5.0 ASSESSMENT OF POTENTIAL INTERACTIONS BETWEEN THE PROJECT AND THE ENVIRONMENT

5.1 POTENTIAL INTERACTIONS OF THE PROJECT WITH THE ENVIRONMENT

Based on the Project Description (Chapter 2), the Environmental Setting (Chapter 3), and the methods described briefly above (Chapter 4), the potential interactions between the Project and the environment are summarized in Table 5.1. Valued Components for which the Project will not have interactions are described in Sections 5.1.1 through 5.1.4.

Table 5.1 Potential Interactions of the Project with the Environment

Activities/Physical Works Associated with the Project	Atmospheric Environment	Water Resources (Surface Water and Groundwater)	Freshwater Fish and Fish Habitat	Terrestrial Environment	Socioeconomic Environment	Heritage Resources	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	Effects of the Environment on the Project
Construction								
Site Preparation	✓			✓	✓			
Excavation, Structure Assembly, and Installation	✓			✓				✓
Conductor Stringing	✓							✓
Connection of Transmission Line								✓
Inspection and Energization								✓
Clean-up/Revegetation	✓			✓	✓			✓
Operation and Maintenance								
Operation and Maintenance of Hardware				✓				✓
Vegetation Management	✓			✓	✓			

In the table above, the interaction with a particular VC is identified when the interaction first occurs.

5.1.1 Water Resources

Water resources consists of water that is available for human use and comes from one of two sources of water: groundwater and surface water. Human use of water resources includes consumption, as well as residential, agricultural, commercial, and industrial use.

There are no known surface water intakes or Designated Watershed Protected Areas within the LAA. Municipal water for the City of Moncton is supplied from the Turtle Creek Reservoir (Moncton 2016b), located approximately 10 km southwest of the PDA. The New Brunswick Online Well Log System (NBOWLS) has no records of registered wells within the LAA (GNB 2017a).

Given the small Project footprint, the lack of water resources near the PDA, pre-existing paved and impervious surfaces, municipal wastewater infrastructure, and the adherence to mitigative methods in NB Power's EPP, there will not be substantial environmental interactions between the Project and water resources.

5.1.2 Fish and Fish Habitat

Fish and Fish Habitat includes CRA fisheries as defined under the *Fisheries Act*, and the habitat that supports these fish populations, including water quality. Fish are defined under the *Fisheries Act* as "any parts of fish…the eggs, sperm, spawn, larvae, spat and juvenile stages of fish" and for the purposes of this assessment include any fish species or life stage of fish within the LAA as described in Section 4.3.1. Fish habitat is defined under the *Fisheries Act* as "spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly to carry out their life processes". Fish also include those listed under Schedule 1 of the *Species at Risk Act* (*SARA*) and the New Brunswick *Species at Risk Act* (NB *SARA*) that are afforded additional regulatory protection.

The nearest watercourse is located downgradient approximately 300 m north of the PDA (Figure 2.1), and is separated from the Project by the vegetated and permeable RoW of existing transmission Line 1124. As such, there are no watercourses crossed by the PDA, nor is the PDA situated within the 30 m buffer of any watercourse.

As there are no watercourses or buffers within the PDA, and no reasonable pathway for the Project to affect the nearest watercourse located 300 m away, there are no potential environmental interactions between the Project and freshwater fish and fish habitat.

5.1.3 Heritage Resources

Heritage resources are those resources, both human-made and naturally occurring, related to human activities from the past that remain to inform present and future societies of that past. Heritage resources are relatively permanent, although highly tenuous, features of the environment. If heritage resources are present, their integrity is highly susceptible to construction and ground-disturbing activities. For this VC, Heritage Resources includes consideration of

historical, archaeological, built heritage, and palaeontological resources. It is further understood that any resources that would be understood to be "historical" are captured under one of these three heritage resource types.

A search of the Canadian Register of Historic Places (CRHP 2017) and the New Brunswick Register of Historic Places (NBRHP 2017) indicated that there are no cemeteries, historic places, or heritage sites located within or near the PDA. There are also no registered archaeological sites within 500 m radius of the Project, and the potential for encountering unknown heritage resources within the PDA is low (Tricia Jarratt, NB Department of Tourism, Heritage and Culture, Archaeological Services Branch, 2017 personal communication).

Project activities that involve surface or sub-surface ground disturbance have the potential for interaction with heritage resources where they are present. As the PDA is situated in a previously disturbed area (e.g., construction of the Moncton Industrial Park, and transportation, transmission, and water and wastewater infrastructure), and there are no built heritage sites in the PDA, there are no potential environmental interactions between the Project and heritage resources.

5.1.4 Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons

The assessment of potential environmental interactions in this section refers to traditional activities such as hunting, fishing and gathering conducted by Aboriginal persons for traditional purposes, and considers subsistence, social and ceremonial uses, and for which the right to engage in those activities is afforded constitutional protection. The assessment is limited to Crown lands crossed by the PDA.

The only Crown owned properties crossed by the PDA are two paved roads (Arsenault Court and Driscoll Crescent). As there are no Crown lands crossed by the PDA that provide for subsistence, social, or ceremonial uses by Aboriginal persons, there are no potential environmental interactions between the Project and current use of land and resources for traditional purposes by Aboriginal persons.

5.2 ATMOSPHERIC ENVIRONMENT

This section assesses the potential environmental interactions between construction and operation and maintenance of the Project and the atmospheric environment VC. The atmospheric environment was included as a VC because of the potential for the Project to interact with air quality, greenhouse gas emissions (GHG), and sound quality.

5.2.1 Scope of Assessment

The atmospheric environment has been selected as a Valued Component (VC) for this EIA Registration because Project-related releases of air contaminants to the atmosphere may

adversely affect the quality of the ambient air, human and/or ecological health. There is also a high level of confidence of the relationship between anthropogenic releases of GHGs to the atmosphere, global climate change, and the resulting adverse environmental interactions. Additionally, unwanted sound and vibration from Project activities may result in community annoyance and/or ecological disturbances.

The following assessment of the atmospheric environment considers air contaminants that are typically associated with this type of Project, which are regulated provincially and in some cases, federally. These air contaminants are generated from fuel combustion and the movement of heavy equipment that are required for Project construction. For the components and activities of the Project assessed herein, combustion gases and particulate matter are considered the main potential contaminants of concern relating to air quality. Releases of GHGs from the combustion of fuel in heavy equipment are considered pertaining to potential interactions with climate change. For sound quality, sound pressure levels and vibration levels are considered. Electromagnetic fields (EMF), which may originate from transmission lines, are also considered.

The *Air Quality Regulation 97-133* under the *New Brunswick Clean Air Act* defines air quality objectives for the province. Sound is defined as a contaminant in the *New Brunswick Clean Air Act*. There are currently no applicable requirements, standards or objectives relating to GHGs or EMF for construction or operation of transmission lines.

5.2.2 Existing Conditions for Atmospheric Environment

The existing conditions for the atmospheric environment are presented at a high level, since the interactions between the Project and air quality, GHGs and sound quality are expected to be limited. As mentioned in Section 3.2.1, air quality, GHG emissions and sound pressure levels (noise) in the PDA and LAA are mostly influenced by vehicle traffic and various sources of contaminants and noise levels within the area, such as machinery and/or equipment located on neighboring properties. Long-range transport of air contaminants from sources outside the area could also affect ambient air quality.

5.2.2.1 Air Quality

There is a provincial ambient air quality monitoring station located in Moncton, NB. There were no exceedances of the provincial air quality objectives (measurements of carbon monoxide (CO), nitrogen oxides (NO_x), ozone (O_3) and fine particulate matter ($PM_{2.5}$)) at the Moncton monitoring station between 2010 and 2015 (NBDELG 2012a, 2013, 2015, 2016 and 2017). Although air contaminants are not measured directly within the LAA, based on data collected at the Moncton monitoring station and from various other locations in New Brunswick, only areas within close proximity to large industry record any exceedances of air quality objectives. Therefore, it is expected that the provincial air quality objectives are met within the LAA.

The Canadian Ambient Air Quality Standards (CAAQS) record long-term trends for fine particulate matter and ground-level ozone across Canada. The 2015 CAAQS targets were met at the Moncton monitoring station from data collected in 2012, 2013, 2014 and 2015 (NBDELG 2015, 2016 and 2017).

5.2.2.2 Climate

Climate normals from the Environment Canada weather station located in Moncton are discussed in Section 3.2.1.

5.2.2.3 Greenhouse Gas Emissions

The quantity of GHG emissions released to the atmosphere in Canada in 2015 (the most recently published data from Canada's National Inventory Reports) was 722 million tonnes of carbon dioxide equivalent (tCO_2e), 14 million tCO_2e of which were released in New Brunswick. Therefore, New Brunswick's GHG emissions represents a small portion (approximately 2%) of Canada's total annual GHG emissions (ECCC 2017a).

Global GHG emissions in 2014 (the most recently available data from the World Resources Institute) was 45.7 billion tCO_2e (excluding land use and forestry). Therefore, Canada's contribution to global GHG emissions is small (approximately 1.6% (WRI 2017).

5.2.2.4 Sound Quality

As discussed in Section 3.2.1, sound quality in the PDA is predominantly influenced by vehicle traffic on nearby roads, and various activities and developments within the LAA. There are clusters of residential areas on the east side of the LAA, and the nearest residence to the Project is located approximately 440 m from the PDA, as shown in Figure 4.1.

Overall, the existing sound pressure levels in the area are expected to be reasonably estimated based on methodology developed by the Alberta Energy Regulator (AER 2007). The average ambient sound level in Alberta for areas with comparable population densities and distances from heavily travelled roads as the LAA was 48 dB_A at night and 58 dB_A during the day (AER 2007). Based on previous environmental assessments, measurements conducted in New Brunswick in areas with similar qualities would tend to generally agree with these values.

Since interactions between the Project and sound quality are expected to be limited to construction, and given the relatively short duration of construction activity, no background sound pressure level monitoring was conducted as part of this assessment.

5.2.3 Assessment of Potential Environmental Interactions with Atmospheric Environment

This section describes how the Project activities could interact with atmospheric environment as well as the techniques and practices that will be applied to mitigate the potential effects of these interactions.

5.2.3.1 Construction

Construction is expected to release small amounts of combustion gases and GHGS from the operation of equipment, machinery and large trucks travelling to and from the Project site. Construction will be transient and relatively short in duration, and repair/maintenance will be conducted on the equipment used as it is required. The unnecessary idling of vehicles, equipment and machinery will be avoided to the extent possible to reduce the release of combustion gases and GHG emissions.

As a result of excavation activities during construction, and the movement of mobile equipment along unpaved roads, dust will be generated. However, standard dust control and mitigation practices will be used to control dust levels. These practices include the use of dust suppressants and water on access roads to limit dust emissions, especially during dry and windy periods. Project-related releases of air contaminants are unlikely to cause exceedances of air quality standards with the use of standard mitigation practices. Based on the small magnitude and scope of work needed, emissions of GHGs will not measurably contribute to provincial or national GHG emissions.

The use of heavy equipment and trucks during construction of the Project will cause noise and vibration to occur; however, they will mostly be confined to the PDA, and will be transient and short in duration. As such, any disturbances to employees in nearby business within the industrial park will be of short duration. Construction is expected to be limited to daytime hours (e.g., between the hours of 8:00 a.m. to 6:00 p.m.) to reduce disturbances to nearby residences. Construction is not typically expected to occur overnight or on weekends; however, delays in the Project schedule may require work hours to be extended beyond daytime hours. The residents are separated from the Project by a busy local highway, and given the relatively small size of the Project, very few pieces of heavy equipment will be required for construction, and it is likely that back-up beepers will generate the most noise. NB Power staff will monitor noise on the RoW and implement appropriate mitigation in the event that they receive noise complaints from near-by residents. Project equipment will be maintained in good working order.

5.2.3.2 Operation and Maintenance

During Project Operation and Maintenance, no substantial emissions of air contaminants, GHGs or noise emissions are expected to occur. Maintenance activities are infrequent and small in scope. There are also no anticipated Project-related environmental effects from EMFs. Health Canada reviewed existing information on EMFs and reported that there is insufficient evidence to

establish a relationship between EMFs and human health risks for the frequencies of EMF associated with electrical transmission lines (Health Canada 2009). Health Canada also noted that the risk associated with EMFs is sufficiently low that there is no requirement to warn people who spend time or live near electrical transmission lines (Health Canada 2009).

5.2.4 Summary for Atmospheric Environment

There will not be substantial interaction between the Project and the atmospheric environment during any phase of the Project, with mitigation and environmental protection measures in place. The Project is not expected to result in any exceedances of the *Air Quality Regulation 97-133* under the New Brunswick *Clean Air Act*. Project-related releases of GHGs would not measurably contribute to provincial or national GHG totals. While there is potential for sound pressure or vibration levels to increase near the Project during construction, changes in sound quality will be mainly confined to the PDA and adjacent areas, will be transient and short in duration, and are only planned to occur during the daytime. There is little risk of Project-related EMF to public health.

5.3 TERRESTRIAL ENVIRONMENT

This section assesses the potential environmental interactions between construction and operation and maintenance of the Project and the terrestrial environment VC. The terrestrial environment was included as a VC due to its social, cultural, and economic importance, and because of the potential for the Project to interact with the terrestrial environment in the PDA.

5.3.1 Scope of Assessment

The terrestrial environment has been selected as a VC due to the potential for interactions between the Project and plant and wildlife species at Risk (SAR), Species of Conservation concern (SOCC), and wildlife habitats including wetlands and Ecological Communities of Management Concern (ECMC).

This VC focuses on vegetation and wildlife SAR and SOCC, as well as wetlands. SAR include species listed as extirpated, endangered, threatened, or special concern by the federal *SARA*, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or the NB *SARA*.

SOCC are species not listed or protected by any legislation, but are considered rare in New Brunswick, or their populations may not be considered sustainable. SOCC are here defined to include species that are not SAR, but are ranked S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) in New Brunswick by the Atlantic Canada Conservation Data Centre (AC CDC).

ECMC are typically vegetation communities which fulfill special management objectives on Crown land in New Brunswick. They may also have been identified on Crown or private land through field work or by local conservation organizations as supporting unique ecological features

(e.g., Environmentally Significant Areas (ESA)). No ECMC's, including ESA's, were identified within 500 m of the Project, and are not discussed further.

Wetlands are defined as lands that are permanently or temporarily submerged by water near the soil surface for long enough to maintain wet or poorly drained soils, support plants adapted to saturated soil conditions, and have other biotic conditions characteristic of wet environments (GC 1991; NBDNRE and NBDELG 2002). Wetland conservation is addressed in both The Federal Policy on Wetland Conservation (GC 1991) and the New Brunswick Wetlands Conservation Policy (NBDNRE and NBDELG 2002).

The federal policy aims to protect wetlands on federal lands and waters or within federal programs where wetland loss has reached critical levels, and also within federally designated wetlands, such as Ramsar sites (GC 1991). None of these conditions apply to the Project.

In New Brunswick, regulation and conservation of wetlands are under the jurisdiction of NBDELG. The provincial wetland policy focuses on protecting wetlands in New Brunswick through securement, increasing education and awareness, and maintaining wetland function. These policy goals are enforced through the New Brunswick *Clean Water Act* and associated *Watercourse and Wetland Alteration (WAWA) Regulation*, and the New Brunswick *Clean Environment Act* and associated *Environmental Impact Assessment Regulation* (*EIA Regulation*). The *WAWA Regulation* applies to all wetlands of 1 hectare (ha) or greater in size, or any wetland contiguous to a watercourse. The *EIA Regulation* considers any activities or projects affecting 2 or more ha of wetland to be an undertaking requiring registration. Any wetlands considered to be "Provincially Significant Wetlands" (primarily tidal wetlands and wetlands adjacent to the lower Saint John River) are subject to a greater level of protection under the provincial policy (NBDNRE and NBDELG 2002).

NBDELG maintains a publicly-available official map of "Regulated Wetlands" in the province on the GeoNB website (SNB 2011). Current guidance from NBDELG (the "Short Term Strategy") released in November 2011 indicates that the wetlands on the GeoNB website, or "GeoNB-mapped wetlands," represent the extent of regulated wetlands within New Brunswick (NBDELG 2011). The Short-Term Strategy states that permits are required for any alterations occurring in GeoNB-mapped wetlands or within 30 m of the boundary of a GeoNB-mapped wetland, and that wetland habitat lost from GeoNB-mapped wetlands will require compensation at a ratio of 2:1 (NBDELG 2011).

Currently, wetland area is frequently used in New Brunswick and other Canadian jurisdictions as a surrogate when discussing potential loss of wetland function. This assessment discusses noteworthy wetland functions that were observed, but potential environmental interactions are reported in terms of amount of wetland area affected. Despite the current guidance to the contrary, it is assumed that wetland compensation may be required for any permanent loss of wetland area, to achieve the goal of no net loss of wetland function described in the provincial wetland conservation policy.

5.3.2 Existing Conditions for Terrestrial Environment

5.3.2.1 Vegetation and Wetlands

5.3.2.1.1 Upland Habitat

The habitat in the LAA consists of a mixture of landscaped areas and residual forest and wetland habitat. Approximately 80% of the PDA extending from pole 5 to 12 is occupied by a mixture of asphalt and lawn (Figure 2.1). The shrub layer is composed of ornamental shrubs such as sand cherry (*Prunus* X cistena). Tree cover consists of scattered ornamental trees which includes a mix of planted ornamentals such as Norway maple (*Acer platanoides*) and residual native species including red maple (*Acer rubrum*) and jack pine (*Pinus banksiana*).

Two small patches of residual upland forest are found within the PDA near poles 4 and 8 (Figure 2.1). These stands are approximately 30 years old and are characterized by a moderately dense tree layer composed mostly of trembling aspen (*Populus tremuloides*) and red maple along with lesser amounts of gray birch (*Betula populifolia*), and jack pine. The shrub understory is composed of a wide variety of species including speckled alder (*Alnus incana*), white meadowsweet (*Spiraea alba*), common winterberry (*Ilex verticillata*), shining rose (*Rosa nitida*), as well as saplings of red maple and trembling aspen. The ground vegetation consists of a mixture of rough-stemmed goldenrod (*Solidago rugosa*), Canada goldenrod (*Solidago canadensis*), calico aster (*Symphyotrichum lateriflorus*), dwarf red raspberry (*Rubus pubescens*), red raspberry (*Rubus idaeus*), smooth blackberry (*Rubus canadensis*), and lakeside sedge (*Carex lacustris*). The species composition of these stands suggests that they are imperfectly drained.

5.3.2.1.2 Wetland Habitat

Four wetlands are present in the LAA including two wetlands that appear in the GeoNB Regulated Wetlands Map and two that were identified based on interpretation of aerial imagery and encountered during a site visit. All of the wetlands appear to be swamps which are variously classified as tall shrub dominated basin swamp, tall shrub dominated stream swamp, deciduous treed basin swamp, and coniferous treed basin swamp. The total area of wetland in the LAA is 5.09 ha.

One of the four wetlands present in the LAA is also present within the PDA. This wetland is not present on the GeoNB Regulated Wetlands Map. The wetland is located between poles 1 and 4 (Figure 2.1). This wetland is a mixture of deciduous treed basin swamp and tall shrub dominated basin swamp. The total area of this wetland is 2.96 ha of which 0.5 ha is present within the PDA (approximately 0.3 ha in the deciduous treed basin swamp and 0.2 ha in the tall shrub basin swamp, within the existing transmission line RoW).

The deciduous treed basin swamp is found in relatively undisturbed portions of the wetland in the vicinity of pole 3. This wetland type is characterized by an open tree canopy composed of paper birch (*Betula papyrifera*) and gray birch (*Betula populifolia*) which is underlain by a dense tall shrub layer composed of speckled alder. The ground vegetation layer is composed largely of

lakeside sedge and an unidentified moss, along with lesser amounts of northern willowherb (*Epilobium ciliatum*), bittersweet (*Solanum dulcamara*), and crested wood fern (*Dryopteris cristata*).

The tall shrub dominated basin swamp is situated in the RoW for the large electrical transmission line at the eastern end of the PDA in which poles 1 and 2 are located (Figure 2.1). This wetland has been altered as a result of vegetation management and vehicle traffic along the RoW. Tree-sized woody plants are not present. The shrub layer is dense and consists of a mixture of low and tall shrubs including meadow willow (*Salix petiolaris*), balsam willow (*Salix pyrifolia*), pussy willow (*Salix discolor*), speckled alder, and white meadowsweet. The ground vegetation layer is composed largely of bluejoint reed grass (*Calamagrostis canadensis*), lakeside sedge, and common wooly bulrush (*Scirpus cyperinus*).

The wetland can be expected to support several wetland functions. It would likely provide habitat for passerines and small mammals as well as some larger mammals such as raccoon (*Procyon lotor*), striped skunk (*Mephites mephitis*), and white-tailed deer (*Odocoileus virginianus*). There was evidence of seasonal pools in the wetland which would provide breeding habitat for ephemeral pool breeding amphibians such as spring peeper (*Pseudacris crucifer*), wood frog (*Rana sylvatica*) and yellow-spotted salamander (*Ambystoma maculatum*). The wetland is located adjacent to Route 15 and borders several commercial buildings which would contribute surface water drainage to the wetland. This drainage could potentially contain contaminants such as metals, hydrocarbons and road salt. The wetland could be expected to retain metals and hydrocarbons. The hydrological functions of the wetland have likely been diminished with the encroachment of urban development. Highway 15 would act as a barrier to water flowing into the wetland from the east while storm sewers in the streets to the west and south of the wetland would intercept surface water that would have flowed to the wetland prior to development. Nevertheless, the wetland would play a role in storing and gradually releasing surface water that enters the wetland through its attenuated catchment area.

5.3.2.1.3 Plants Species of Conservation Concern

Six species of plants were identified in the AC CDC data search, none of which are SAR. The plant SOCC that have been recorded within 5 km of the PDA include lesser brown sedge (*Carex adusta*), tender sedge (*Carex tenera*), tufted love grass (*Eragrostis pectinacea*), Bicknell's crane's-bill (*Geranium bicknellii*), sea-side dock (*Rumex maritimus*), and Terra del Fuego dock (*Rumex maritimus* var. *fueginus*).

Tender sedge is listed as S3 (Vulnerable) by the AC CDC and the provincial general status rank is Secure. Tender sedge is typically found in meadows and woodlands in moist to dry soils. In the PDA it could potentially occur in the imperfectly drained forest near poles 4 and 8 as well as the disturbed roadside habitat near pole 4. However, given the urban and fragmented nature of the area, its presence is unlikely.

The habitats of the remaining five plant species, lesser brown sedge (S2S3; Imperiled to Vulnerable), tufted love grass (S2S3), Bicknell's crane's-bill (S3; Vulnerable), sea-side dock (S3S4; Vulnerable to Apparently Secure) and Terra del Fuego dock (S3S4) are not present in the PDA, so none would be expected to be present.

5.3.2.2 Wildlife and Wildlife Habitat

5.3.2.2.1 Wildlife Habitat

Upland and wetland habitats are described above in sections 5.4.2.1.1 and 5.4.2.1.2. Habitat in the LAA is primarily industrial and contains many buildings and paved areas. This type of habitat is generally of fairly low value as wildlife habitat, and is limited to species that have adapted to urban areas, and are not sensitive to disturbance. A variety of common birds are regularly found in these types of habitats; however, it is uncommon that rare (SOCC/SAR) species occur. The two patches of residual upland forest are located in the PDA (near poles 4 and 8) and may support bird species that rely on forest habitats, as well as small mammals such as red squirrel (*Tamiasciurus hudsonicus*). However, habitat with more natural habitat types are highly fragmented in this area. The wetlands present in the LAA may support some wetland dependent species, although they are fragmented as well. The availability of habitat for bird SAR is discussed by species in section 5.4.2.2.3.

5.3.2.2.2 Wildlife Species at Risk and Species of Conservation Concern

AC CDC rare species data was obtained for a 5-km radius surrounding the PDA center point. A total of 63 SOCC were identified as have been recorded in this area, including 45 birds, two fish, 10 invertebrates and six plants. Of these species, 12 are species at risk (SAR). All SAR are discussed in detail below. AC CDC results are presented in Appendix C.1.

5.3.2.2.3 Birds

A variety of bird species have been recorded within 5 km of the PDA, including waterfowl, raptors, shorebirds, nightjars, one owl (snowy owl (*Bubo scandiacus*)), and passerines. Bird data was obtained from both the Maritime Breeding Bird Atlas (MBBA) and the AC CDC. The second MBBA (2006-2010) was a five-year project to update the distribution and abundance of all bird species breeding in the three Maritime Provinces. The first MBBA was conducted from 1986 to 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 is obtained from Bird Studies Canada from the NatureCounts website (BSC 2016). The proposed transmission line is within one atlas square, which is coded as 20LA50. A total of 107 bird species were identified in this square in the second MBBA. This list of species is presented in Appendix C.2. The AC CDC identified 45 species of birds. Eleven of the species identified from either the AC CDC (Appendix C1) or MBBA are SAR. These include least bittern (*Ixobrychus exilis*) Barrow's goldeneye (*Bucephala islandica*), bald eagle (*Haliaeetus leucocephalus)*, common nighthawk (*Chordeiles minor*), whip-poor-will (*Caprimulgus vociferous*), chimney swift (*Chaetura pelagica*), eastern wood-pewee (*Contopus virens*), bank swallow (*Riparia riparia*), barn swallow (*Hirundo rustica*), and Canada warbler (*Wilsonia canadensis*).

None of these SARA species are likely to be found in the PDA or LAA, given the habitat present and the urban nature of the LAA. Common nighthawk does occupy urban areas, and will nest on flat top gravel roofs. As this type of roof exist in the LAA, common nighthawks could potentially occur. Eastern wood-pewee is not expected to breed on site; some potentially suitable habitat does exist, but it is likely not abundant enough to support this species.

5.3.2.2.4 Invertebrates

Ten invertebrate SOCC were identified in the AC CDC data search, including beetles, butterflies and a dragonfly. None of these species are SAR, and AC CDC s-ranks were all either S3 or S3S4, with one exception; the transverse lady beetle (*Coccinella transversoguttata richardsoni*) is listed as SH (possibly extirpated). While some of these species may occur on site, it is not expected that the populations of any of these species will negatively impacted by the Project.

5.3.2.2.5 Mammals

No mammals were identified in the AC CDC data search. It is expected that mammals in the LAA would include those found commonly in urban areas of New Brunswick, including red squirrel, striped skunk, raccoon, white-tailed deer, and eastern coyotes (*Canis latrans*).

5.3.3 Assessment of Potential Environmental Interactions with the Terrestrial Environment

This section describes how the Project activities could interact with the terrestrial environment, as well as the techniques and practices that will be applied to mitigate the potential effects of these interactions.

5.3.3.1 Construction

Construction activities have the potential to result in adverse environmental interaction with the terrestrial environment. Disturbance of the soil surface caused by clearing of the transmission line RoW, movement of equipment along the transmission RoW and construction of transmission line structures could result in the loss of plant SOCC, if present. However, the PDA does not represent an area of high potential for plant SOCC. Similarly, construction activities could result in disturbance of wetland vegetation, hydrology, and wetland soils. The wetland intersected by the PDA is not found on the GeoNB Regulated Wetland Map. As such, any loss of wetland habitat in this wetland currently does not typically require the implementation of wetland compensation. To minimize the disturbance of wetlands, heavy equipment should avoid wetlands whenever possible. By way of example, when heavy equipment is used to auger holes for posts and place post in position, it should enter the wetland perpendicular to the direction of the transmission line RoW in order to minimize the amount of wetland vegetation and soil that are traversed and potentially disturbed. Vegetation should be cleared and controlled using hand tools. With the implementation of mitigation, the amount of wetland habitat lost to construction will be approximately 9 m^2, associated with one structure in the deciduous treed basin swamp, and two structures within the current transmission line RoW. The structure of the vegetation in the deciduous

treed basin swamp will be altered such that there will be more shrub cover and less tree cover. However, the wetland will still maintain its function as habitat for wildlife. Similarly, the hydrology of the wetland will not be altered nor will the ability of the wetland to retain contaminants be substantially affected. As the habitat of the tall shrub basin swamp within the existing transmission line RoW will not undergo much change, any functions present will be maintained.

Wildlife can be affected directly, such as through collision with construction equipment, indirectly by changes to habitat. or by sensory disturbance which could lead to habitat avoidance. Collisions between birds and construction equipment could result in a Project-related increase in bird mortality. Lighted equipment can attract birds during migration periods; this phenomenon is most pronounced at night and in poor weather conditions (Avery *et. al* 1976; Longcore and Rich 2004; Ogden 1996; Wiese *et al.* 2001); however, the industrial park roads and parking lots are already well lit.

Sensory disturbance to wildlife species may be caused by light and noise of construction equipment during site preparation and excavation for pole placement. This sensory disturbance could result in reduced breeding or rearing success through reduced productivity or nest abandonment. Some species may experience temporary habitat loss through avoidance (Bayne et al. 2008). The project is situated in an urban area and is situated immediately adjacent to a busy highway (Highway 15). Wildlife species present in the LAA can be expected to be habituated to a wide variety of human activities so disturbance effects associated with construction activities can be expected to adversely affect mobile wildlife only within a few tens of meters of the activities. Small mammal and herpetile species may experience increased mortality through predation upon leaving cover in response to construction noise, at the eastern end of the PDA.

The construction phase will also result in changes to wildlife habitat, though this will be limited to vegetation clearing in the northeastern end of the PDA, and removal of individual trees along Arsenault Court and part of a small stand near pole 8; as the area is already highly fragmented, this clearing will not increase fragmentation. All construction including vegetation clearing will occur during the fall season, outside of the breeding season, avoiding disturbing breeding birds, or destroying nests, eggs or nestlings. The regional nesting period for southern New Brunswick extends from mid-April to late August (ECCC 2017c).

5.3.3.2 Operation and Maintenance

During operation and maintenance, there is potential for bird mortality through collisions with the transmission line. In 2013, Calvert et al. estimated transmission line collision to be the third leading cause of human-related bird mortality in Canada. Waterfowl and waterbirds are at greater risk of collision with transmission lines due to their higher wing loading (body weight relative to wing area), which limits their reaction time over other species of birds (APLIC 2012; Bevanger 1998; Rioux *et al.* 2013). There is the potential for some migrating birds to pass through the area. Nocturnal migrants (i.e., most passerines) are generally high-flyers and are at low risk of suffering collision with transmission lines in flight. However, diurnal migrants, including waterfowl, waterbirds, and raptors,

may fly at lower elevations during migration. Although these species are more susceptible to wire collision than many other birds (Erickson *et al.* 2001), there are no major waterfowl staging areas available near the PDA; thus, it is likely these species pass over at an elevation higher than the transmission line wires, limiting their potential for collision. Transmission line collisions, if they occur, will likely be limited to local movements of resident birds. Transmission lines do not pose a new threat in this region, as they already occur. Two transmission lines pass through the eastern end of the PDA.

During operation and maintenance, plant SOCC (if present) and wetland habitat could be adversely affected by periodic vegetation management programs which would result in the direct loss of vegetation and possible disturbance to soils and wetland hydrology if heavy equipment such as brush hogs or hydro-axes are used for vegetation control. Vegetation management for plant SOCC will adhere to the PSEMP. Operation and maintenance within the existing transmission line RoW will be unchanged from present.

5.3.4 Summary for the Terrestrial Environment

With mitigation and environmental protection measures, it is not anticipated that there will be any substantial changes in vegetation communities or wildlife habitat within the LAA. No SAR or SOCC are expected to be lost as a result of the Project. Although one wetland does intersect the PDA, this wetland is not found on the GeoNB Regulated Wetland Map. As such, any loss of wetland habitat in this wetland currently does not typically require the implementation of wetland compensation. Wetland functions are expected to be maintained.

5.4 SOCIOECONOMIC ENVIRONMENT

This section assesses the potential environmental interactions between construction and operation and maintenance of the Project and the socioeconomic environment VC. The socioeconomic environment was included as a VC due to the potential for this Project to interact with land and resource use, transportation, infrastructure, and services, and employment and the economy.

Most of the potential environmental effects on the socioeconomic environment will occur during the construction phase of the Project due to peak employment levels and restrictions surrounding physical construction sites. Some socioeconomic effects, such as operation of the power transmission infrastructure, and economic benefit by returning revenue to New Brunswick rate payers, and temporary interruptions in land use during maintenance (e.g., clearing) of the RoW, will last the life of the Project.

5.4.1 Scope of Assessment

Land use refers to the current and future use of public and private land/resources in the immediate vicinity of the Project. It includes industrial and commercial use, private ownership, and changes

in the use of land for any recreational purposes. The current Use of land and resources for traditional purposes by Aboriginal persons is discussed in Section 5.7.

Transportation, infrastructure and services refers to current and future estimated daily traffic, and potential resultant effects on infrastructure (i.e., change in road surface quality as a result of changes in daily traffic volumes and types).

Employment and the economy refers to current and future employment and revenue generating opportunities for the local area and the province.

The scope of assessment is based on applicable regulations and policies, professional judgment and knowledge of the study team, and potential interactions.

In considering a change in socioeconomic environment, the spatial boundaries of the PDA and LAA are consistent with those defined in Section 4.3.1, with the following exceptions:

The LAA for the change in transportation, Infrastructure, and services encompasses the PDA, land use LAA, as well as the municipal boundaries of the City of Moncton.

The LAA for the change in employment and the economy encompasses the PDA, land use LAA, as well as the municipal boundaries of the City of Moncton, and boundaries of Westmorland County and New Brunswick.

5.4.2 Existing Conditions for the Socioeconomic Environment

5.4.2.1 Information Sources

A combination of spatial analysis and baseline research was used to characterize the Socioeconomic Environment in the PDA and LAA. Baseline research included a review of online sources for land and resource use information, as well as directed interviews with representatives of relevant groups and organizations. Information on existing conditions was drawn from the following sources:

- GIS databases
- Published maps and aerial photography
- Government sources, including:
  - statistics Canada and other agencies and departments of the Government of Canada (GC)
  - Various departments of the Government of New Brunswick
  - Municipal governments
- Community organizations

5.4.2.2 Overview

The Project is located on Edinburgh Drive in the Moncton Industrial Park, in Moncton, Westmorland County, New Brunswick. Approximately 144,810 people reside in the Moncton CMA, with 71,889 in the City of Moncton, which has demonstrated growth in population over the past decade (Statistics Canada 2017).

The largest component of the PDA is private land (1.01 ha, or 58%) followed by crown land (0.723 ha, or 42%). Most of the PDA is reserved for industrial purposes (1.47 ha, or 85.5%), followed by land reserved for transmission lines (0.22ha, or 12.6%), and land reserved for transportation, communication, and/or utilities (0.04 ha, or 2.3%).

According to the Service New Brunswick database (ca. 2017), there are no buildings located within the PDA, however there are 16 private residences and approximately 66 businesses within 500 m of the PDA (i.e., within the LAA). The nearest private residence to the Project is located approximately 440 m from the PDA, and the nearest sensitive receptor is Bernice MacNaughton High School, located approximately 340 m from the PDA (Figure 4.1).

The PDA intersects the properties of the following businesses:

- Graybar Canada
- Atlantic Outdoor Power Equipment
- Robert Bury Company Canada
- NewCap Radio
- Traction
- Coca Cola Bottling Ltd.
- OrganiGram
- Nordia Moncton
- Source Atlantic

There are no Oil and Natural Gas Licences or mining licences within or near the LAA (Province of New Brunswick 2005).

There are no recreation trails, watercourses, or large forested areas within the PDA, which is designated for industrial land use. The PDA runs northeast from Edinburgh Drive, and crosses the intersection with Driscoll Crescent, along Arsenault Court, in the Moncton Industrial Park. The LAA intersects Wheeler Boulevard, St. George Boulevard, Loftus Street, Edinburgh Drive, English Drive, Rooney Crescent, Aresnault Court, Delong Drive, Driscoll Crescent, Chandler Crescent, and Centennial Drive. The Park is adjacent to Wheeler Boulevard (Route 15), which provides fast, easy access to the Greater Moncton International Airport and all points in the Greater Moncton area (Moncton Industrial Development 2017).

Emergency services within the LAA are provided by the City of Moncton; the City outsources policing services to the Codiac RCMP, and fire fighting services are provided by the Moncton Fire Department's five fire stations (Moncton 2017). Health services are provided by the Moncton

Hospital, Vitalité Health, and the Dr. George L. Dumont University Hospital Center (Moncton 2017). Moncton is also home to three universities, two public community colleges and multiple private, post-secondary colleges (Moncton 2017). Several temporary accommodation options serve the LAA including 25 hotels/motels, and six bed and breakfast locations (Tourism New Brunswick 2017).

Westmorland County dominates the population and the economy of the Southeast Economic Region (GNB 2013). The key economic drivers in Southeast Economic Region are centered around the services-producing industries. While employment levels associated with all industries have been slowly but steadily increasing, the balance of employment in this region is strongly weighted with the services-producing sector (over 53 % of "all other" service industries) (GNB 2012).

From 2006 to 2011, the number of individuals employed in the province increased by 2.1%, from 344,770 to 351,935 (Statistics Canada 2007). In 2011, the employment rate in New Brunswick was 56.6%, slightly lower than the national average of 60.9% (Statistics Canada 2007) (Table 5.16).

Table 5.2 Labour Force Statistics: New Brunswick, Westmorland County and Moncton, CMA, 2011

Location	Labour Force	Employed	Participation Rate (%)[1]	Employment Rate (%)[2]	Unemployment Rate (%)[3]
New Brunswick	395,425	351,935	63.5	56.5	11.0
Westmorland County	81,055	74,275	68.1	62.4	8.4
Moncton, CMA[4]	78,905	73,145	69.2	64.2	7.3

Notes:
1 Percentage of the working-age population employed or actively looking for employment.
2 Number of employed persons expressed as a percentage of the total population 15 years and older.
3 Number of unemployed persons expressed as a percentage of the labour force.
4 Moncton, Census Metropolitan Area (CMA) includes Moncton, Riverview and Dieppe
Note: totals may not add due to rounding.
Source:
Statistics Canada (2013a, 2013b)

In 2011, the experienced labour force in Westmorland County numbered 81,055 (Table 5.16), and the employment rate was 62.4%, which is 5.9% higher than the provincial employment rate. The experienced labour force in Moncton CMA numbered 78,905 (Table 5.2), and the employment rate was 69.2%, which is 7.7% higher than the provincial employment rate.

In 2011, the top occupations for employment in Westmorland County were sales and service occupations (28%); business, finance and administrative occupations (16%); and trades, transport and equipment operators and related occupations (13%) (Statistics Canada 2013b). This is consistent the Southeast Regional Service Commission, who reported 25.4% sales and service occupations; 21.9% Business, finance and administrative occupations; and 15.2% Trades, transport and equipment operators and related occupations (GNB 2013).

5.4.3 Assessment of Potential Environmental Interactions with the Socioeconomic Environment

This section describes how the Project activities could interact with the socioeconomic environment as well as the techniques and practices that will be applied to mitigate the potential environmental effects and enhance beneficial effects of these interactions.

5.4.3.1 Construction

Construction activities will have an environmental effect on the socioeconomic environment through interactions with land use, transportation, infrastructure and services, as well as employment and the economy.

Construction activities will have an environmental effect on land use due to safety restrictions put in place during construction, which will result in short-term restrictions to portions of the PDA. However, owners of private land will be consulted and accommodated for use of their land as appropriate, prior to construction. Access restrictions will be defined and will be limited in size to reduce the interactions with land and resource users. Overall, siting of the transmission route (Section 2.3) reduced potential disruption of land use during construction throughout most of the PDA. For example, siting considerations helped minimize the overall length of the line by maintaining the straightest alignment possible. Aerial photographs, GIS based mapping, and biological databases were referenced to reduce the potential for the crossing of wetlands, and other constraints.

Noise, vibration, and dust related to construction activities could also cause-short term nuisance issues with employees in the area and subsequently affect commercial land use for short periods of time. Mitigation described for the atmospheric environment (Section 5.1.3.1) will be used to reduce these nuisance effects. These include limiting noise emitting construction activities to daytime hours (i.e., between the hours of 7:00 am and 10:00 pm).

Project environmental effects on transportation, infrastructure and services result primarily from project-related interactions with the road transportation network. Construction activities will temporarily and intermittently restrict access for vehicular and/or pedestrian traffic, and local traffic patterns in the transportation network leading to and from the PDA and surrounding area. Construction will also result in a slight increase in passenger vehicles and heavy trucks transporting workers, materials, and equipment to and from the site. However, traffic will be managed through standard procedures such as signage and flagging crews. All large-sized vehicles will obtain appropriate weight and size permits. Moving large equipment involving road closures (if required) will be very limited and very short term due to the small scale of the Project.

Construction is anticipated to be beneficial to both employment and the economy, because local employment and business opportunities will be created, and taxes will be paid to municipal and provincial governments. However, these benefits will be relatively short-term (e.g., 2 months).

5.4.3.2 Operation and Maintenance

Operation and maintenance activities are not expected to have an adverse environmental effect on the socioeconomic environment through interaction with land use, transportation, infrastructure and services, as well as employment and the economy.

The Project will supply electricity to OrganiGram Inc. (Section 1.6); therefore, operation and maintenance activities are expected to have a positive effect on the economy resulting in increased long-term economic activity and employment, and by returning revenue to New Brunswick rate payers for the life of the Project.

5.4.4 Summary for the Socioeconomic Environment

Adverse interactions will be mitigated through compensation for acquisition of land rights, communication with landowners and businesses within the PDA, nuisance mitigation (e.g. dust and noise), traffic and maintenance of access to businesses. Residual effects are temporary, localized, of low magnitude, and not substantive. These interactions will be temporary (approximately two months) during construction, with negligible interactions during operation and maintenance. Socioeconomic benefits are expected through the provision of upgraded energy transmission to industrial park tenants (particularly OrganiGram) resulting in increased long-term economic activity and employment and tax revenue. Based on the predicted characterization of residual environmental effects and mitigation measures described above (including compensation for loss of land, and maintenance of access to businesses), it is anticipated that Project activities will not cause a longstanding disruption, wide restriction, or degradation of land use to a point for the socioeconomic environment where it cannot continue at current levels. Power infrastructure for Park business will be expanded and improved allowing for a general improvement in the local socioeconomic environment.

5.5 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Effects of the environment on the Project are assessed in this EIA Registration because of the potential for natural hazards and environmental conditions to interact with the Project. Interactions between the environment and the Project may include naturally-occurring events associated with climate (including weather), climate change and seismic activity.

The effects of natural hazards and environmental conditions, if unanticipated or unmanaged, can result in adverse changes to Project components, schedule, and costs. Typically, these potential effects are addressed through project design (including site and materials selection), scheduling, and operational procedures implemented in consideration of expected normal and extreme environmental conditions.

NB Power adheres to generally accepted engineering practices, designs, and design standards to consistently manage the potential effects of the natural environment on transmission

infrastructure, including extreme conditions. Such engineering design incorporates a considerable margin of safety that fosters the safe and reliable operation of a facility throughout its lifetime. NB Power will monitor any observed effects of the environment on the Project, and take action as required to maintain, repair, and upgrade Project infrastructure and modify operations to facilitate its continued safe operation.

Some effects, such as damage to infrastructure, could also result in consequential effects on the environment; these environmental effects are addressed as accidents, malfunctions, and unplanned events in Section 2.8.

5.5.1 Scope of Assessment

This section assesses the potential interactions between the environment and the construction and operation and maintenance phases of the Project, with consideration of the following environmental conditions:

- Climate (including weather and weather variables such as air temperature, precipitation, winds, and extreme weather events)
- Climate change
- Seismic activity

5.5.2 Existing Conditions for Effects of the Environment on the Project

5.5.2.1 Climate

Climate is defined as the historical, seasonal meteorological/weather conditions experienced in an area or region (ECCC 2017b). Climate includes, but it not limited to, temperature, humidity, precipitation, winds, sunshine, and cloudiness. Statistical climate data are typically averaged over a period of many decades (GC 2017b).

The Government of Canada has developed statistical summaries of data collected from weather stations located all over the country for a recent 30-year period (1981 – 2010), referred to as climate normals data (GC 2017a). There is an Environment Canada weather station with available climate normals data located in Moncton.

5.5.2.2 Air Temperature and Precipitation

Climate normals (1981 – 2010) from the Moncton weather station indicate that January is typically the coldest month of the year, with a daily average temperature of -8.9°C. July is typically the warmest month of the year, with a daily average temperature of 18.5°C. The average annual precipitation (including the water equivalent of snow) in Moncton is 1200.4 mm, with October being the rainiest month (112.1 mm on average) and January being the snowiest month (78.1 cm on average) (GC 2017a).

5.5.2.3 Wind

The strongest winds measured at the Moncton weather station have been predominantly from the southwest direction between the months of May to October, with a maximum hourly wind speed of 103 km/hr recorded in September 1954. The maximum wind gusts speed measured at the Moncton weather station was from a southwest direction in July 1963 at 161 km/h (GC 2017a).

5.5.2.4 Fog

Fog is defined as visible, miniscule water droplets suspended in the air that reduces visibility to a distance of less than 1 km (GC 2017b). The Moncton weather station experiences an average of 171.8 hours (just over 7 days) of fog per year, based on data from 1981 to 2010. Visibility is lowest during the month of March (there are approximately 24 hours per month when visibility is reduced to a distance of less than 1 km) (GC 2017b).

5.5.2.5 Extreme Weather Events

The Government of Canada lists floods, hurricanes, landslides, severe storms, storm surges, and tornadoes among New Brunswick's regional environmental hazards in the federal "Get Prepared" campaign (GC 2015). Earthquakes (seismic activity) are discussed in Section 5.8.2.7. Although tornadoes are rare, they do occasionally occur in New Brunswick (Cheng et al. 2013).

Extreme storms and precipitation in New Brunswick tend to be more common and severe during the winter months. Winter storms can consist of high winds and a mixture of snow, rain and ice. Ice storms, resulting from freezing rain adhering to objects, can cause substantial damage if ice thickness builds to a point where trees and built structures are unable to withstand the weight. In general, distribution power lines are more susceptible to damage during storm events than transmission power lines; this is a result of a relatively narrow cleared RoW through vegetation (i.e., risk from trees, overhanging branches, etc.) required by distribution power lines, compared with wider RoW associated with transmission lines.

In December 2010, a low-pressure system brought torrential rain to New Brunswick, especially to the southwestern and mid-western regions. Damage from flooding and heavy rainfall threatened public safety and transportation systems, and cost the province over $13 million (NBDELG 2012b). In February 2015, extreme snowfall events exceeded the recorded provincial average winter snowfall total (CBC News 2015). An ice storm swept through central and southern New Brunswick in January 2017 bringing high winds and ice accretion that felled trees and toppled distribution lines, disrupting power distribution in the region (GNB 2017b).

5.5.2.6 Climate Change

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC 2014) as:

> "*a change in the state of climate that can be* identified (e.g., *by using statistical tests) by changes in the mean and/or variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use*"

Predictions of future climate change trends are derived from mathematical representations (models) of climate systems. While climate change models can provide useful information for predicting and preparing for climate change, their ability to forecast regional changes is quite limited compared to larger-scale predictions (*e.g.*, continental climate change) (Randall et al. 2007; Flato et al. 2013). However, like all modelling projections, the results obtained from climate change models can be used as a guide for the planning process, and can facilitate Project design and adaptation.

Future climate change, such as increases in temperature, frequency and magnitude of precipitation, and increased incidences and intensity of storm events, could affect the long-term integrity and reliability of the Project. Despite differences in climate change model outputs, there is an overall consensus among the climatological community in that, over the next century, Atlantic Canada will likely experience warmer temperatures, more frequent storm events, increased storm intensity, and increased flooding (Lemmen et al. 2008; Lines et al. 2005, 2008). This average temperature change is expected to be gradual and is likely to affect precipitation types and patterns including later freeze up, wetter, heavier snow, more liquid precipitation occurring later into the fall, and possibly more freezing precipitation during fall and winter (Lines et al. 2008).

5.5.2.7 Seismic Activity

Seismic activity is defined by the local geography of an area and occurs through the sudden release of stored elastic energy caused by the fracture and/or movement of rocks within the Earth (*e.g.*, the movement of tectonic plates). These movements release seismic waves that cause vibration of the ground known as earthquakes (NRCan 2013a). The Project is located within the Northern Appalachians seismic zone which includes New Brunswick and extends towards New England. Historically, seismic activity in this area has been low. Earthquakes with a magnitude of 5 or less (on the Richter scale) have occurred in the general area of the Project (near Moncton) (NRCan 2013b). New Brunswick's largest earthquake, with a magnitude of 5.7, occurred near Miramichi in 1982. There was no structural damage in buildings up to 100 km away from the epicentre (Cassidy et al., 2009). According to Natural Resources Canada, it is unlikely that an earthquake with a magnitude of 5 or less would cause damage (NRCAN 2013b).

5.5.3 Assessment of Potential Effects of the Environment on the Project

This section describes how the environment could interact with planned Project activities to result in change to Project schedule and/or damage to the Project. The techniques and practices that

will be applied to mitigate the potential negative effects of these environmental interactions are also noted.

5.5.3.1 Construction, Operation and Maintenance

5.5.3.1.1 Climate

During construction, and operation and maintenance of the Project, there are several climatic conditions that have the potential to adversely affect project activities, equipment, and/or infrastructure.

Extreme low temperatures have the potential to reduce the ductility of construction materials and increase their susceptibility to brittle fracture.

High winds, especially those greater than 90 km/h have the potential to break trees and limbs which can strike and break transmission infrastructure (NB Power 2017b). Wind also has the potential to increase structural loadings on infrastructure and could result in damage to Project infrastructure and/or equipment.

Wet snow, freezing rain, and ice accretion pose some of the most serious risks to transmission infrastructure. The excessive build-up of snow and ice can increase loadings on Project infrastructure, and has the potential to exceed the tensile strength of the conductors, causing them to break (NB Power 2017b).

Extreme precipitation has potential to result in flooding and erosion. These events could lead to the release of total suspended solids in runoff, and the related environmental effects of such an occurrence. Heavy rains can also exacerbate the effects of freezing or high winds on project infrastructure, by allowing water to enter stress fractures in the insulators resulting in a power failure (NB Power 2017b).

During electrical storms, fault currents (electric currents that flow from one conductor to ground, or to another conductor due to an abnormal connection between the two (IESO 2015)) may occur during a lightning strike. This could result in danger to workers and/or damage to Project infrastructure and equipment. Lightning strikes during electrical storms can also ignite a fire (see Section 2.8.2 for additional discussion of fire as an accidental event).

Measures to mitigate the potential effects of climate on the Project will include the following.

- The Project will be constructed to meet the standards of the Canadian Electrical Code (a CSA Group Standard) which includes the applicable building, safety, industry codes, and standards for wind, snowfall, extreme precipitation, and other weather variables associated with climate. These standards and codes provide factors of safety regarding environmental loading and Project specific activities and events.
- All aspects of Project design, including selection of materials and equipment to be used, planning, and maintenance, will consider normal and extreme climate/weather conditions that may be encountered throughout the life of the Project. Delays due to poor weather are

anticipated and can often be predicted, and allowance for them will be included in the construction schedule.

- A minimum RoW width and the removal of danger trees adjacent to the RoW will be maintained to avoid wind-related tree strikes (NB Power 2012).
- All components and physical activities associated with the Project will follow NB Power's Environmental Protection Plan (EPP) (NB Power 2012), the information from which will be incorporated into the Project Specific Environmental Management Plan (PSEMP).
- A maintenance and safety management program will be implemented.
- Contingency plans will be implemented, including emergency back-up power for necessary operations and dispatch of crews for emergency repairs of storm damage.
- Emergency measures will be in place, in conjunction with existing NB Power, community, and provincial plans to provide rapid detection and response to any fire threat, and quickly control and extinguish the flames prior to contact with any flammable structures (e.g., wood). Mitigation for Project-caused fires is discussed in Section 2.8.2.

5.5.3.1.2 Climate Change

The Government of New Brunswick calculated climate change projections for the province (GNB 2017c); they were derived from the application of existing Environment and Climate Change Canada (ECCC) historical weather station data in the province to the guidance provided by the Intergovernmental Panel on Climate Change (IPCC) in their Fifth Assessment Report (AR5) (IPCC 2014). The climate change projections for New Brunswick are based on four greenhouse gas (GHG) concentration trajectories adopted by the IPCC in the AR5. These GHG concentration trajectories are referred to as representative concentration pathways (RCP), and are indicative of the potential range of radiative forcing values that could result in GHG-related heating of the planet in the year 2100, as compared to pre-industrial values (Moss et al., 2010).

Total Annual Precipitation

The mean total annual precipitation for the Moncton station from 1980 to 2010 was 1,200.4 mm (GC 2017a). The projected mean total annual precipitation for the Moncton area for the year 2080 is 1,328.88 mm per year (Figure 5.1, GNB 2017c) under an intermediate climate projection scenario for New Brunswick (RCP4.5). The long-term projection for the Moncton region is less than the mean total precipitation historically experienced elsewhere in New Brunswick, such as at the Alma ECCC weather station, which has a historical mean total annual precipitation of 1,477.03 mm (GNB 2017c). As transmission infrastructure near Alma, and other areas of southern New Brunswick, have not been adversely affected by total precipitation, climate change related effects associated with an increase in total annual precipitation are not expected to cause adverse effects on the Project infrastructure.

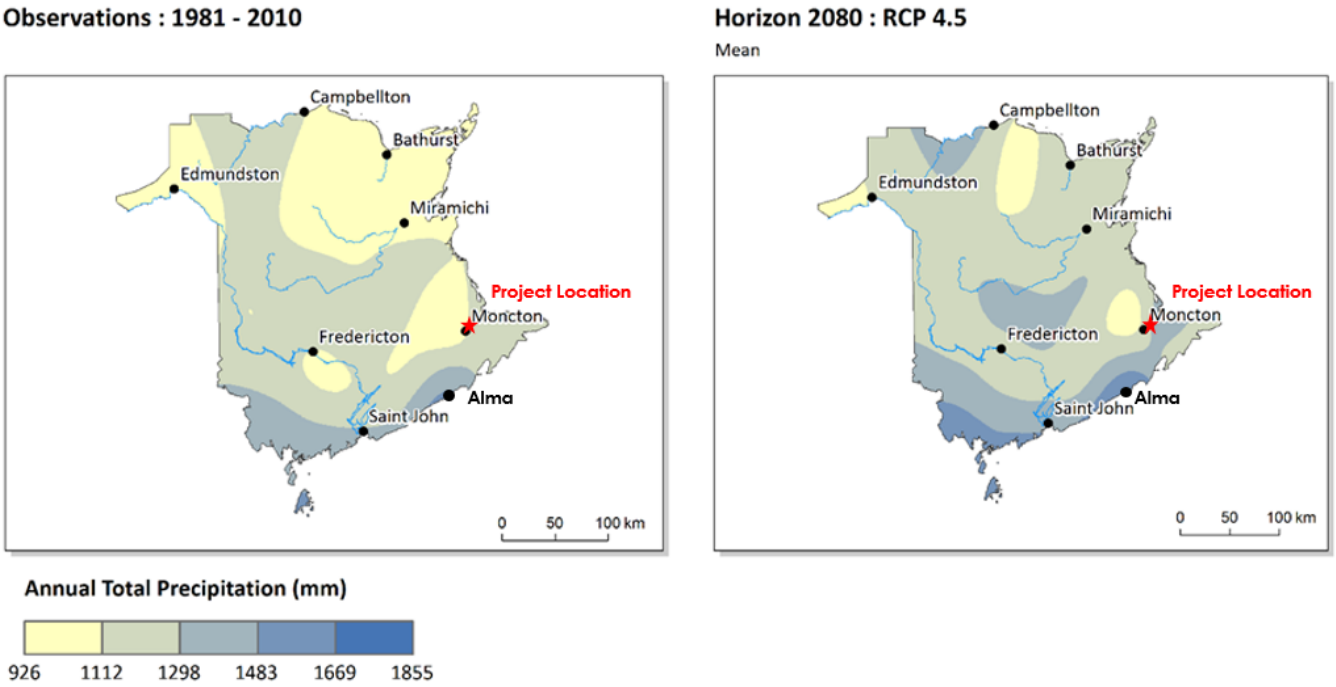

Figure 5.1 Mean total annual precipitation in New Brunswick: (left) historical observations for the years 1981 – 2010, and (right) climate projections RCP4.5 for the year 2080. (Source GNB 2017c)

Winter Precipitation

Winter precipitation could be considered a surrogate for snowfall and/or freezing rain, both of which could affect the integrity of the infrastructure through load bearing on lines and poles, or trees falling across the lines from snow/ice load. Winter precipitation for the Moncton weather station has averaged 297.87 mm per year from 1981 to 2010 (GNB 2017c). The projected mean winter precipitation for the Moncton weather station for the year 2080 (Figure 5.2) is 360.9 mm, which represents a projected increase of 21% above historical values. Nevertheless, the long-term projection for the Moncton area is less than the mean winter precipitation historically experienced elsewhere in New Brunswick, such as at the Alma ECCC weather station which has a historical mean winter precipitation of 401 mm (GNB 2017c). As transmission infrastructure near Alma, and other areas of southern New Brunswick, have not been adversely affected by winter precipitation, climate change-related effects associated with an increase in total winter precipitation are not expected to cause adverse effects on the Project infrastructure.

The lifespan of Project infrastructure is estimated to be 50 years, or until 2068. Based on the information provided above, there are no anticipated effects from projected changes in total annual precipitation or winter precipitation on the Project.

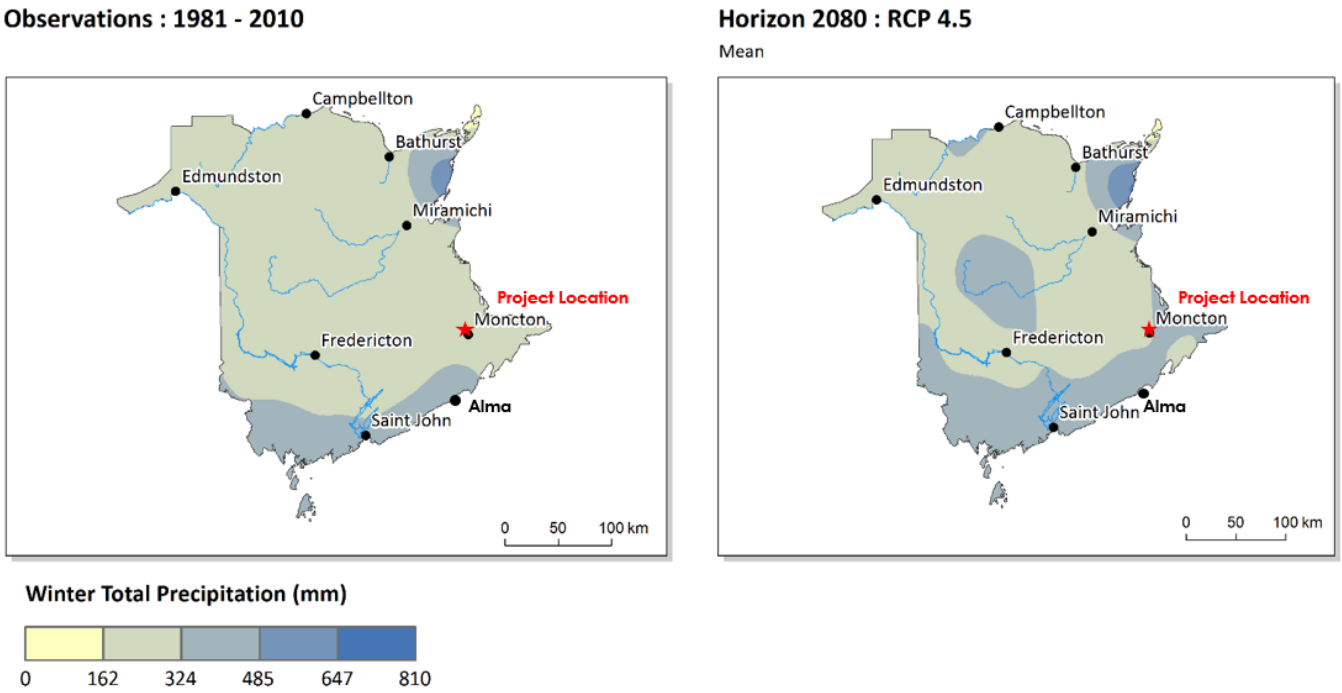

Figure 5.2 Mean winter precipitation in New Brunswick: (left) historical observations for the years 1981 – 2010, and (right) climate projections RCP4.5 for the year 2080. (Source GNB 2017c)

Extreme Rainfall Events

Heavy rains can exacerbate the effects of freezing or high winds on project infrastructure, by allowing water to enter stress fractures in the insulators resulting in a power failure (NB Power 2017b). Cornell University uses weather station data to predict extreme rainfall trends in northeastern North America, including Atlantic Canada (Cornell University 2016). The Moncton ECCC weather station was used by Cornell University in the study. The 50-year, 24-hour extreme rainfall estimate for Moncton, NB has a depth of 118.9 mm, which is lower than the maximum precipitation depth of 131.8 mm, recorded at the Moncton ECCC weather station in April 1962 (GC 2017a). As the potential effects of extreme rainfall will be taken into consideration in the Project design, these climate change related effects are not expected to cause adverse effects on the Project infrastructure.

5.5.3.1.3 Seismic Activity

The level of seismic activity in the province and near the PDA is low, and the earthquakes that have been recorded in the general area of the Project have generally been low on the Richter scale (see Section 5.8.2.7). Therefore, the likelihood of a major seismic event occurring in the vicinity of the Project that would cause substantive damage to the Project or interruption to any Project-related activities or phases is low. Project structures will be built in accordance with industry standards to withstand minor seismic events.

5.5.4 Summary for Potential Effects of the Environment on the Project

Project construction techniques, best practices, scheduling, and equipment design codes account for environmental factors such as extreme weather conditions and climate predictions. Other environmental factors such as seismic activity are considered to have a low likelihood of occurrence. Therefore, the possibility of environmental conditions affecting Project infrastructure or operations resulting in a change to Project schedule and/or damage to the Project is considered low over the life of the Project. If such damage or interruption of service was to occur, NB Power will rely on standard contingency and response plans to repair damaged equipment and reduce service interruptions.