland data, the closest wetlands are more than 200 m from the PDA. In this light, the potential environmental effects of the Project on a change in wetland area or function during all phases is rated not significant with a high degree of confidence. A change in wetland area or function is therefore not discussed further in this VC section.

6.7 ASSESSMENT OF RESIDUAL ENVIRONMENTAL EFFECTS ON THE TERRESTRIAL ENVIRONMENT

6.7.1 Analytical Assessment Techniques

The assessment of potential environmental effects on the terrestrial environment was conducted for those Project activities that were identified in Table 6.6 as having a potential interaction with the terrestrial environment, using a combination of field-collected data and desktop information.

Vegetation, wetland, and avian field surveys were conducted throughout the PDA by qualified biologists with experience in botany, wetland delineation and classification, and wildlife (particularly avifauna). Desktop information was used to augment field surveys and to classify land use in portions of the LAA outside of the PDA. Information on vascular plant and wildlife observations was obtained from the AC CDC (2015). Information on bird observations was obtained from a variety of sources, including: the North American Breeding Bird Survey (BBS) database, the Maritimes Breeding Bird Atlas (MBBA) database, and the AC CDC. These data sources are described in Section 6.5.2.1.

6.7.2 Change in Vegetation or Wildlife

6.7.2.1 Project-Environmental Effects Pathways

The construction phase of the Project has the potential to result in adverse environmental effects resulting in a change in vegetation communities, the loss of wildlife habitat, loss of vascular plant SOCC, sensory disturbance to wildlife resulting in habitat avoidance, and direct mortality of wildlife.

The Project would result in a change in vegetation communities during construction, including one ECMC (the Clark Gregory Nature Preserve). Site preparation for the modification to existing cable riser stations would remove some trees and shrubs and would damage understory plants within portions of the PDA. Any vascular plant SAR or SOCC present within areas to be cleared would be removed or damaged.

A change in vegetation communities could also occur from the cable landfall construction if HDD is not possible and the OCT method is used instead; OCT would completely remove vegetation and wildlife habitat within the OCT footprint, including SOCC, where they are present. No SAR were recorded within the PDA.

Topsoil and the associated seedbank, as well as lower soil levels would also be removed. Heavy machinery driving through the site would cause soil compaction. Removing and compacting soil would result in a change in habitat quality for plants in any areas that may not be completely developed. Thus, any areas that are cleared and then allowed to revegetate may have different plant communities establish because of changed habitat characteristics.

Construction activities can also lead to the introduction of invasive plants, many of which are strong competitors that thrive in disturbed habitats. These invasive species could out-compete native vegetation

in the PDA and surrounding areas. Removal of wildlife habitat can also lead to increased habitat fragmentation.

If any clearing activities occur during the breeding bird season (April through August), construction activities could affect wildlife, including migratory birds. Construction activities such as clearing (for cable riser station construction or cable installation, if the OCT method is used) can increase edge effects on wildlife, changing abiotic factors such as light availability, humidity, wind, and temperature, thereby changing wildlife habitat. Edges can also result in indirect changes to mortality rates by allowing predators or nest parasitizers increased access to other wildlife.

Noise and light from construction equipment and activities can cause sensory disturbance to many wildlife species, resulting in reduced productivity or nest abandonment. These issues can result in indirect changes to mortality rates. Wildlife can avoid areas where construction activities are occurring, thereby experiencing temporary habitat loss (Bayne et al. 2008).

Direct mortality can occur through disturbing nests, either on the ground or in cleared vegetation, and from collisions with equipment. Collision rates with vehicles and equipment and predation can increase when some wildlife, particularly small mammals, reptiles, and amphibians, move out from cover in response to noise or vibration disturbance. In addition, lighted equipment can attract birds during migratory periods. This phenomenon is most pronounced during poor weather conditions and at night (Avery et al. 1976; Longcore and Rich 2004; Ogden 1996; Wiese et al. 2001).

Operation of the Project includes several activities and components that could have adverse environmental effects on the terrestrial environment, including vegetation management and the presence of the expanded cable riser stations adjacent to existing cable riser stations.

Vegetation management involves the periodic clearing of vegetation around Project infrastructure, which would result in the regular disturbance of vegetation communities and wildlife habitats that would have previously been disturbed during construction activities. If this activity occurs during the breeding bird season, it could result in direct and indirect mortality of migratory birds, as described above for clearing within the construction phase. If any vascular plant SAR or SOCC were not affected by construction and are within the footprint of vegetation management, they could be either directly affected by machinery, or indirectly affected through a change in abiotic conditions related to removal of overstory vegetation (similar to edge effects, discussed above).

Decommissioning the existing submarine cables may occur by several options, and would be decided upon in the future (Section 2.4.6). Two of the three potential options do not include the removal of the terrestrial portion of the cable, and therefore have no terrestrial component and would not result in any adverse environmental effects on the terrestrial environment. The third option includes the removal of the entire cable, including terrestrial portions. This option would require vegetation clearing and ground disturbance, including soil removal. Blasting would not be required for this Project. All potential environmental effects described above for the construction phase, including disturbance related to the OCT method for cable installation, apply to this decommissioning method. This includes removal of vegetation communities, potential removal or indirect habitat changes for vascular plant SAR or SOCC, if

they are present or adjacent to the PDA of the existing cables, and direct and indirect interactions with wildlife, including disturbance to breeding birds if the decommissioning occurs during the breeding bird season.

6.7.2.2 Mitigation

The following well-established practices to reduce the interaction between the Project and a change in vegetation or wildlife would be implemented during construction, operation, and decommissioning of the Project.

- Known locations of individuals of SOCC would be flagged and avoided during construction and vegetation maintenance, when possible.
- A Project-specific Environmental Management Plan (PSEMP) would be developed for this Project, based on the existing NB Power EMP for Overhead Transmission Lines.
- Erosion and sediment control measures (would be included in the PSEMP for works around sensitive areas, such as shorelines or areas with SOCC, such as Wilson's Beach.
- Construction and clearing activities would be limited to the minimum required area, and construction equipment and vehicles would be operated on previously disturbed ground, whenever possible.
- Construction equipment would operate at low speeds, to reduce potential wildlife mortality resulting from collisions.
- Construction equipment would arrive on site clean and free of soil or vegetative debris.
- Clearing activities would be avoided when possible during the normal breeding season for migratory birds (April through August). According to the "General nesting periods of migratory birds in Canada" (ECCC 2017c), approximately 95% of migratory birds in Zone C3 (which extends over the southern 2/3 of New Brunswick, all of Prince Edward Island, the northern half of Nova Scotia, and parts of Ontario) breed between approximately April 12 to August 17.
- If completion of clearing outside the breeding season is not possible, work would be conducted according to an avian management plan to be developed in such a circumstance. The avian management plan which would include breeding bird surveys to determine if any nesting activity is occurring at that time. If active nests are observed in the area to be cleared, additional mitigation would be employed such as flagging the area and avoidance of nests until the young have fledged.
- Approved noise arrest mufflers would be used on equipment to reduce potential environmental interactions between noise and wildlife.
- The HDD method would be used (instead of the OCT method) for landfall construction wherever possible to minimize the area of surface disturbance.
- Any construction wastes that could attract wildlife would be properly stored and disposed of.
- Full cut-off lighting (i.e., where no illumination is visible above an angle of 90°) would be used during construction to reduce attraction to migrating birds.
- LED lights would be used instead of other types of lights, where possible.
- If OCT method is used, removed soil would be placed adjacent to construction area, soil piles would be covered for the duration of construction, and soil layers would be replaced from where they were removed.
- Vegetation management would be restricted to the minimum area required and conducted outside of the normal breeding season for migratory birds (April to August).
- Proposed access road upgrades that extend beyond 30 m of the riser stations should be surveyed for vascular plants prior to construction. If any vascular plant SAR or SOCC are encountered within the PDA of the road upgrades, specific mitigation would be developed at that time.
- If decommissioning of the existing cables would require removal of terrestrial portions of the cable, these areas would be resurveyed for vascular plants prior to (but within a year of) their removal. If any

vascular plant SAR or SOCC are encountered within the PDA of the existing cables, specific mitigation would be developed at that time.
- If decommissioning of the existing cables would require removal of terrestrial portions of the cables, this work would occur outside of the normal breeding season for migratory birds (April to August) where possible.

6.7.2.3 Characterization of Project Residual Environmental Effects

Assuming the OCT method is used for landfall construction (a conservative assumption), construction activities related to landfall would result in disturbance to approximately 0.91 ha of vegetation communities and wildlife habitat, including 0.17 ha of coastal land, 0.40 ha of anthropogenic land, 0.26 ha of existing transmission line RoW, and 0.07 ha of mature – overmature mixedwood forest. These habitats are common and not limiting in the surrounding LAA. Of this area, 0.13 ha is within the Clark Gregory Nature Preserve at the Chocolate Cove landing site. Adverse environmental effects associated with construction would be reduced if HDD cable installation is possible.

If HDD installation is used, any ground disturbance associated with construction, such as vegetation removal and direct mortality of wildlife, should be restricted to the footprint of the riser station modifications. Modifications to the cable riser stations are expected to result in direct disturbance to and permanent loss of 0.50 ha of land: 0.19 ha of transmission line RoW, 0.28 ha of anthropogenic land class, and 0.03 ha of mature – overmature mixedwood. These habitats are common and not limiting in the surrounding LAA. The affected area of the Clark Gregory Nature Preserve at the Chocolate Cove landing site would be reduced to 0.07 ha.

Construction of the Project may result in the loss of several individuals of a vascular plant SOCC from within the PDA. Kalm's hawkweed was noted within the PDA in a disturbed area, an existing power line. Although Kalm's hawkweed was not noted in any other locations surveyed in support of the Project, its preference for disturbed habitats suggests it likely exists in other locations within the LAA. In addition, it is unlikely to be affected by the Project if the HDD method of cable installation is used, as planned, as it would be flagged and avoided. Therefore, the loss of these individuals is not expected to have population-level effects on this species in the LAA or surrounding ecodistrict.

Because the various areas of the PDA are already disturbed and with the application of mitigation outlined in Section 6.7.2.2, potential issues and concerns related to soil compaction and invasive plant introduction are reduced.

Although construction of the Project would result in both temporary and permanent loss of vegetation communities and wildlife habitat, it is not expected to contribute to habitat fragmentation, as the landfall sites are generally in fragmented habitats, the cable riser stations are already on a disturbed footprint (though it would be expanded slightly for the Project), and there is no interior forest within the PDA.

The PDA would be cleared outside of the breeding season for migratory birds, and thus interactions with breeding birds, including SAR and SOCC, would be limited to a small reduction in available habitat related to the increased footprint of the existing cable riser stations, and sensory disturbance associated with construction activities. Wildlife species are not expected to be restricted by a lack of suitable

available habitat within the LAA, as the land components of the PDA are in areas with existing levels of ambient noise, and similar habitats are not lacking in surrounding areas.

Wildlife mortality resulting from collisions with construction equipment would be reduced by limiting clearing activities to the minimum required area, and imposing speed limits within construction areas. Collision between birds and construction equipment would be reduced by the use of full cut-off lighting. Wildlife mortality is not expected to be raised above existing levels as a result of the construction of the Project.

Operation includes periodic vegetation management. Vegetation management would be restricted to previously disturbed areas, and would not occur during the breeding bird season, which would reduce potential wildlife mortality. If vegetation management occurs in the areas where SOCC have been observed, these species would be flagged and avoided. Roseroot was observed on rock outcrops, in full sun, and would not be affected by overstory removal. Kalm's hawkweed was observed within an existing electrical power line RoW which currently experiences periodic vegetation management. Vegetation management would occur by hand, to minimize disturbance associated with large machinery. The expanded cable riser stations would not be a new structure in the area, and its presence is not expected to contribute to wildlife mortality. Similarly, connections from the new cable riser stations to existing 69 kV overhead power lines would replace existing connections and would not represent an increased risk to wildlife mortality as a result of the Project.

If decommissioning of the existing cables includes removal of terrestrial portions, this would result in in the disturbance of approximately 0.40 ha of vegetation communities and wildlife habitat, including 0.18 ha of coastal land, 0.11 ha of anthropogenic land, 0.06 ha of existing transmission line RoW, 0.05 ha of mature – overmature mixedwood forest, and 0.002 ha of young – immature hardwood forest. These habitats are common and not limiting in the surrounding LAA. Decommissioning of the existing cables on land would also disturb 0.06 ha of the Clark Gregory Nature Preserve at the Chocolate Cove landing site, if terrestrial portions of the cables are removed.

Decommissioning of terrestrial portions of the existing cables would result in the loss of a vascular plant SOCC from within the PDA, if it still exists in that location at the time of removal. Roseroot was observed in two locations, one of which is within the terrestrial footprint of the existing cables to be decommissioned. It is also likely that this species exists in other unsurveyed areas within the LAA. The loss of these individuals associated with the removal of the terrestrial portion of the existing cables is not expected to have population-level effects on this species in the LAA or surrounding ecodistrict. Although not observed during field surveys, small-flowered bittercress, has been observed near the terrestrial portion of the existing cable, within the Clark Gregory Nature preserve. If this species is noted within the PDA of the existing cables at the time of decommissioning, mitigation outlined in Section 6.7.2.2 would be employed to reduce any interaction with this species.

The residual environmental effects of the Project are predicted to be adverse, since they would result in disturbance; however, the environmental effects would be temporary and reduced in area within the PDA. The main residual environmental effect is the loss of habitat, which would be temporary in cable construction and decommissioning areas but permanent in cable riser station modification areas. The

extent of this environmental effect is lessened because of the disturbed nature of the PDA and surrounding areas.

6.7.3 Change in Wetland Area or Function

6.7.3.1 Project Environmental Effects Pathways

There were no interactions identified in Table 6.7 between the Project and a change in wetland area or function for any phase of the Project. As there are no wetlands within the PDA or within 200 m of the PDA, no Project-related environmental effects on a change in wetland area or function are anticipated.

6.7.3.2 Mitigation

As no Project-related environmental effects on wetlands are anticipated, no mitigation for a change in wetland area or function is proposed.

6.7.3.3 Characterization of Project Residual Environmental Effects

Because there are no wetlands within the PDA or within 200 m of the PDA, the Project is not expected to cause a measurable change from baseline conditions that would be both outside the range of natural variability and would alter wetland area or function on a widespread basis within the surrounding ecodistrict. As a result, there are no residual environmental effects of the Project on a change in wetland area or function.

6.8 SUMMARY OF PROJECT RESIDUAL ENVIRONMENTAL EFFECTS

Table 6.7 summarizes the prediction of residual environmental effects of the Project and the terrestrial environment that were rated as having a potential interaction in Table 6.7. Since there were no residual environmental effects on a change in wetland area or function, ratings are not required.

Table 6.7 Summary of Project Residual Environmental Effects on the Terrestrial Environment

Residual Environmental Effect	Residual Environmental Effects Characterization								
	Project Phase	Direction	Magnitude	Geographic Extent	Duration	Frequency	Timing	Reversibility	Ecological and Socioeconomic Context
Change in vegetation or wildlife	C	A	L	LAA	MT	S	A	R/I	C
	O	A	L	LAA	MT	R	A	R	C
	D	A	L	LAA	MT	S	A	R	C

KEY
See Table 6.2 for detailed definitions

Project Phase
C: Construction
O: Operation
D: Decommissioning

Direction:
P: Positive
A: Adverse

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PDA: Project Development Area
LAA: Local Assessment Area

Duration:
ST: Short-term;
MT: Medium-term
LT: Long-term

N/A: Not applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Timing:
A: Applicable
N/A: Not applicable

Reversibility:
R: Reversible
I: Irreversible

Ecological/Socioeconomic Context:
C: Common
U: Unique

Based on the above, the residual environmental effects of the Project are predicted to be adverse, since they would change the condition of the terrestrial environment in a negative way. The magnitude is predicted to be low, because any changes would be to a small amount of area within a previously disturbed landscape. The geographic extent is limited to the LAA, as some limited amount of edge effect would extend into the LAA, but most effects would be concentrated within the PDA. The duration and frequency are predicted to be moderate, and a single event for construction and decommissioning, but regular events for operation. Timing is applicable because of the difference in potential environmental effects during the breeding bird season. The environmental effects are characterized as reversible, because the previously disturbed areas can regenerate to near pre-Project conditions within a relatively short time period. The ecological and socioeconomic context is common because the various locations within the PDA are similar to surrounding coastal areas.

6.9 DETERMINATION OF SIGNIFICANCE

The construction phase of the Project would result in both temporary and permanent disturbance to vegetation communities and wildlife habitat within the PDA; however, all of these habitat types are common within the LAA, and the long-term survival of any species is not expected to be affected by the Project. Under some evaluated options, both the construction and decommissioning phases of the Project could result in the loss of some individual vascular plant SOCC; however, the loss of these individuals is not expected to have long-term population-level effects on the species in the LAA or surrounding ecodistrict. No non-permitted contraventions of *SARA* prohibitions or non-compliance with existing management plans would occur as a result of the Project. There could be a slight alteration of an ECMC (the Clark Gregory Nature Preserve at the Chocolate Cove landfall site), depending on the methods for new cable installation and existing cable removal that are chosen, but this change is not expected to result in the ECMC experiencing a change in function. There are no wetlands within the PDA; therefore, the Project would not result in any residual environmental effects to wetlands.

With the application of proposed mitigation and environmental protection measures, the residual environmental effects of a change in vegetation or wildlife and a change in wetland area or function from Project activities and components are rated not significant. This conclusion has been determined with a high level of confidence because of the quality of desktop and field data available for the Project, and based on a good understanding of the general effects of construction and operation activities on the terrestrial environment and the effectiveness of mitigation measures discussed in Section 6.7.2.2.