Environmental Component	Description	Assessed further?	Applicable Section in the Report
Visual Landscape	Wind farms produce visual effects to the local landscape. A Visual Impact Assessment Study was completed for the Project. Results concluded the set-back distances from residential homes result in minimal effects as the turbines do not dominate the landscape. Effects to the visual landscape are considered minimal to non-existent due to the size and location of the wind farm and setback distances.	No	Section 11.3
Sound	Sound is generated during all phases of the wind farm. Concerns include: • Noise during construction and decommissioning phases. • Annoyance and unpleasantness, for local residents in close vicinity, from turbine blades during operation. Construction and decommissioning phases will be short-term. Effects of noise created during these phases are expected to be temporary, minor, and localized in nature. Operational sound effects from the turbines will be long-term; however, predictive modeling indicates that sound levels will not exceed NSE guidelines at any structure. Effects from sound are considered minimal to non-existent due to the size and location of the wind farm and setback distances.	No	Section 11.4

Based on the preliminary assessment of potential interactions summarized in Table 7.1, the VECs addressed in this EA are as follows:

- SOCI;
- Avifauna; and
- Bats.

8.0 BIOPHYSICAL ENVIRONMENT

8.1 Atmospheric Environment

8.1.1 Weather and Climate

Nova Scotia's climate is quite varied and is largely governed by coastal influences and elevation (Davis and Browne 1996). The Project site (centered at 44°55'2.34"N, 63° 40'48.49"W) is found within the Eastern Ecoregion of Nova Scotia (Neily *et al*. 2003). Bordered to the south by the Atlantic Coastal Ecoregion, the area is removed from direct climatic influence of the Atlantic, and is characterized by relatively warm summers and cool winters. The mean winter temperature (-5ºC) is colder than that of the adjacent Western Ecoregion, where the mean temperature is -3.5ºC (Webb

and Marshall 1999 as cited in Neily *et al.* 2003). Climatic conditions have made landscapes in the region particularly prone to natural disturbance. Moisture deficit in the summer months often results in large numbers of forest fires caused by lightning, while hurricanes travelling along the eastern sea board have frequently destroyed large areas of mature forest in the ecodistrict (Neily *et al*. 2003).

Local temperature and precipitation data were obtained from the Mount Uniacke meteorological station (44°54'00.000" N, 63°50'00.000" W), located approximately 11.8 km southwest of the Project site. For the period from 1971-2000, the average daily temperature was 5.8°C, with a mean daily high of 10.9°C and a mean daily low of 0.6°C (EC 2012a). January and February were the coldest months (-6.6°C and -6.2°C, respectively), while the warmest months were July and August (18.0 °C and 17.7°C, respectively) (EC 2012a). During this time, mean annual snowfall was 270.1 cm and rainfall was 1,282.7 mm (EC 2012a). Most snowfall is received in January and February (67.3 cm and 55.6 cm, respectively), while the wettest months are October and November (131.6 mm and 139.3 mm, respectively) (EC 2012a).

Environment Canada (EC) measures wind conditions in Nova Scotia at those meteorological stations that are under long term observation. The closest such station to the Project site is the Halifax Stanfield International Airport meteorological station (44°53’00.000”N, 63°31’00.000”W) located approximately 14.8 km southeast of the Project site. The Canadian Climate Normals (1971-2000) for this station have recorded an annual wind speed of 16.8 km/h, most commonly out of the south (EC 2012b). The maximum hourly wind speed for this station was 89 km/h, recorded on February 10, 1969, with the highest single wind gust measuring at 132 km/h on December 26, 1976 (EC 2012b). According to the NS Wind Atlas (NSDE 2007), average wind speeds at 30 m and 50 m above the ground at the Project site range from 18.03-19.8 km/h, and range from 19.8-23.4 km/h at 80 m above the ground.

8.1.2 Air Quality

Currently in Nova Scotia, 42% of total greenhouse gas (GHG) emissions come from electricity use and 89% of electricity comes from fossil fuels (NSDE 2012). Because of this heavy reliance on coal and other fossil fuels for electricity, every MW of wind power installed reduces GHG emissions by as much as 2,500 tonnes per year (NSDE 2009). By reducing Nova Scotia’s reliance on fossil fuels, wind energy will therefore contribute to improving local air quality (NSDE 2009).

Nova Scotia monitors air quality at six stations throughout the province. Measured parameters include ground-level ozone (O_3), particulate matter (PM2.5), and nitrogen dioxide (NO_2), and these values are used to calculate a score on the Air Quality Health Index (AQHI) (EC 2012c). The AQHI is a scale from 1-10+, in which scores represent the following health risk categories: Low (1-3), Moderate (4-6), High (7-10), and Very High (10+). The AQHI monitoring station closest to the Project site is located at Halifax, approximately 32 km southeast of the Project site. The AQHI at this site is usually low at all times of the year (EC 2012c).

Mitigation measures for potential effects to the atmospheric environment are provided in Section 4.0

8.2 Geophysical Environment

8.2.1 Physiography and Topography

The Project site lies within the Eastern Interior Ecodistrict, which occupies an area from Pockwock Lake in the west to the Town of Guysborough in the east (Neily *et al*. 2003). The site is located on a hummocky terrain with much of the topography controlled by the underlying, parallel-banded Cambrian slate and quartzite bedrock (Webb and Marshall 1999; Neily *et al*. 2003).
Elevation within the proposed Project site slopes from 176 m in the north to 110 m in the south.

8.2.2 Surficial Geology

The surficial geology of the Project site is characterized as a silty till plain with drumlins present at the northern extent containing a higher percentage of distant source material including red clay (Stea *et al*. 1992) (Drawing 8.1). Till thickness is quite variable ranging from 1 – 10 m, with drumlins ranging up to 30 m in thickness.

8.2.3 Bedrock Geology

Geological mapping indicates the majority of the Project site is underlain by the Cambrian-Ordovician aged Halifax Formation of the Meguma Group (Drawing 8.2) (Keppie 2000). The Halifax Formation consists of dark grey to grey-green slate and metasiltstone. The Goldenville Formation of the Meguma Group is mapped along the southern extent of the Project site, consisting of a thick sequence of grey to greenish-grey metasandstones.

According to the NSE Well Log Database, there are no drilled wells located within a 500 m radius of the Project site (NSE 2012b). However, six wells were identified within 2 km of the Project site, ranging in depths from 15.2 m to 123.3 m. All six wells were drilled through varying surficial materials including clay, sand, boulders and fill ranging from 0.3 m to 60.9 m in thickness, followed by slate, quartzite, and shale bedrock.

Bedrock containing sulphide bearing minerals (*e.g.,* pyrite, pyrrhotite, etc.) can potentially generate acid run-off if fresh surfaces are exposed to oxygen and water. The physical disruption of such bedrock leads to oxidation of iron-sulphide minerals and the generation of ARD (Fox *et al*. 1997). Construction activities in the presence of ARD can result in the acidification of surface and groundwater and promote the mobilization and leaching of toxic contaminants into the environment, including heavy metals. The transitional bed between the two formations is described as the Beaver Bank unit which has been confirmed to contain sulphide-rich metasilstone within its upper subunit (Feetham *et al*. 1997). Sulphur analyses of samples from the Beaver Bank unit indicate a potential acid generating hazard, based on NSE guidelines which suggest that rocks containing greater than 0.40% sulphur should be treated as potentially acid generating. Rocks from the Beaver Bank unit have sulphur contents as high as 3.4% (Feetham *et al*. 1997).

The likelihood of ARD to occur will be determined following the results of the geotechnical evaluation.

8.2.4 Hydrogeology and Groundwater

Groundwater Quantity

Water supplies near the Project site are generally derived from individually drilled wells. According to the NSE Well Log Database (NSE 2012b) of logs for wells constructed between 1920 and 2012, wells near the Project site have been reportedly installed through varying bedrock formations including: slate, quartzite, and shale. A summary of the pertinent well properties included in these logs is presented in Table 8.1.

Table 8.1: Summary of Drilled Well Records Within Approximately 2 km of the Project Site

	Drilled Date (yr)	Well Depth (m)	Casing Length (m)	Estimated Yield (Lpm)	Water Level (m)	Overburden Thickness (m)	Water Bearing Fractures (m)
Minimum	1971	15.22	6.09	0.9	9.1	0.3	18.3
Maximum	2000	123.32	66.99	36.3	12.2	60.9	76.2
Average	1990	58.3	19.4	13.9	10.7	15.6	49.3
Geomean	1990	49.2	13.0	8.7	10.6	6.0	45.8
Number of well records	6	6	6	6	2	6	5

Source: NSE 2012b

Based on short term driller's estimates for the wells in Table 8.1, the average yield is approximately 13.9 Lpm (3.1 gpm) and average well depth is approximately 58.3 m (191.2 ft). These measurements represent very short term yields estimated by the driller at the completion of well construction. Fracture depths ranged from 18.3 m (60.0 ft) to 76.2 m (249.9 ft). The closest drilled well to the Project site is located approximately 1.4 km west of the site boundaries, along Beaver Bank Road.

The NSDNR Pump Test Database (NSDNR 2012a) provides longer term yields for select wells throughout the province. One regional well, drilled through the Goldenville formation is located within 3 km of the Project site, indicates long term safe yields (Q_{20}) of 56.8 Lpm (12.5 gpm), and apparent transmissivity (T) value of 9.88 m^2/d. Storativity values were not available from the two pump tests.

NSE maintains the Nova Scotia Groundwater Observation Well Network (NSE 2012c). The nearest observation well to the Project site is located approximately 12 km south, in Fall River. This observation well was drilled to a depth of 61 m through slate bedrock of the Halifax Formation and has been monitored since 2008. In 2010, the average water level elevation was 103.95 m above sea level and the annual water level fluctuation was 6.08m. The average depth to water in this well was 4.72 m below ground surface.

Groundwater Quality

Water quality in the Meguma Group bedrock is usually soft to moderately hard, with relatively low total dissolved solids, and variable pH. Those present naturally in the groundwater most likely to exceed aesthetic-based guidelines are iron and manganese, and occasionally hardness, colour, and

N

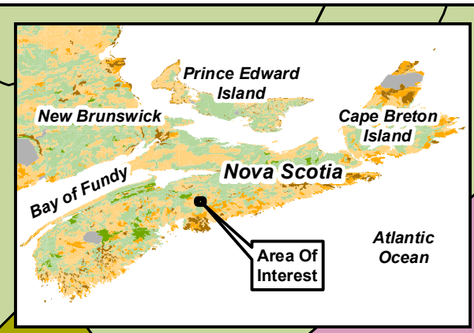
Dryweather

1

2

3

4



0 100 200 400 600 800 1,000 Metres

Notes:

1. Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre. DP ME 36, Version 2, 2006, Digital Version of Nova Scotia Department of Natural Resources Map ME 1992-3, Surficial Geology Map of the Province of Nova Scotia, scale 1:500 000, by R. R. Stea, H. Conley and Y. Brown, 1992
2. Projection: NAD83(CSRS), UTM Zone 20 North.

Legend:

- Project Site Boundary
- Proposed Turbine
- Proposed Access Road
- Public Roads
- Access Roads / Trails
- Water Bodies

Surficial Geology By Unit

- Bedrock
- Silty Drumlin
- Silty Till Plain
- Stony Till Plain

Surficial Geology

Strum CONSULTING

Date: October 2013	Project #: 12-4563
Scale: 1:15,000	Drawing #: ***8.1***
Drawn By: H. Serhan	
Checked By: M. Henley	

N

Dryweather

1

2

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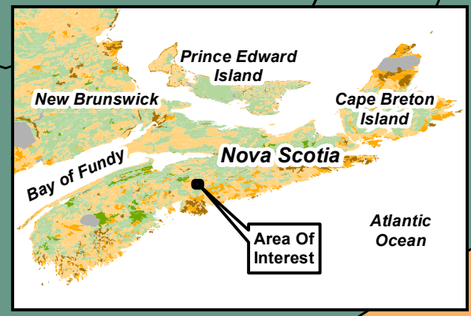
4



0 100 200 400 600 800 1,000 Metres

Notes:

1. Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre. DP ME 43, Version 2, 2006, Digital Version of Nova Scotia Department of Natural Resources Map ME 2000-1, Geological Map of the Province of Nova Scotia, scale 1:500 000, Compiled by J. D. Keppie, 2000
2. Projection: NAD83(CSRS), UTM Zone 20 North.

Legend:

- Project Site Boundary
- Proposed Turbine
- Proposed Access Road
- Public Roads
- Access Roads / Trails
- Water Bodies

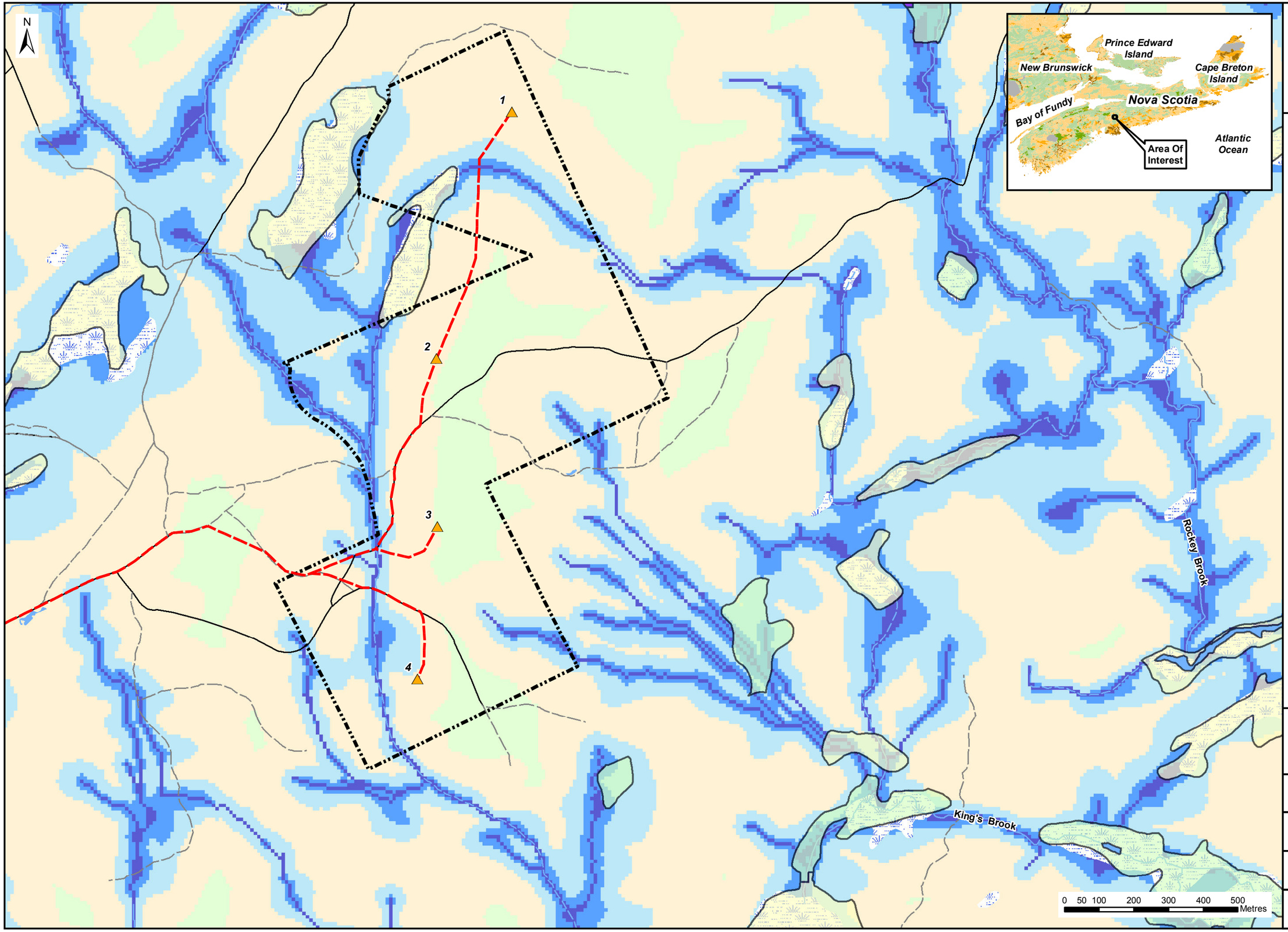
Bedrock Geology By Formation

- Halifax Formation
- Goldenville Formation

Bedrock Geology

Strum CONSULTING

Date: October 2013	Project #: 12-4563
Scale: 1:15,000	Drawing #: **8.2**
Drawn By: H. Serhan	
Checked By: M. Henley	



Notes:

1. Reference: Digital Topographic Mapping by Nova Scotia Geomatics Centre. Wetland Inventory and Wet Areas Mapping by Nova Scotia Department of Natural Resources (NS DNR).
2. Projection: NAD83(CSRS), UTM Zone 20 North.

Legend:

- Project Site Boundary
- Proposed Turbine
- Proposed Access Road

NS DNR Wetland Inventory

Wetland Type

- Bog or Fen
- Fen
- Marsh
- Salt Marsh
- Swamp

Depth to Water Table (m)

- 0 - 0.10 m
- 0.11 - 0.50 m
- 0.51 - 2 m
- 2.01 - 10 m
- > 10 m
- Public Roads
- Access Roads / Trails
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area

Wetland and Watercourse Desktop Review Results

Strum CONSULTING

Date: October 2013	Project #: 12-4563
Scale: 1:10,000	Drawing #: **8.3**
Drawn By: H. Serhan	
Checked By: M. Henley	

N

Hants County

Halifax County

Wetland 1A

Wetland 1B

Wetland 2

Wetland 3

Wetland 4

Wetland 5

Watercourse 1

Watercourse 2

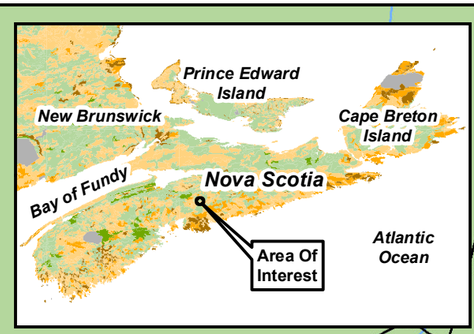
Watercourse 3

1

2

3

4



0 50 100 200 300 400 500 Metres

Notes:

1. Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. GPS Points Taken Are Typically To +/-5m Accuracy.

Legend:

- Project Site Boundary
- Proposed Turbine
- Proposed Access Road
- Construction Disturbance Area
- Field Identified Watercourse
- Field Identified Drainage
- Wetland Boundary
- Field Identified Wetland
- 20 m Hydrology Buffer
- County Boundary
- Public Roads
- Access Roads / Trails
- Existing Transmission Lines
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Cleared Area

Wetland and Watercourse Survey Results

Strum CONSULTING

Date: October 2013	Project #: 12-4563
Scale: 1:8000	Drawing #: 8.4
Drawn By: H. Serhan	
Checked By: M. Henley	

turbidity. The pH may be higher or lower than its aesthetic range of 6.5 to 8.5 in some cases. The parameters most likely to exceed health-based guidelines are arsenic and uranium. However, uranium is more likely to exceed its guideline in granitic bedrock or in Meguma Group bedrock in proximity to or influenced by granitic rocks.

Water chemistry results obtained from the Fall River Observation Well in 2008 indicate that no health-based drinking water guidelines were exceeded; however, three aesthetic drinking water guidelines were exceeded, including pH, iron and manganese.

Mitigation measures for potential effects to the geophysical environment are provided in Section 4.0.

8.3 Freshwater Environment

The Project site lies within the Eastern Interior Ecodistrict which has numerous freshwater lakes (27,312 hectares or 7.4%).

The Project site lies within the Shubenacadie River Watershed (1DG). The Shubenacadie Watershed includes all tributaries, lakes and rivers discharging into the Shubenacadie River which eventually empties into the Minas Basin (Bay of Fundy). Surface water in the vicinity of the Project site drains to Beaver Bank Lake which then flows north-northeast to Grand Lake and then to the Shubenacadie River. There are no identified lakes on the Project site. The closest water bodies are Cranberry Lake, located approximately 2.3 km south of the Project site and Rocky Lake, approximately 2.3 km east of the Project site. Surface water bodies east of the Project site (Rocky Lake, Whites Lake, Ash Lake, and Oak Lake) discharge further east into Grand Lake. Water bodies located south of the Project site (Sandy Lake, Cranberry Lake, and Crotched Lake) flow into Beaver Bank Lake and then Kinsac Lake, which eventually discharges into Grand Lake. Grand Lake is a large, deep lake which drains 59 named lakes and numerous streams (Halfyard 2008).

Two hundred and fifty lakes within Halifax County are included in the Nova Scotia Lake Inventory Program (NSLIP), which determines the baseline biophysical attributes of lakes throughout the province. Data is available for the following nearby lakes: Cranberry Lake, Sandy Lake, Beaver Bank Lake, and Shubenacadie Grand Lake; however, the data are from sampling events completed between 11 to 34 years ago, and therefore, are outdated.

One mapped stream with two branches flows through the western portion of the Project site (Drawing 8.3) (NSDNR 2012b). Two additional watercourses were identified along existing access roads during field surveys (Drawing 8.4). General characteristics for these watercourses are provided in Table 8.2.

Table 8.2 Watercourse Characteristics

Feature ID	Bank-full Width (m)	Water Depth (cm)		Substrate	Drainage Direction
		Bank Full	Wet		
Watercourse 1	0.75	35	15	Cobble / fines	Northwest to southeast
Watercourse 2	2 to 3	60	25	Cobble / fines	Northwest to east
Watercourse 3	0.4	20	15	Cobble/ gravel / fines	North to south

8.3.1 Watercourse Alteration

Based on the proposed Project layout, two-three watercourse crossings are required along the access roads. The on-site watercourses are fairly small in size (*i.e.,* a bank-full width of less than 1 m), with the exception of watercourse 2 which approaches 3 m in width. Any potential impacts can be easily addressed through the provincial permitting process.

8.3.2 Fish and Fish Habitat

For the purposes of the EA, all watercourses on the Project site have been assumed to be 'fish bearing' and shall be treated as such throughout site development plans.

Grand Lake is popular among recreational fishers, thus fish species present in the lake have been well-documented. Species known to inhabit Grand Lake include striped bass (*Morone saxatilis*), Atlantic salmon (*Salmo salar*) (landlocked population), brook trout (*Salvelinus fontinalis*), chain pickerel (*Esox niger*), white perch (*Morone Americana*), yellow perch (*Perca flavescens*), brown bullhead (*Ameiurus nebulosus*), American eel (*Anguilla rostrata*), rainbow smelt (*Osmerus mordax*), alewife (*Alosa pseudolarengus*) and American shad (*Alosa sapidissima*), banded killifish (*Fundulus diaphanous*), and stickleback (species unspecified) (Halfyard 2008).

A review of the Atlantic Canada Conservation Data Center (ACCDC) database for fish species recorded within a 100 km radius of the Project site was completed. All species, including status rankings, are provided in Table 8.3.

Table 8.3: Fish Species Recorded within a 100 km radius of the Project Site

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
American Eel	*Anguilla rostrata*	Not Listed	Not Listed	Threatened	Green
Atlantic Salmon	*Salmo salar*	Not Listed	Not Listed	Endangered	Red
Atlantic Salmon - Inner Bay of Fundy population (IBoF)	*Salmo salar*	Endangered	Not Listed	Endangered	Red
Atlantic Sturgeon	*Acipenser oxyrhynchus*	Not Listed	Not Listed	Threatened	Red
Atlantic Whitefish	*Coregonus huntsmani*	Not Listed	Endangered	Endangered	Red
Striped Bass	*Morone saxatilis*	No Status	Not Listed	Endangered	Red

Source: ACCDC 2013
[1] Government of Canada 2012; [2] NS *ESA* 2013; [3]COSEWIC 2012a; [4] NSDNR 2010

Fish species recorded within a 100 km radius of the Project site were screened against the criteria outlined in the document "Guide to Addressing Wildlife Species and Habitat in an EA Registration Document" (NSE 2009b) to develop a list of SOCI, which are assessed further as a VEC.

For the purposes of this EA, SOCI include those that are:

- Listed under *SARA* as "Endangered", "Threatened", or "Special Concern";
- Listed under the NS *ESA* as "Endangered", "Threatened", or "Vulnerable";
- Assessed by COSEWIC as "Endangered", "Threatened", or "Special Concern"; or
- Assessed by NSDNR as "Red" (at risk or may be at risk) or "Yellow" (sensitive).

Fish SOCI species include:

- American eel – "Threatened" (COSEWIC);
- Atlantic salmon – "Endangered" (COSEWIC), "Red" (NSDNR);
- Atlantic salmon (Inner Bay of Fundy population) – "Endangered" (*SARA*), "Endangered" (COSEWIC) "Red" (NSDNR);
- Atlantic sturgeon – "Threatened" (COSEWIC), "Red" (NSDNR);
- Atlantic whitefish – "Endangered" (*SARA*), "Endangered" (NS *ESA*), "Red" (NSDNR); and
- Striped bass – "Endangered" (COSEWIC), "Red" (NSDNR).

American Eel

The distribution of the American eel ranges from South America to Greenland in accessible freshwater systems that are connected to the Atlantic Ocean. This species spawns in salt water, and juveniles drifts in ocean currents, eventually migrating inland through freshwater rivers and their tributaries. In later life stages, American eel persist in a variety of freshwater and estuarine habitats (COSEWIC 2012b). The American eel is common in Nova Scotia and has been documented in lakes and watercourses in the vicinity of the Project site.

Potential effects of the Project on this species, as well as proposed mitigation measures, are discussed in more detail in Section 14.2.1.

Atlantic Salmon

The Atlantic salmon is an anadromous species native to the North Atlantic Ocean and coastal rivers, which undertakes long feeding migrations in the ocean as older juveniles and adults, and returns to freshwater streams to reproduce. The species requires rivers that are clear, cool and well oxygenated, with pools and shallow riffles and gravel, rubble, rock or boulder bottoms (NSFA 2007; COSEWIC 2010a). All watercourses identified at the Project site form part of the Shubenacadie/Stewiacke River watershed, therefore any Atlantic salmon present would form part of the IBoF population or the landlocked population which inhabits Grand Lake (Halfyard 2008; COSEWIC 2010a).

IBoF salmon spawn in those rivers of Nova Scotia and New Brunswick that drain into the Minas Basin and Chignecto Bay (COSEWIC 2010a). Although the population is estimated to have declined by 94% in the past decade, IBoF Atlantic salmon have been recorded in 32 Bay of Fundy rivers in

recent years, including the Shubenacadie River (DFO 2008). All on-site watercourses drain northwards into Cobequid Bay and form part of the Shubenacadie River watershed. Therefore, IBoF Atlantic salmon may be present in watercourses within the Project site.

The recovery strategy for the species includes a live gene-banking program which has been developed to prevent the imminent extinction of the species (DFO 2010b), and several key populations are maintained in DFO Biodiversity Centres in New Brunswick and Nova Scotia. These stocks will be used to restore self-sustaining populations in select Inner Bay of Fundy rivers. The recovery strategy sets a goal of conserving the genetic characteristics of the few remaining anadromous IBoF Atlantic salmon populations in order to re-establish self-sustaining populations of the species. Nineteen rivers are identified as being critical to the success of this strategy, including the Shubenacadie and Stewiacke Rivers (DFO 2010b).

Potential effects of the Project on this species, as well as proposed mitigation measures, are discussed in more detail in Section 14.2.1.

Atlantic Sturgeon
Little is known about the habitat requirements for Atlantic sturgeon at the northern extent of its range, but important freshwater habitats for the species appear to be rivers with access to the sea, preferably with deep channels. Research suggests that the anadromous species spawns in freshwater over hard-bottom substrates at depths of 1-3 m in areas of strong currents, and under waterfalls and in deep pools just above the marine-freshwater demarcation (COSEWIC 2011a). Juveniles remain in freshwater for the first summer before migrating to estuaries in winter. Juveniles remain in the freshwater-estuary system for 3 to 5 years before migrating to the near-shore marine environment as adults (NOAA 2006).

Occurring in rivers and estuaries near North Atlantic shore environments, the Atlantic sturgeon has been reported in the Annapolis, Avon, Shubenacadie, St. Croix and LaHave River systems, as well as the Minas Basin (Colligan *et al.* 1998; COSEWIC 2011a). In Canada, the species is known to spawn only in two areas, the St. John River and middle St. Lawrence. Historically, the St. Croix River in New Brunswick was also a known spawning area, although the current status of this population is unknown.

Although the watercourses on the Project site drain into the Shubenacadie River, they are not conducive to the spawning habitat requirements of Atlantic sturgeon, therefore it is unlikely that they would be found within the Project site.

The Project is therefore not expected to have any impact on Atlantic sturgeon and no further consideration of effects and mitigation for specific to this species has been undertaken.

Atlantic Whitefish
The Atlantic Whitefish is a Canadian endemic species found in the Petite Riviere watershed in Nova Scotia (Hebb, Milipsigate and Minamkeak lakes). Though historical populations were anadromous, the remaining population of Atlantic whitefish was considered landlocked and completed their life cycle in the three lakes and connecting streams (COSEWIC 2011b). A new fish ladder in 2012 has

restored access to salt water for this population. The on-site watercourses do not form part of this system or lie in close proximity to the Petite Riviere watershed. Therefore, it is unlikely that the species is present at the Project site.

The Project is therefore not expected to have any impact on Atlantic whitefish and no further consideration of effects and mitigation for specific to this species has been undertaken.

Striped Bass
The Striped bass is an anadromous species typically associated with estuaries and coastal waters, which spawns and over-winters in fresh, and occasionally brackish, water.

In Nova Scotia, the Annapolis River and the Shubenacadie–Stewiacke River system in the Bay of Fundy historically supported spawning populations (Rulifson and Dadswell 1995, as cited in COSEWIC 2004). Today, the species is known to spawn only in two river systems in eastern Canada; the Miramichi and the Shubenacadie. Catches have been recorded throughout the province, including Annapolis River, River Phillip, Grand Lake, and the Minas Basin.

The Shubenacadie River population ascends the river to overwinter in Grand Lake, then returns downriver to spawn in the Stewiacke River (a tributary of the Shubenacadie). Spawning occurs in the portion of the river affected by a tidal bore (COSEWIC 2004). The on-site watercourses form part of the Shubenacadie-Stewiacke system, therefore it is possible that striped bass would be found within the Project site.

Potential effects of the Project on this species, as well as proposed mitigation measures, are discussed in more detail in Section 14.2.1.

8.4 Terrestrial Habitat
The Eastern Ecoregion is often characterized by high levels of disturbance from forest fires and hurricanes, which have reduced forest cover to scrub hardwoods such as red maple (*Acer rubrum*) and white birch *(Betula papyrifera)*. Scattered white pine (*Pinus strobus*) and black spruce (*Picea mariana*) are also present, underlain by a dense layer of ericaceous vegetation. Deeper, well drained soils support stands of red spruce (*Picea rubens).* Stands of tolerant hardwood occur on the crests and upper slopes of hills, drumlins and hummocks. Both American beech (*Fagus grandifolia*) and Eastern hemlock (*Tsuga canadensis)* occur on these deeper, well drained soils, but their presence is usually individual and seldom of a high percentage in any stand. On the imperfectly and poorly drained soils, black spruce dominates (Neily *et al*. 2003).

The NS Forest Inventory (NSDNR 2013) and recent aerial imagery were reviewed to evaluate habitat types at the Project site. The majority (66%) of the Project site is forested, with softwood stands representing the dominant habitat feature (Table 8.4; Drawing 8.5). Cut over areas represent approximately 32% of the Project site.

Table 8.4: Habitat Types at the Project Site

Habitat Type	Area (ha)	Percent of Site
Softwood	58.7	50%
Cut over areas	34.4	32%
Mixed woods	9.8	8%
Hardwood	9.2	8%
Mapped wetlands	1.2	1%
Powerline corridor	0.02	<1%
Total	**116.7**	**100%**

Source: NSDNR 2012a

The Project site is primarily a matrix of mid-aged to mature softwood stands, mature tolerant hardwoods and recently cut-over areas. Field studies have identified several areas of wetland habitat throughout the Project site.

Mature softwood stands are prevalent and are dominated by black spruce/red spruce in the canopy, with a minor balsam fir component. Hardwood stands, meanwhile, occur in pockets or narrow strips and consist largely of mature, shade tolerant species such as yellow birch (*Betula alleghaniensis*) and American beech.

A small powerline right-of-way is present along the northwestern edge of the Project site. This right-of-way is maintained in a low shrub condition, and is dominated by ericaceous vegetation with intermittent pockets of localized wetland conditions.

Excluding upgrades to existing logging roads, which are expected to require little additional disturbance, the construction of new access roads and turbine pads will disturb approximately 5.94 ha of habitat. However, approximately 2.97 (50%) of this disturbance will occur in previously cutover areas. Three of four turbines, for example, will be located in such cutovers. The remaining 2.97 ha represents just 2.5% of the Project site, and will include mostly mature softwood and mixed wood stands.

8.4.1 Wetlands

A desktop identification of the location and extent of potential wetlands across the Project site was completed by reviewing the following information sources:

- Satellite and aerial photography;
- Nova Scotia Wet Areas Mapping database (WAM) (NSDNR 2012b);
- Nova Scotia Geomatics Centre; and
- NS Significant Species and Habitats database (NSDNR 2012c).

Topographic mapping and the NS Significant Species and Habitat database identifies marsh habitat that extends into the north of the Project site from the west (Drawing 8.3). Several other wetlands are also identified near the Project site to the north, west and southeast. Satellite imagery indicates an open area in the same location as the marsh identified in the north of the Project site, supporting the likelihood of wetland habitat in that area. WAM indicates the potential for wetland habitat and/or

N

Hants County

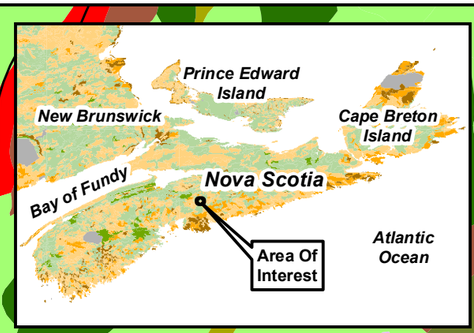
Halifax County

1

2

3

4



0 50 100 200 300 400 500 Metres

Notes:

1. Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre. Forestry Inventory By Nova Scotia Department Of Natural Resources (NS DNR).
2. Projection: NAD83(CSRS), UTM Zone 20 North.

Legend:

- Project Site Boundary
- Proposed Turbine
- Proposed Access Road
- County Boundary
- Public Roads
- Access Roads / Trails
- Existing Transmission Lines
- Water Bodies

Foresterd Land

- Softwood
- Mixedwood
- Hardwood

Non-Forested Land

- Brush
- Alders >75%
- Clear Cut
- Partial Cut-over
- Treed Bog
- Inland Water
- Rock Barren
- Agriculture
- Powerline Corridor

Habitat Cover

Strum CONSULTING

Date:	Project #:
October 2013	12-4563
Scale: 1:10,000	Drawing #: **8.5**
Drawn By: H. Serhan	
Checked By: M. Henley	

watercourses throughout the Project site, particularly in the north and throughout the western extent of the Project site.

A wetland survey was completed across the Project site to identify locations and extent of wetland habitat. At the time of the survey, detailed characterization was completed for wetlands that existed in close proximity to the Project footprint [labelled on Drawing 8.4, Table D1 (Appendix D)]. Since the survey, the layout has been slightly modified to avoid wetlands and accommodate DNR/NSE preferred buffer distances.

Generally, the wetlands on the Project site are dominated by treed and shrub swamps characterized by plant species typical of wet wooded areas growing in thin organic soils over a depleted mineral horizon. The wetlands on the Project site exist as outflow or throughflow wetlands.

Wetlands observed in northern areas of the Project site are undisturbed and drain water to the south via watercourses and additional wetland habitat. An area of bog habitat exists in this area, at the same location as the desktop review identified marsh habitat (Wetland 1A). The bog is typical of this wetland type as it is situated on high land and sources outflow water to lower lying wetland areas. This wetland is characterized by obligate herbs growing in deep wet organic soils under sparse tree and shrub coverage, primarily larch (*Larix laricina*) and black spruce.

The remaining wetlands located in central and southern portions of the Project site occur in areas disturbed by forestry activities *(i.e.,* cut overs or existing forestry roads). They are characterized by opportunistic herbs such as woolgrass (*Scirpus cyperinus*) and soft rush (*Juncus effusus*) growing in poorly drained organic soils over a depleted mineral horizon. Shrub coverage in these wetlands is primarily young hardwood, and tree coverage is primarily black spruce (*Picea mariana*) in areas that have not been cut-over. The general movement of water in this area is to the southeast toward potential wet areas identified by the WAM database and a NSDNR identified swamp beyond the southeastern Project site boundary (Drawing 8.3).

Based on the current layout, no impacts to wetland habitat are expected.

8.5 Terrestrial Vegetation

ACCDC records indicate that 277 vascular flora species and 24 nonvascular flora species have been identified within 100 km of the Project site. Of the 277 vascular species identified by ACCDC, 186 SOCI were identified within 100 km of the Project site. This preliminary list was used to develop a short list of plant SOCI that might be present at the Project site. The short list of plant SOCI is provided in Appendix E.

A plant survey was completed on July 29, 2013. A complete list of plant species identified during the survey is provided in Appendix E. No SOCI were identified.

8.5.1 Boreal Felt Lichen

ACCDC records indicate that 20 lichen species, including 33 individual sightings of boreal felt lichen (*Erioderma pedicellatum*) have been observed within 100 km of the Project site. The closest sighting of boreal felt lichen was recorded 39 km +/- 10 km from the Project site. A review of GIS mapping of

predicted suitable habitat for boreal felt lichen in Nova Scotia, based on a heuristic model developed by Cameron and Neily (2008), revealed 3.53 ha of predicted habitat in the Project site's northern extent (Drawing 8.6).

A targeted survey for boreal felt lichen was conducted on October 16, 2013 by naturalist Chris Pepper. The survey focused on the areas of predicted habitat, but also included general site reconnaissance. In general, it was determined that habitat for boreal felt lichen at the Project site is poor, primarily due to the prevalence of black spruce (*Picea mariana*) as opposed to balsam fir (*Abies balsamea*). *Coccocarpia palmicola*, the primary indicator for potential boreal felt lichen growth, was also not observed. *Lobaria scrobiculata*, a second such indicator, was observed sporadically, and *Frullania tamarisci* growth on the few balsam fir trees present was sparse. It is therefore highly unlikely that boreal felt lichen occurs at the Project site.

8.6 Terrestrial Fauna

Information regarding terrestrial fauna for the Project site, including any SOCI, was obtained through a combination of desktop review and field studies.

A review of the NS Significant Species and Habitat Database (NSDNR 2012c) and ACCDC data (ACCDC 2012) for species recorded within a 100 km radius of the Project site was completed. A comparison of habitat mapping data (Section 8.3) to known habitat requirements for species expected to occur within the area, and for all SOCI, was also completed.

8.6.1 Mammals

The Nova Scotia Significant Species and Habitat Database (NSDNR 2012c) contains 34 unique species and/or habitat records pertaining to terrestrial mammals within a 100 km radius of the Project site. These records include:

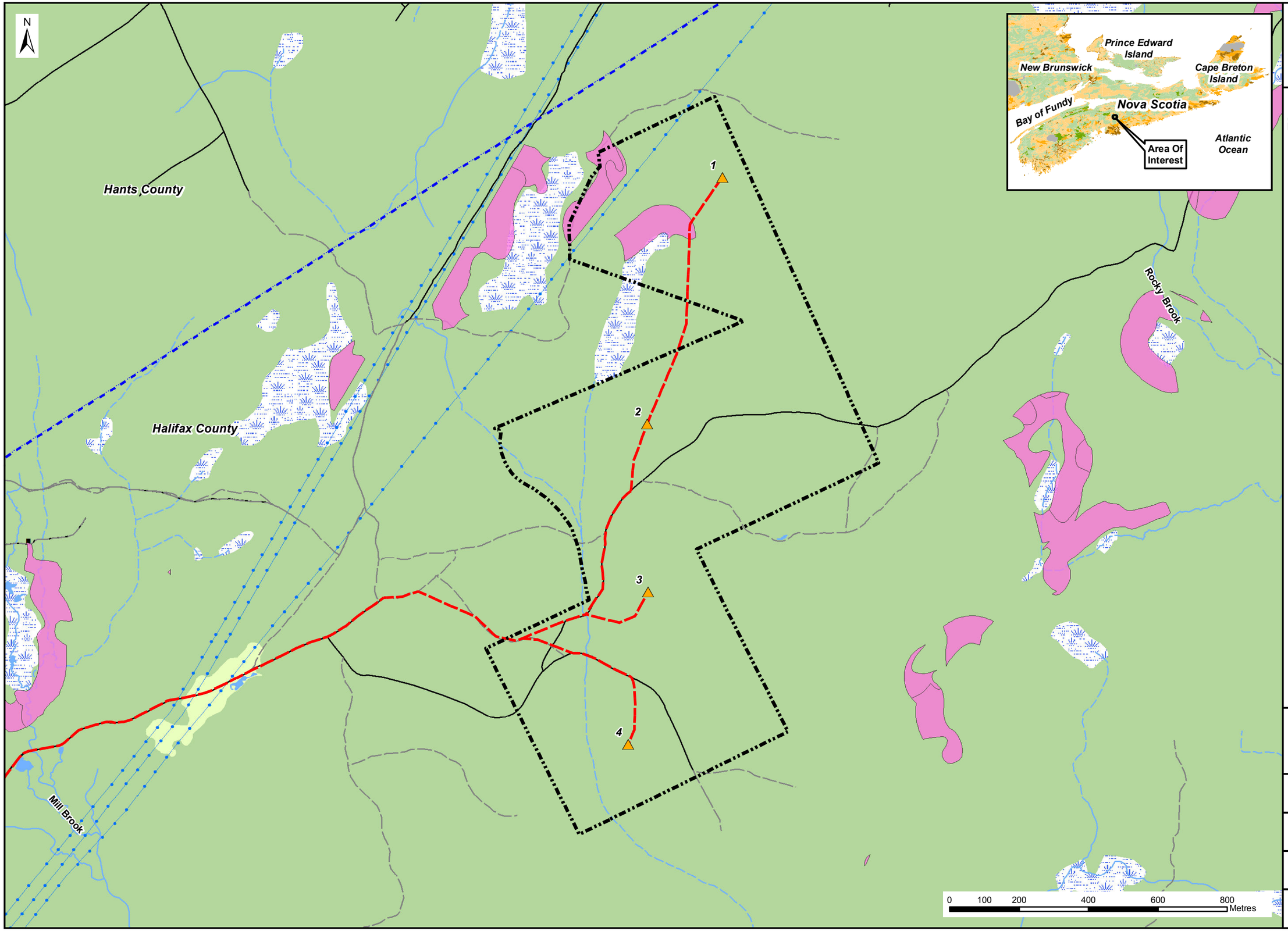
- Twenty-nine records that are classified in the database as "Deer Wintering", which relate to known over-wintering habitat for White-tailed deer (*Odocoileus virginianus*);
- Two records that are classified as "Other Habitat", which relate to American beaver (*Castor canadensis*) and American black bear (*Ursus americanus*);
- Two records that are classified as 'Species of Concern", which relate to Fisher (*Martes pennanti*) and Long-tailed Shrew (*Sorex dispar*);and
- One record classified as "Species at Risk", which relates to Southern flying squirrel (*Glaucomys volans*).

There are no records pertaining to terrestrial mammals within a 10 km radius of the Project site.

The ACCDC database (2012) indicates that six species of terrestrial mammals (excluding bats) have been recorded within a 100 km radius of the Project site (Table 8.6).

Table 8.6: Mammal Species Recorded within a 100 km radius of the Project Site

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
Canadian lynx	*Lynx canadensis*	Not Listed	Endangered	Not at Risk	Red
Eastern cougar	*Puma concolor*	Not Listed	Not Listed	Data Deficient	Undetermined



Notes:

1. Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre. Predicted BFL Habitat by MTRI (2010).
2. Projection: NAD83(CSRS), UTM Zone 20 North.

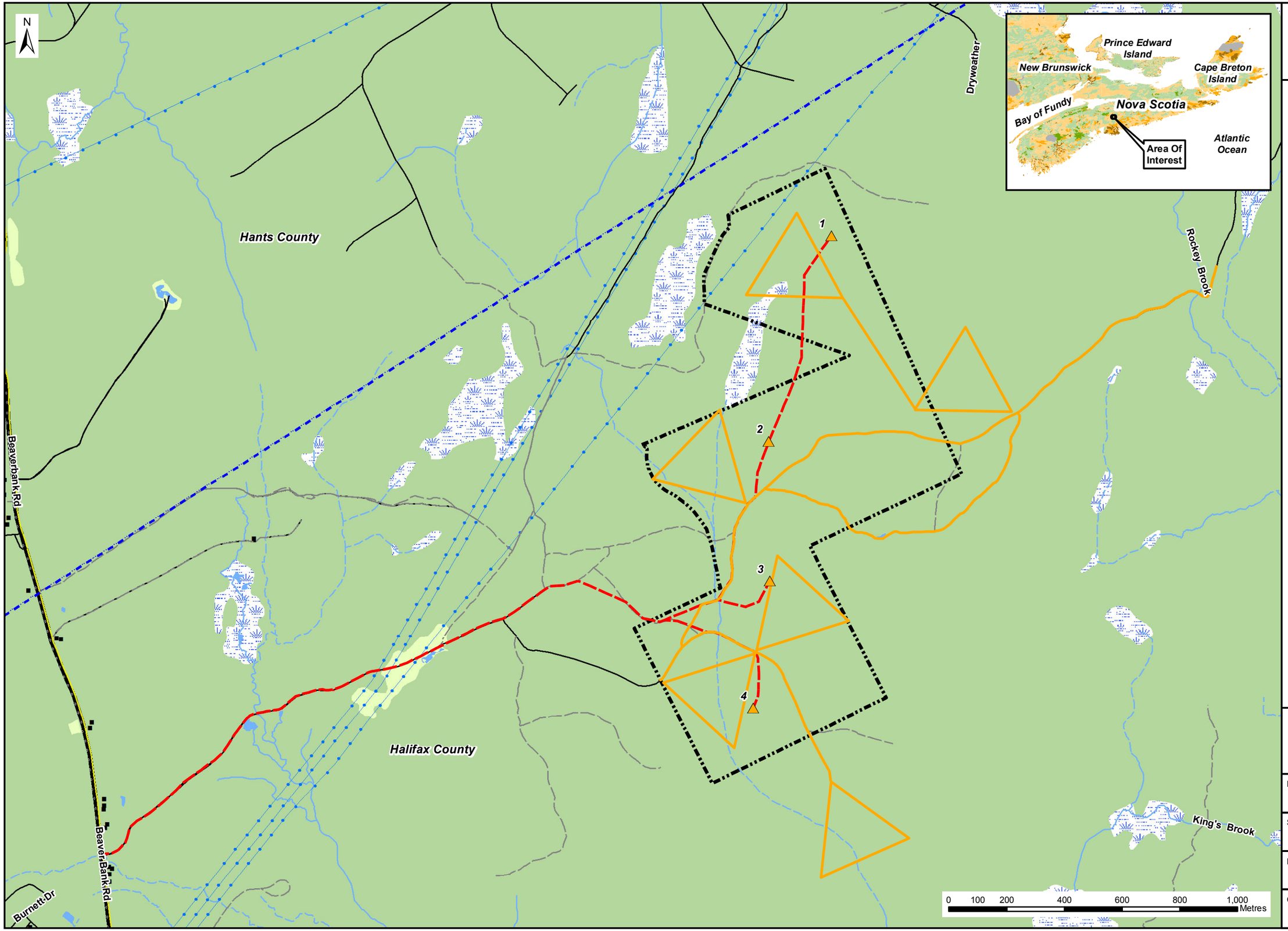
Legend:

- Project Site Boundary
- Proposed Turbine
- Proposed Access Road
- Predicted Boreal Felt Lichen Habitat
- Building
- County Boundary
- Public Roads
- Access Roads / Trails
- Existing Transmission Lines
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area

Predicted Boreal Felt Lichen Habitat

Strum CONSULTING

Date: October 2013	Project #: 12-4563
Scale: 1:10,000	Drawing #: 8.6
Drawn By: G. Gregory	
Checked By: M. Smith	



Notes:

1. Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.

Legend:

- Project Site Boundary
- Proposed Turbine
- Proposed Access Road
- Moose Survey Transect
- Building
- County Boundary
- Major Roads and Highways
- Public Roads
- Access Roads / Trails
- Existing Transmission Lines
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area

Moose Survey Transects

Strum Consulting

Date: October 2013	Project #: 12-4563
Scale: 1:12,000	Drawing #: 8.7
Drawn By: H. Serhan	
Checked By: M. Henley	

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
Fisher	*Martes pennanti*	Not Listed	Not Listed	Not Listed	Yellow
Long-tailed shrew	*Sorex dispar*	Not Listed	Not Listed	Not Listed	Yellow
Mainland moose	*Alces alces americanus*	Not Listed	Endangered	Not Listed	Red
Southern flying squirrel	*Glaucomys volans*	Not Listed	Not Listed	Not at Risk	Yellow

Source: ACCDC 2013
[1]Government of Canada 2012; [2]NS *ESA* 2013; [3]COSEWIC 2012; [4]NSDNR 2010

Of note is that sightings of many common species are unreported to ACCDC, and are therefore under-represented or absent from the database. Consequently, a review of the ACCDC data reveals predominantly rare or noteworthy species despite the fact that these species certainly represent a small fraction of the existing mammal community in an area.

Field studies (between November 2012 and October 2013) of mammalian fauna at the Project site consisted of direct observation of individuals, as well as the indirect identification of species by sound and/or sign (*e.g.,* scat, tracks, scent, dens, lodges, etc). Snow-tracking surveys, targeting Mainland moose but also encompassing all wildlife sign, were conducted in January 2013 and a pellet count survey was completed in May 2013. A detailed methodology for snow-tracking and pellet count surveys is provided in Appendix F.

Table 8.7 lists the mammal species observed/identified at or near the Project site during field studies.

Table 8.7: Mammal Species Observed during Field Studies

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
American porcupine	*Erethizon dorsatum*	Not Listed	Not Listed	Not Listed	Green
Bobcat	*Lynx rufus*	Not Listed	Not Listed	Not Listed	Green
Eastern coyote	*Canis latrans*	Not Listed	Not Listed	Not Listed	Green
Fisher	*Martes pennanti*	Not Listed	Not Listed	Not Listed	Yellow
Masked shrew	*Sorex cinereus*	Not Listed	Not Listed	Not Listed	Green
Red fox	*Vulpes vulpes*	Not Listed	Not Listed	Not Listed	Green
Red squirrel	*Tamiasciurus hudsonicus*	Not Listed	Not Listed	Not Listed	Green
Short-tailed weasel	*Mustela erminea*	Not Listed	Not Listed	Not Listed	Green
Snowshoe hare	*Lepus americanus*	Not Listed	Not Listed	Not Listed	Green
White-footed deermouse	*Peromyscus leucopus*	Not Listed	Not Listed	Not Listed	Green
White-tailed deer	*Odocoileus virginianus*	Not Listed	Not Listed	Not Listed	Green

[1]Government of Canada 2012; [2]NS *ESA* 2013; [3]COSEWIC 2012; [4]NSDNR 2010

Mammal SOCI include:

- Canada lynx - “Endangered” (NS *ESA*), “Red” (NSDNR);
- Fisher – “Yellow” (NSDNR);
- Long-tailed shrew – “Yellow” (NSDNR);

- Mainland moose – "Endangered" (NS *ESA*), "Red" (NSDNR); and
- Southern flying squirrel – "Yellow" (NSDNR).

Canada lynx
Canada lynx typically prefer high elevation softwood stands of varying successional stage, most notably second growth forest following natural or human-induced disturbance, that allow Snowshoe hare (*Lepus americanus*) populations to reach peak densities (Parker *et al*. 1983; Parker 2001). Downed woody debris, such as that associated with older forests, are required for maternal den sites (Nova Scotia Lynx Recovery Team 2006).

The breeding population of Canada lynx in Nova Scotia is limited to the Cape Breton Highlands (Parker 2001; Nova Scotia Lynx Recovery Team 2006). During cyclic lows in Snowshoe hare populations, individual Canada lynx may disperse great distances throughout mainland Nova Scotia. ACCDC data indicate that the closest observation of Canada lynx to the Project site was 91 ± 1 km away.

No indication of Canada lynx was observed during field studies. Mature softwood and mixed wood forest stands are present at the Project site (Drawing 8.5), which could conceivably provide suitable denning habitat for breeding females but likely does not support an adequate Snowshoe hare population. Considering the species' habitat requirements and known range in Nova Scotia, it is highly unlikely that Canada lynx occur at the Project site. Any occurrence of this species would represent a transient individual ranging in search of food during periodic lows in the Snowshoe hare cycle. The Project is therefore not expected to have any impact on Canada lynx, and no further consideration of effects and mitigation for this species has been undertaken.

Fisher
Fisher prefer dense, mature to old-growth forests with continuous overhead cover (Allen 1983). Generally considered a forest-interior species (OMNR 2000), Fisher require large tracts of well-connected habitat (Meyer 2007).

Fisher are distributed throughout mainland Nova Scotia, and trapping data suggests population concentrations in Cumberland, Colchester, and Pictou counties (NSDNR 2012d). Approximately 4% of 1,754 Fisher trapped in Nova Scotia between 2000 and 2011 were harvested from Halifax and Hants Counties (NSDNR 2012d). ACCDC data indicate that the closest observation of this species to the Project site was 68 ± 10 km away.

Suitable habitat for fisher is present at the Project site in the form of tolerant hardwood and mature spruce stands. Fisher tracks were observed in the northern extent of the Project site during snow-tracking surveys in January 2013. Potential effects of the Project on this species, as well as proposed species-specific mitigation measures, are discussed in more detail in Section 13.2.1.

Long-tailed shrew
Long-tailed shrew in Nova Scotia was thought to be found only in the Cobequid Mountains (Scott 1987; Woolaver *et al*. 1998), but more recent research has identified an additional population 60 km to the southwest, near Wolfville (Shafer and Stewart 2006). All records of this species in Nova Scotia are associated with steep, talus slopes, usually close to running water, and the presence of

rocks is considered a principal habitat component (Kirkland 1981). No preferred Long-tailed shrew habitat exists within the Project site boundaries. When also considering the currently known range of this species in Nova Scotia, it is unlikely that Project activities will impact Long-tailed shrew populations. No further consideration of effects and mitigation for this species has been undertaken.

Mainland moose
Habitat requirements for Mainland moose change throughout the year. Early successional growth, such as that provided by recent cutovers, offers quality foraging habitat for moose, and interspersed wetlands provide suitable summer habitat for cows and calves (Parker 2003; Snaith and Beazley 2004). Mature softwood forest is used as escape cover throughout the year, and also provides thermal relief during the summer months and relief from deep snows in winter.

Five significant concentration areas for Mainland moose have been identified in Nova Scotia (NSDNR 2012e). The Project site is located approximately 13.2 km to the east of the closest such area, which encompasses the Halifax peninsula. According to the ACCDC database, the closest sighting of Mainland moose was 40 ±10 km from the Project site (ACCDC 2012).

No evidence of Mainland moose was observed at the Project site, including during snow-tracking surveys conducted in January 2013 and during pellet group surveys conducted in May 2013. Moose tracks were observed, however, during a pellet group survey conducted in May 2013 at the site of a nearby wind energy development, approximately 10.6 km north of the Project site. Suitable foraging habitat for Mainland moose at the Project site available in regenerating cutovers, with nearby escape cover, in the form of mature softwoods, in adjacent intact stands. Considering the known concentration areas of Mainland moose in Nova Scotia, as well as the species' ecology (home range, seasonal habitat requirements, etc), there is the potential for this species to occur at the Project site.

Potential effects of the Project on this species, as well as proposed species-specific mitigation measures, are discussed in more detail in Section 13.2.1.

Southern flying squirrel
Southern flying squirrel requires mast bearing trees for forage and tree cavities for nesting and in the Atlantic Region, southern flying squirrels select older forest stands (COSEWIC 2006). In Nova Scotia, the species demonstrates a particular affinity to red oak, which is most commonly found in mixed wood stands as opposed to pure hardwood stands (Lavers 2004).

In Nova Scotia, Southern flying squirrel occur primarily in a region bounded by the South Mountain in the north, Kentville in the east, New Ross in Lunenburg County to the south, and extends to Kejiimkujik National Park in the west (COSEWIC 2006). ACCDC data indicate that the closest observation of this species to the Project site was 53±10 km away.

No indication of Southern flying squirrel was observed during field studies, although the species' nocturnal habits make observations difficult in the absence of targeted surveys. The Project is therefore not expected to have any impact on Southern flying squirrel, and no further consideration of effects and mitigation for this species has been undertaken.

8.6.2 Herpetofauna

The Nova Scotia Significant Species and Habitat Database (NSDNR 2012c) contains 26 unique species and/or habitat records pertaining to reptiles and amphibians within a 100 km radius of the Project site. These records include:

- Twenty-four that are classified in the database as "Species at Risk", all of which relate to the Wood turtle (*Glyptemys insculpta*);
- One record classified as "Species of Concern", which relates to the Painted turtle (*Chrysemys picta*); and
- One record classified as "Other Habitat", which relates to the Wood turtle.

There are two records pertaining to herpetofauna within a 10 km radius of the Project site, both representing Wood turtles, 7.10 km to the northwest in Moore Lake Brook/Lagoon Lakes and 8.14 km to the north in Story's Lake.

Data from the ACCDC (2012) indicate that five species of terrestrial herpetofauna have been recorded within a 100 km radius of the Project site (Table 8.8).

Table 8.8: Herpetofauna Species Recorded by ACCDC within a 100 km radius of the Project Site

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
Blanding's turtle	*Emydoidea blandingii*	Endangered	Endangered	Endangered	Red
Common snapping turtle	*Chelydra serpentina*	Special Concern	Vulnerable	Special Concern	Green
Eastern ribbonsnake	*Thamnophis sauritus*	Threatened	Threatened	Threatened	Red
Four-toed salamander	*Hemidactylium scutatum*	Not Listed	Not Listed	Not at Risk	Green
Wood turtle	*Glyptemys insculpta*	Threatened	Threatened	Threatened	Yellow

Source: ACCDC 2012
[1]Government of Canada 2012; [2]NS *ESA* 2013; [3]COSEWIC 2012; [4]NSDNR 2010

The same data limitations and interpretations as noted for the mammalian fauna (Section 8.6.1) are also applicable to the reptile and amphibian data.

Field studies of amphibian and reptile species were conducted in conjunction with other surveys between November 2012 and October 2013. Species were either identified directly through visual observation, or indirectly using other evidence (*e.g.,* calls, egg masses, tadpoles, calls, etc.). Table 8.9 lists the amphibian and reptile species identified at or near the Project site during field studies.

Table 8.9: Herpetofauna Species Recorded During Field Studies

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
Green frog	*Lithobates clamitans*	Not Listed	Not Listed	Not Listed	Green
Northern Leopard Frog	*Lithobates pipiens*	Not Listed	Not Listed	Not at Risk	Green

[1]Government of Canada 2012; [2]NS *ESA* 2013; [3]COSEWIC 2012; [4]NSDNR 2010

Herpetofauna SOCI include:

- Blanding's turtle – "Endangered" (*SARA*), "Endangered" (NS *ESA)*, "Red" (NSDNR);
- Common snapping turtle – "Special Concern" (*SARA*), "Vulnerable" (NS *ESA*);
- Eastern ribbonsnake – "Threatened" (*SARA*), "Threatened" (NS *ESA*); "Red" (NSDNR); and
- Wood turtle – "Threatened" (*SARA*), "Threatened" (NS *ESA*), "Yellow" (NSDNR).

None of the SOCI listed above were observed during field studies.

Blanding's turtle
Blanding's turtle make use of a variety of wetland habitats including lakes, ponds, brooks, creeks, and marshes (COSEWIC 2005), and are closely associated with areas of extensive beaver activity (TBTRT 2012). The known range of this species in Nova Scotia is restricted to the southwestern interior of the province where there are five disjunct populations within the Medway, Mersey, and Sissiboo River watersheds (TBTRT 2012). The geographic separation from the range of Blanding's turtle in Nova Scotia ensures that the Project will not impact this species. No further consideration of effects and mitigation for this species has been undertaken.

Common snapping turtle
Common snapping turtle, despite its conservation status, is considered relatively common in mainland Nova Scotia (Davis and Browne 1996). Snapping turtle habitat is usually associated with slow moving water of moderate depth, with a muddy bottom and dense vegetation. Established populations are typically found in ponds, lakes and river edges (COSEWIC 2008a). While the species has a widespread distribution across mainland Nova Scotia, the Project site lacks habitat requirements such as open water bodies and slow moving rivers required to sustain a local population. While individual Common snapping turtles may occur at the Project site, this is highly unlikely. Population level impacts to this species are therefore not expected and no further consideration of effects and mitigation for this species has been undertaken.

Eastern ribbonsnake
Eastern ribbonsnake is a semi-aquatic species typically found in freshwater habitats including wetlands, still water streams and marshes (COSEWIC 2002). In Nova Scotia, concentrations of Eastern ribbonsnake are thought to be limited to interior portions of the Mersey, Medway, and LaHave River watersheds in the southwestern region of the province, although recent discoveries have expanded the known range of this species to include the Petite Rivière watershed (Gilhen *et al*. 2012). Nonetheless, the Project site has substantial geographic separation from the species' known range in Nova Scotia; Project activities will therefore not impact Eastern ribbonsnakes.

The Project is therefore not expected to have any impact on Eastern ribbonsnake and no further consideration of effects and mitigation for this species has been undertaken.

Wood turtle
Wood turtle requires three key habitat components: a watercourse, sandy substrate, and a forested area (MacGregor and Elderkin 2003). The species is found throughout the province but seems to be most abundant in central Nova Scotia. In fact, the Shubenacadie River watershed, within which the

Project site is located, has among the most abundant Wood turtle populations in Nova Scotia (MacGregor and Elderkin 2003). Due to the presence of watercourses and forested areas on the Project site, there is the potential for Wood turtle to occur.
Potential effects of the Project on this species, as well as proposed mitigation measures, are discussed in more detail in Section 13.2.1.

8.6.3 Butterflies and *Odonates*

The Nova Scotia Significant Species and Habitats (NSDNR 2012c) database identifies five significant habitat features relating to butterflies and *Odonates* within a 100 km radius of the Project site. These records include:

- Three records that are classified in the database as "Species of Concern", of which two relate to Jutta arctic (*Oeneis jutta*) and one relates to Little bluet (*Enallagma minusculum*);
- One record classified as "Species at Risk", which relates to Ebony boghaunter (*Williamsonia fletcheri*); and
- One record classified as "Other Habitat", which relates to Hoary elfin (*Callophrys polios*).

The database contains no records of butterflies or *Odonates* within a 10 km radius of the Project site.

The ACCDC database contains records of 58 unique taxa of butterfly and *Odonates* within a 100 km radius of the Project site (Table 8.10).

Table 8.10: Unique Butterfly and *Odonate* Species Recorded within a 100 km radius of the Project Site

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
Aphrodite Fritillary	*Speyeria aphrodite*	Not Listed	Not Listed	Not Listed	Green
Arctic Fritillary	*Boloria chariclea*	Not Listed	Not Listed	Not Listed	Yellow
Baltimore Checkerspot	*Euphydryas phaeton*	Not Listed	Not Listed	Not Listed	Green
Banded Hairstreak	*Satyrium calanus*	Not Listed	Not Listed	Not Listed	Undetermined
Bog Elfin	*Callophrys lanoraieensis*	Not Listed	Not Listed	Not Listed	Red
Bronze Copper	*Lycaena hyllus*	Not Listed	Not Listed	Not Listed	Green
Brook Snaketail	*Ophiogomphus aspersus*	Not Listed	Not Listed	Not Listed	Red
Clamp-Tipped Emerald	*Somatochlora tenebrosa*	Not Listed	Not Listed	Not Listed	Green
Common Branded Skipper	*Hesperia comma*	Not Listed	Not Listed	Not Listed	Green
Common Roadside Skipper	*Amblyscirtes vialis*	Not Listed	Not Listed	Not Listed	Green
Compton Tortoiseshell	*Nymphalis l-album*	Not Listed	Not Listed	Not Listed	Green
Delicate Emerald	*Somatochlora franklini*	Not Listed	Not Listed	Not Listed	Yellow
Eastern Comma	*Polygonia comma*	Not Listed	Not Listed	Not Listed	Not Listed
Eastern Pine Elfin	*Callophrys niphon*	Not Listed	Not Listed	Not Listed	Green
Eastern Red Damsel	*Amphiagrion saucium*	Not Listed	Not Listed	Not Listed	Green
Ebony Boghaunter	*Williamsonia fletcheri*	Not Listed	Not Listed	Not Listed	Red
Elfin Skimmer	*Nannothemis bella*	Not Listed	Not Listed	Not Listed	Green
Forcipate Emerald	*Somatochlora forcipata*	Not Listed	Not Listed	Not Listed	Red

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
Green Comma	*Polygonia faunus*	Not Listed	Not Listed	Not Listed	Green
Greenish Blue	*Plebejus saepiolus*	Not Listed	Not Listed	Not Listed	Not Listed
Grey Comma	*Polygonia progne*	Not Listed	Not Listed	Not Listed	Green
Grey Hairstreak	*Strymon melinus*	Not Listed	Not Listed	Not Listed	Green
Harlequin Darner	*Gomphaeschna furcillata*	Not Listed	Not Listed	Not Listed	Yellow
Harpoon Clubtail	*Gomphus descriptus*	Not Listed	Not Listed	Not Listed	Yellow
Harvester	*Feniseca tarquinius*	Not Listed	Not Listed	Not Listed	Green
Henry's Elfin	*Callophrys henrici*	Not Listed	Not Listed	Not Listed	Green
Hoary Comma	*Polygonia gracilis*	Not Listed	Not Listed	Not Listed	Yellow
Hoary Elfin	*Callophrys polios*	Not Listed	Not Listed	Not Listed	Green
Jutta Arctic	*Oeneis jutta*	Not Listed	Not Listed	Not Listed	Red
Juvenal's Duskywing	*Erynnis juvenalis*	Not Listed	Not Listed	Not Listed	Green
Kennedy's Emerald	*Somatochlora kennedyi*	Not Listed	Not Listed	Not Listed	Red
Lance-Tipped Darner	*Aeshna constricta*	Not Listed	Not Listed	Not Listed	Green
Laurentian Skipper	*Hesperia comma laurentina*	Not Listed	Not Listed	Not Listed	Green
Maine Snaketail	*Ophiogomphus mainensis*	Not Listed	Not Listed	Not Listed	Red
Maritime Copper	*Lycaena dospassosi*	Not Listed	Not Listed	Not Listed	Not Listed
Milbert's Tortoiseshell	*Aglais milberti*	Not Listed	Not Listed	Not Listed	Green
Monarch	*Danaus plexippus*	Special Concern	Special Concern	Not Listed	Yellow
Mottled Darner	*Aeshna clepsydra*	Not Listed	Not Listed	Not Listed	Green
Mustard White	*Pieris oleracea*	Not Listed	Not Listed	Not Listed	Yellow
Northern Cloudywing	*Thorybes pylades*	Not Listed	Not Listed	Not Listed	Yellow
Northern Pearly-Eye	*Lethe anthedon*	Not Listed	Not Listed	Not Listed	Green
Northern Pygmy Clubtail	*Lanthus parvulus*	Not Listed	Not Listed	Not Listed	Green
Ocellated Darner	*Boyeria grafiana*	Not Listed	Not Listed	Not Listed	Yellow
Orange Bluet	*Enallagma signatum*	Not Listed	Not Listed	Not Listed	Red
Pepper and Salt Skipper	*Amblyscirtes hegon*	Not Listed	Not Listed	Not Listed	Green
Prince Baskettail	*Epitheca princeps*	Not Listed	Not Listed	Not Listed	Yellow
Quebec Emerald	*Somatochlora brevicincta*	Not Listed	Not Listed	Not Listed	Red
Question Mark	*Polygonia interrogationis*	Not Listed	Not Listed	Not Listed	Green
Riffle Snaketail	*Ophiogomphus carolus*	Not Listed	Not Listed	Not Listed	Green
Rusty Snaketail	*Ophiogomphus rupinsulensis*	Not Listed	Not Listed	Not Listed	Red
Satyr Comma	*Polygonia satyrus*	Not Listed	Not Listed	Not Listed	Yellow
Seaside Dragonlet	*Erythrodiplax berenice*	Not Listed	Not Listed	Not Listed	Yellow
Skillet Clubtail	*Gomphus ventricosus*	Not Listed	Not Listed	Not Listed	Red
Spot-Winged Glider	*Pantala hymenaea*	Not Listed	Not Listed	Not Listed	Yellow
Striped Hairstreak	*Satyrium liparops*	Not Listed	Not Listed	Not Listed	Undetermined
Taiga Bluet	*Coenagrion resolutum*	Not Listed	Not Listed	Not Listed	Red
Vesper Bluet	*Enallagma vesperum*	Not Listed	Not Listed	Not Listed	Yellow
Zebra Clubtail	*Stylurus scudderi*	Not Listed	Not Listed	Not Listed	Red

Source: ACCDC 2013

[1]Government of Canada 2012; [2]NS *ESA* 2013; [3]COSEWIC 2012; [4]NSDNR 2010

No incidental observations of butterflies were made during other field studies conducted at the Project site between February 2012 and October 2013.
Butterfly and *Odonate* SOCI include:

- Arctic fritillary – "Yellow" (NSDNR);
- Bog elfin – "Red" (NSDNR);
- Brook snaketail – "Red" (NSDNR);
- Delicate emerald – "Yellow" (NSDNR);
- Ebony boghaunter – "Red" (NSDNR);
- Forcipate emerald – "Red" (NSDNR);
- Harlequin darner – "Yellow" (NSDNR);
- Harpoon clubtail – "Yellow" (NSDNR);
- Jutta arctic – "Red" (NSDNR);
- Kennedy's emerald – "Red" (NSDNR);
- Maine snaketail – "Red" (NSDNR);
- Monarch – "Special Concern" (*SARA*), "Special Concern" (COSEWIC) "Yellow" (NSDNR);
- Mustard white – "Yellow" (NSDNR);
- Northern cloudywing – "Yellow" (NSDNR);
- Ocellated darner – "Yellow" (NSDNR);
- Orange bluet – "Red" (NSDNR);
- Prince baskettail – "Yellow" (NSDNR 2010);
- Quebec emerald – "Red" (NSDNR);
- Rusty snaketail – "Red" (NSDNR);
- Satyr comma – "Yellow" (NSDNR);
- Seaside dragonlet – "Yellow" (NSDNR);
- Skillet clubtail – "Red" (NSDNR);
- Spot-winged glider – "Yellow" (NSDNR);
- Taiga bluet – "Red" (NSDNR);
- Vesper bluet – "Yellow" (NSDNR); and
- Zebra clubtail – "Red" (NSDNR).

Monarch
Only the Monarch has been granted a designated conservation status at either the provincial or federal level. This species can be found in open-habitats with abundant wildflower growth. Milkweed (*Asclepias* sp.) is a critical element of breeding habitat, whereas asters (*Asteraciae* sp.) and goldenrods (*Solidago* sp.) provide necessary food resources during migration (MTRI 2008a). Nova Scotia falls within the breeding range of this migratory species (COSEWIC 2010b), and individuals can be found throughout the province from May to October (MBA 2012).

No indication of Monarch was observed during field surveys. Open habitat at the Project site is prevalent, particularly in along roadsides and in more recent cutovers. Considering the widespread distribution of the species in Atlantic Canada, it is possible that Monarch occurs at the Project site, particularly during the migratory period (late summer/early fall). However, given that the species was not observed despite a frequent presence at the site during this time of year, it is unlikely that the

Project site provides sufficient nectar resources to support a large congregation of migratory Monarchs.
Potential effects of the Project on this species, as well as proposed mitigation measures, are discussed in more detail in Section 13.2.1.

The requirements as set out in *SARA* and NS *ESA* will be adhered to for Project activities. Additional general mitigation measures for terrestrial fauna are provided in Section 4.0. Where required, species-specific mitigation is provided in Section 13.

8.7 Avifauna

The Project site consists of a matrix of intact mid-aged to mature softwood stands, mature tolerant hardwoods, and regenerating cutovers. In addition, field studies have identified several areas of wetland habitat throughout the Project site. This diversity of habitat types provides foraging, breeding, and roosting habitat for a variety of resident and migratory bird species. Baseline information was utilized to gain insight into significant avifauna habitats, species utilization of the area, and to identify avifauna SOCI potentially occurring at or near the Project site

The closest Important Bird Area (IBA) in Canada (IBA Canada 2012) is the Southern Bight of the Minas Basin located approximately 36 km southwest of the Project site. This IBA is a 22,190 ha staging ground for an estimated 1 to 2 million shorebirds in late July to early August. A high diversity of migrant shorebirds forage on the large intertidal mud and sand flats throughout the Bight. This area is also a designated Ramsar Wetland Site as it supports the largest numbers of mixed species of shoreline birds during fall migration in all of North America.

The majority of the Project site is contained within map square 20MQ47, and in the most recent edition of the Maritime Breeding Bird Atlas (MBBA) (2006-2012), 87 species were identified as being possible, probable, or confirmed breeders within this area (MBBA 2012). The following SOCI are considered possible, probable, or confirmed breeders in the survey area:

- American Bittern (*Botaurus lentiginosus*) – “Yellow” (NSDNR)
- Barn Swallow (*Hirundo rustica*) – “Endangered” (NS *ESA*), “Threatened” (COSEWIC), “Yellow” (NSDNR);
- Black-backed Woodpecker (*Picoides arcticus*) – “Yellow” (NSDNR);
- Boreal Chickadee (*Poecile hudsonicus*) – “Yellow” (NSDNR);
- Canada Warbler (*Wilsonia canadensis*) – “Threatened” (*SARA*), “Endangered” (NS *ESA*), “Threatened” (COSEWIC), “Red” (NSDNR);
- Cliff Swallow (*Petrochelidon pyrrhonota*) – “Red” (NSDNR);
- Common Loon (*Gavia immer*) – “Red” (NSDNR);
- Common Nighthawk (*Chordeiles minor*) – “Threatened” (*SARA*), “Threatened” (NS *ESA*), “Threatened” (COSEWIC), “Red” (NSDNR);
- Common Snipe (*Gallinago delicata*) – “Yellow” (NSDNR);
- Eastern Wood-Pewee (*Contopus virens*) – “Vulnerable” (NS *ESA*), “Special Concern” (COSEWIC), “Yellow” (NSDNR);
- Golden-crowned Kinglet (*Regulus satrapa*) – “Yellow” (NSDNR);
- Gray Jay (*Perisoreus canadensis*) – “Yellow” (NSDNR);

- Olive-sided Flycatcher (*Contopus cooperi*) – "Threatened" (*SARA*), "Threatened" (NS *ESA*), "Threatened" (COSEWIC), "Red" (NSDNR)
- Pine Grosbeak (*Pinicola enucleator*) – "Red" (NSDNR);
- Pine Siskin (*Spinus pinus*) – "Yellow" (NSDNR);
- Rose-breasted Grosbeak (*Pheucticus ludovicianus*) – "Yellow" (NSDNR);
- Ruby-crowned Kinglet (*Regulus calendula*) – "Yellow" (NSDNR);
- Tennessee Warbler (*Oreothlypis peregrina*) – "Yellow" (NSDNR);
- Tree Swallow (*Tachycineta bicolor*) – "Yellow" (NSDNR); and
- Yellow-bellied Flycatcher (*Empidonax flaviventris*) – "Yellow" (NSDNR).

The NS Significant Species and Habitats database contains 401 unique records pertaining to birds and/or bird habitat within a 100 km radius of the Project site. These records include:

- 166 classified in as "Other Habitat", primarily relating to Bald Eagle (*Haliaeetus leucocephalus*) (114) or Osprey (*Pandion haliaetus*) (39) but also including records of Great Blue Heron (*Ardea herodias*) (45 and Gray Partridge (*Perdix perdix*) (2), among others;
- 107 records classified as "Species of Concern", primarily relating to Common Loon (*Gavia immer*) (56) but also including records of unclassified Tern species (18) and Common Tern (*Sterna hirundo*) (7), among others;
- 76 records classified as "Migratory Bird", including unclassified shorebirds (16), Great Blue Heron (15), Double-crested Cormorant (*Phalacrocorax auritus*) (15), American Black Duck (*Anas rubripes*) (9), among others; and
- 52 records classified as "Species at Risk", primarily relating to Piping Plover (*Charadrius melodus*) (22) and Peregrine Falcon (*Falco peregrinus*) (8), but also including records of Harlequin Duck (*Histrionicus histrionicus*) (4), Common Loon (3), and Roseate Tern (*Sterna dougallii*) (3), among others.

Multiple significant habitat features related to birds are present within a 10 km radius of the Project site (Table 8.11).

Table 8.11. Significant Habitat Features Related to Birds within a 10 km Radius of the Project Site

Species	Location	Distance to Project Site (km)	Direction
Bald Eagle	Shores of Sleepy Cove	3.84	ESE
Bald Eagle	Island Near Sleep Cove	4.44	ESE
Common Loon	Shubenacadie Grand Lake near Grand Lake Station	6.66	E
Common Loon/Bald Eagle	Little Grand Lake	7.13	NE
Bald Eagle	Shores of Miller's Cove	7.21	NE
Common Loon/Bald Eagle	Shubenacadie River	7.93	E
Common Loon	Long Lake	9.67	WNW

Source: NSDNR 2012c

The ACCDC database contains records of 93 bird species within a 100 km radius of the Project site. Table 8.12 lists these species as well as their respective provincial and national conservation status ranks.

Table 8.12 Bird Species Recorded within a 100 km Radius of the Project Site

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
American Bittern	*Botaurus lentiginosus*	Not Listed	Not Listed	Not Listed	Yellow
American Coot	*Fulica americana*	Not Listed	Not Listed	Not at Risk	Undetermined
American Golden-Plover	*Pluvialis dominica*	Not Listed	Not Listed	Not Listed	Yellow
Arctic Tern	*Sterna paradisaea*	Not Listed	Not Listed	Not Listed	Red
Atlantic Puffin	*Fratercula arctica*	Not Listed	Not Listed	Not Listed	Yellow
Baltimore Oriole	*Icterus galbula*	Not Listed	Not Listed	Not Listed	Red
Bank Swallow	*Riparia riparia*	Not Listed	Not Listed	Not Listed	Red
Barn Swallow	*Hirundo rustica*	No Status	Endangered	Threatened	Yellow
Bay-breasted Warbler	*Dendroica castanea*	Not Listed	Not Listed	Not Listed	Yellow
Black Guillemot	*Cepphus grylle*	Not Listed	Not Listed	Not Listed	Green
Black-backed Woodpecker	*Picoides arcticus*	Not Listed	Not Listed	Not Listed	Yellow
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Not Listed	Not Listed	Not Listed	Red
Black-legged Kittiwake	*Rissa tridactyla*	Not Listed	Not Listed	Not Listed	Yellow
Blackpoll Warbler	*Dendroica striata*	Not Listed	Not Listed	Not Listed	Yellow
Blue-winged Teal	*Anas discors*	Not Listed	Not Listed	Not Listed	Red
Bobolink	*Dolichonyx oryzivorus*	No Status	Vulnerable	Threatened	Yellow
Boreal Chickadee	*Poecile hudsonica*	Not Listed	Not Listed	Not Listed	Yellow
Boreal Owl	*Aegolius funereus*	Not Listed	Not Listed	Not at Risk	Undetermined
Brant	*Branta bernicla*	Not Listed	Not Listed	Not Listed	Yellow
Brown Thrasher	*Toxostoma rufum*	Not Listed	Not Listed	Not Listed	Undetermined
Brown-headed Cowbird	*Molothrus ater*	Not Listed	Not Listed	Not Listed	Green
Canada Warbler	*Wilsonia canadensis*	Threatened	Endangered	Threatened	Red
Cape May Warbler	*Dendroica tigrina*	Not Listed	Not Listed	Not Listed	Yellow
Chimney Swift	*Chaetura pelagica*	Threatened	Endangered	Threatened	Red
Cliff Swallow	*Petrochelidon pyrrhonota*	Not Listed	Not Listed	Not Listed	Red
Common Goldeneye	*Bucephala clangula*	Not Listed	Not Listed	Not Listed	Green
Common Loon	*Gavia immer*	Not Listed	Not Listed	Not at Risk	Red
Common Moorhen	*Gallinula chloropus*	Not Listed	Not Listed	Not Listed	Undetermined
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Threatened	Red
Common Tern	*Sterna hirundo*	Not Listed	Not Listed	Not at Risk	Yellow

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
Eastern Bluebird	*Sialia sialis*	Not Listed	Not Listed	Not at Risk	Yellow
Eastern Kingbird	*Tyrannus tyrannus*	Not Listed	Not Listed	Not Listed	Yellow
Eastern Meadowlark	*Sturnella magna*	No Status	Not Listed	Threatened	Yellow
Eastern Phoebe	*Sayornis phoebe*	Not Listed	Not Listed	Not Listed	Yellow
Eastern Wood-Pewee	*Contopus virens*	Not Listed	Vulnerable	Special Concern	Yellow
Fox Sparrow	*Passerella iliaca*	Not Listed	Not Listed	Not Listed	Green
Gadwall	*Anas strepera*	Not Listed	Not Listed	Not Listed	Red
Gray Catbird	*Dumetella carolinensis*	Not Listed	Not Listed	Not Listed	Red
Gray Jay	*Perisoreus canadensis*	Not Listed	Not Listed	Not Listed	Yellow
Great Cormorant	*Phalacrocorax carbo*	Not Listed	Not Listed	Not Listed	Yellow
Great Crested Flycatcher	*Myiarchus crinitus*	Not Listed	Not Listed	Not Listed	Red
Greater Yellowlegs	*Tringa melanoleuca*	Not Listed	Not Listed	Not Listed	Yellow
Harlequin Duck - Eastern pop.	*Histrionicus histrionicus pop. 1*	Special Concern	Endangered	Special Concern	Red
Horned Lark	*Eremophila alpestris*	Not Listed	Not Listed	Not Listed	Green
Hudsonian Godwit	*Limosa haemastica*	Not Listed	Not Listed	Not Listed	Yellow
Indigo Bunting	*Passerina cyanea*	Not Listed	Not Listed	Not Listed	Undetermined
Killdeer	*Charadrius vociferus*	Not Listed	Not Listed	Not Listed	Yellow
Least Sandpiper	*Calidris minutilla*	Not Listed	Not Listed	Not Listed	Green
Long-eared Owl	*Asio otus*	Not Listed	Not Listed	Not Listed	Red
Northern Bobwhite	*Colinus virginianus*	Not Listed	Not Listed	Not Listed	No Status
Northern Cardinal	*Cardinalis cardinalis*	Not Listed	Not Listed	Not Listed	Green
Northern Gannet	*Morus bassanus*	Not Listed	Not Listed	Not Listed	Green
Northern Goshawk	*Accipiter gentilis*	Not Listed	Not Listed	Not at Risk	Green
Northern Mockingbird	*Mimus polyglottos*	Not Listed	Not Listed	Not Listed	Green
Northern Pintail	*Anas acuta*	Not Listed	Not Listed	Not Listed	Red
Northern Shoveler	*Anas clypeata*	Not Listed	Not Listed	Not Listed	Red
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened	Threatened	Red
Peregrine Falcon - anatum/tundrius	*Falco peregrinus pop. 1*	Threatened	Vulnerable	Special Concern	Yellow
Philadelphia Vireo	*Vireo philadelphicus*	Not Listed	Not Listed	Not Listed	Undetermined
Pied-billed Grebe	*Podilymbus podiceps*	Not Listed	Not Listed	Not Listed	Yellow
Pine Grosbeak	*Pinicola enucleator*	Not Listed	Not Listed	Not Listed	Red

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]
Pine Siskin	*Carduelis pinus*	Not Listed	Not Listed	Not Listed	Yellow
Piping Plover melodus ssp	*Charadrius melodus melodus*	Endangered	Endangered	Endangered	Red
Purple Martin	*Progne subis*	Not Listed	Not Listed	Not Listed	Red
Purple Sandpiper	*Calidris maritima*	Not Listed	Not Listed	Not Listed	Yellow
Razorbill	*Alca torda*	Not Listed	Not Listed	Not Listed	Yellow
Red Knot	*Calidris canutus rufa*	Endangered	Endangered	Endangered	Red
Red Phalarope	*Phalaropus fulicarius*	Not Listed	Not Listed	Not Listed	Yellow
Red-breasted Merganser	*Mergus serrator*	Not Listed	Not Listed	Not Listed	Green
Red-necked Phalarope	*Phalaropus lobatus*	Not Listed	Not Listed	Not Listed	Yellow
Ring-billed Gull	*Larus delawarensis*	Not Listed	Not Listed	Not Listed	Green
Roseate Tern	*Sterna dougallii*	Endangered	Endangered	Endangered	Red
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Not Listed	Not Listed	Not Listed	Yellow
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Endangered	Special Concern	Red
Savannah Sparrow princeps ssp	*Passerculus sandwichensis princeps*	Special Concern	Not Listed	Special Concern	Green
Scarlet Tanager	*Piranga olivacea*	Not Listed	Not Listed	Not Listed	Undetermined
Semipalmated Plover	*Charadrius semipalmatus*	Not Listed	Not Listed	Not Listed	Green
Semipalmated Sandpiper	*Calidris pusilla*	Not Listed	Not Listed	Not Listed	Yellow
Short-eared Owl	*Asio flammeus*	Special Concern	Not Listed	Special Concern	Red
Solitary Sandpiper	*Tringa solitaria*	Not Listed	Not Listed	Not Listed	Green
Spotted Sandpiper	*Actitis macularius*	Not Listed	Not Listed	Not Listed	Yellow
Tennessee Warbler	*Vermivora peregrina*	Not Listed	Not Listed	Not Listed	Yellow
Turkey Vulture	*Cathartes aura*	Not Listed	Not Listed	Not Listed	Yellow
Vesper Sparrow	*Pooecetes gramineus*	Not Listed	Not Listed	Not Listed	Red
Virginia Rail	*Rallus limicola*	Not Listed	Not Listed	Not Listed	Undetermined
Warbling Vireo	*Vireo gilvus*	Not Listed	Not Listed	Not Listed	Undetermined
Whip-Poor-Will	*Caprimulgus vociferus*	Threatened	Threatened	Threatened	Red
Willet	*Tringa semipalmata*	Not Listed	Not Listed	Not Listed	Red
Willow Flycatcher	*Empidonax traillii*	Not Listed	Not Listed	Not Listed	Yellow
Wilsons Snipe	*Gallinago delicata*	Not Listed	Not Listed	Not Listed	Yellow
Wilson's Warbler	*Wilsonia pusilla*	Not Listed	Not Listed	Not Listed	Yellow