

3.1 Regional and Local Environmental Considerations

Pubnico Point is located within the Tusket Islands Unit (Unit 831) of the Beaches and Islands District of the Atlantic Coast Theme Region of Nova Scotia, which is characterized by submerged coastlines, long headlands and inlets (Davis and Browne, 1996). The coastal region enjoys relatively mild winters that facilitate the survival of relict coastal-plain flora species. The relatively ice-free conditions and coastal marsh areas also provide important wintering habitat for waterfowl and nutrient-rich waters that support a diverse marine fauna.

The Tusket Island Region is characterized by many medium-sized, elongated lakes, small freshwater wetlands and bogs. Long Savannah and Spinneys Heath, for example, are two large wetlands that are considered to be significant habitats for wildlife (Davis and Browne, 1996). The Tusket and Chebogue Rivers are the largest river systems in the area and support a diverse range of valued habitat. The Tusket supports a large run of Gaspereaux (*Alosa pseudoharengus*) in the spring; Rainbow Smelt (*Osmerus mordax*) and Striped Bass (*Morone saxatilis*) are also important. The Chain Pickerel (*Esox niger*) is an introduced species that has had a major impact on the area as a predator of both migratory and exotic freshwater fish; it is thought to have played a critical role in the extirpation of the Atlantic Whitefish (*Coregonus huntsmani*).

The area's mild winter temperatures in conjunction with the islands, sheltered inlets and salt marshes to the west of the Pubnico Peninsula provide productive wintering areas for waterfowl and other bird species including the Bald Eagle (*Haliaeetus leucoucephalus*). Abundant numbers of American Black Duck (*Anas rubripes*), Canada Geese (*Branta canadensis*), scaups, and the Common Goldeneye (*Bucephala clangula americana*) are common in the area in winter. Other less common waterfowl include Red-breasted Merganser (*Mergus serrator*) and Oldsquaw (*Clangula hyemalis*). Shorebird numbers as the birds arrive in spring are small, peak in early to mid-August, and decline sharply in September. Osprey (*Pandion haliaetus*) breed along the shores and Leach's Storm-Petrels (*Oceanodroma leucorhoa*) breed on the islands.

The Brothers Islands are home to the largest Canadian population of Roseate Terns (*Sterna dougallii*). The Roseate Tern is an endangered species under the *Nova Scotia Endangered Species Act* and listed by COSEWIC's Committee on the Status of Endangered Wildlife in Canada. Approximately 50 % of the Canadian Roseate Tern population nests in this location. Arctic Terns (*Sterna paradisaea*) and Common Terns (*Sterna hirundo*) also nest here. The islands are located approximately 4 kilometres off the coast of West Pubnico. In 1999, this site was identified as an Internationally Important Bird Area (IBA) by Bird Studies Canada (BSC). Two other IBAs are located in this general region, approximately 30 kilometres to the south west of Pubnico Point. Eastern Cape Sable Island is the most southerly point of land in the province. It is designated as an IBA Globally Significant area because it is a stop-over for high concentrations of shore birds, waterbirds and seabirds. In the summer, the Piping Plover (*Charadrius melodus*), a species endangered in Canada and globally vulnerable, nests along the sand beaches on the eastern side of the island.

Bon Portage Island supports the largest known colony of Leach's Storm-Petrel in the Maritimes. During the late 1980s, a breeding population of over 50,000 pairs was estimated which represented over 1% of the total western Atlantic population at that date. Great Blue Herons (*Ardea herodias fannini*) are abundant and about 10 pairs of nesting Black-crowned Night Herons (*Nycticorax nycticorax*) have been recorded. Since the late

1980s, Snowy Egrets (*Egretta thula*) have been present during the breeding season, but nesting has yet to be confirmed. The only other place where Snowy Egrets have bred in Canada is in Southern Ontario.

The western shoreline and salt marsh of the inner Pubnico Harbour has been identified as “significant habitat” because of its importance as wintering habitat for waterfowl and eagles. NSDNR records indicate an abundance of American Black Ducks (*Histrionicus histrionicus*) and Canada Geese wintering, but there are no records of Harlequin Ducks in the area.¹⁸ The inner most area of Pubnico Harbour, where Welchards Brook, Bog Brook, Deadhorse Brook and Long Savannah discharge into the Harbour is considered as “significant habitat” for Gaspereaux. This is a species listed on the NSDNR’s General Status Ranks of Wild Species in Nova Scotia (2003) and a “yellow species”, i.e., sensitive, but not believed to be at risk of immediate extirpation or extinction. Retired NSDNR biologist, Paul Tusk, has identified the Yarmouth archipelago of islands, including the Tusket Island Region as important wintering areas for eagles, shorebirds and wintering waterfowl. The southern portion of Pubnico Point is not included in this “significant habitat” (see Figure 3.1).

Although this part of southwest Nova Scotia has a very rich and diverse ecological profile providing valued habitat for many species, there are locations within this region that are much less productive. The proposed Project site is such an area.

As stated in Section 1.2, AWPC proposes the development of a wind farm on land at the south of Pubnico Point. This is a peninsula of land that extends for approximately 14 kilometres and defines the western shoreline of Pubnico Harbour. The communities of Pubnico, Upper West Pubnico, West Pubnico, Middle West Pubnico and Lower West Pubnico are located along the west side of Pubnico Harbour (see Figure 3.1). The four most southerly Pubnicos are commonly referred to as West Pubnico, and together have a population of approximately 1,890. Historically land in the southern portion of the peninsula belonged to local families and was used primarily as a source of wood and for hunting and trapping. It remains undeveloped. This is due to a combination of factors: on the one hand, the population density of the area has not warranted additional development and, on the other, the physical environment of this area is unprotected and not conducive to production or development. The combination of lack of soil, scrub forest¹⁹, wetland areas and an open, rocky, wind swept coastline has kept settlers further up the peninsula. There is access to the southern part of the peninsula from Highway 103 by Route 335. The tarmac surface of Route 335 is replaced by rough gravel at the driveway of the last house and further south becomes a beach stone road that follows the coastline around to the southern tip of the peninsula.



¹⁸ The study team has searched, and been in communication with Lawrence Benjamin, NSDNR database technician, for the Significant Habitats of Nova Scotia Database; they have also searched sources at the NS Museum of Natural History and have examined maps generated by the Yarmouth County Coastal Resources Mapping Project. There are no records in these sources of Harlequin Ducks having been sighted in or in proximity to the site.

¹⁹ A forest fire in the 1940s further reduced the use value of the area.

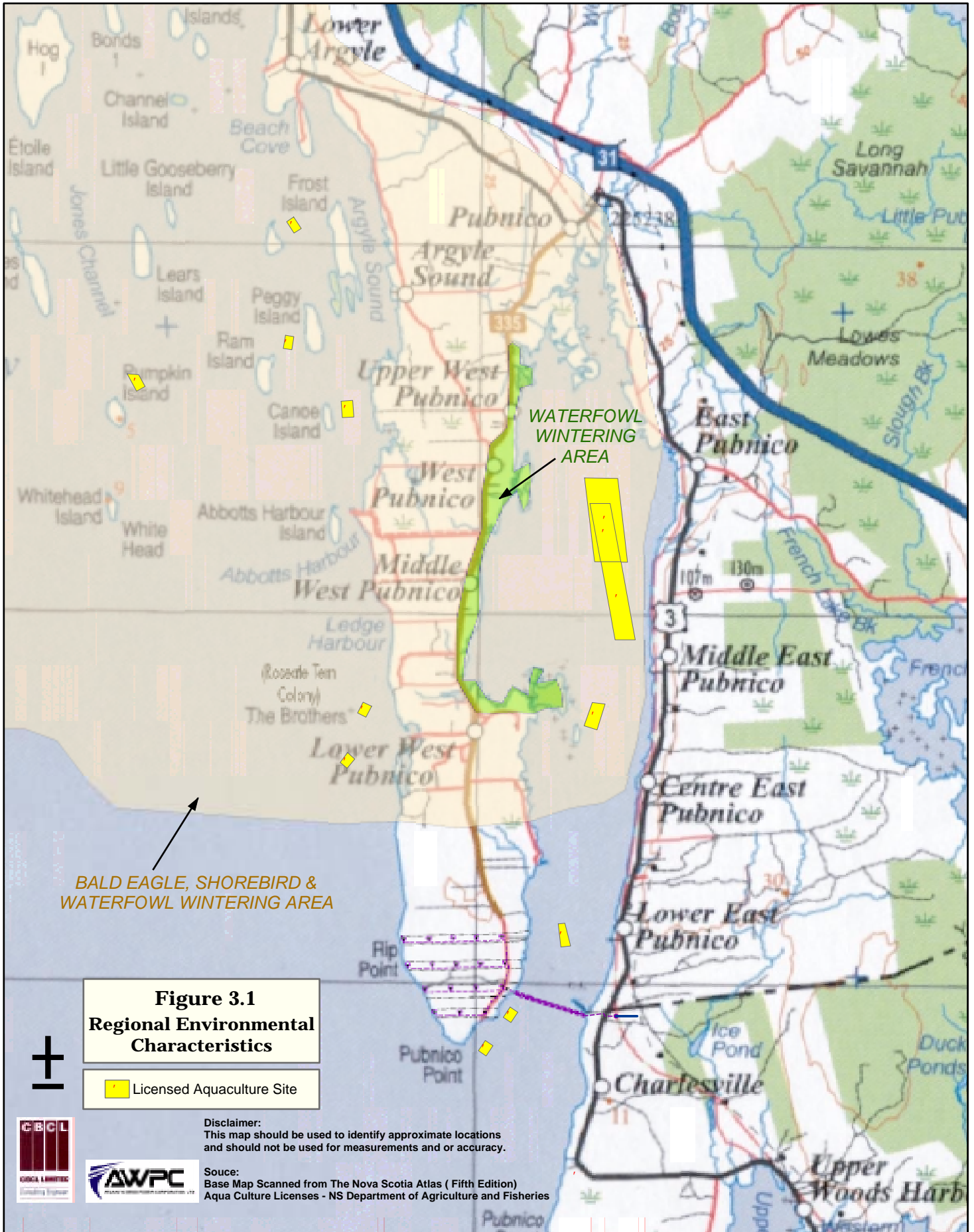



Figure 3.1
Regional Environmental
Characteristics

 Licensed Aquaculture Site



Disclaimer:
 This map should be used to identify approximate locations
 and should not be used for measurements and or accuracy.

Source:
 Base Map Scanned from The Nova Scotia Atlas (Fifth Edition)
 Aqua Culture Licenses - NS Department of Agriculture and Fisheries

The coastline in the vicinity of the site at Pubnico Point, i.e., the area above the highwater mark, is characterized by boulders and cobbles. There are no coastal wetlands nor salt marshes in this location. There are no sensitive beach or dune habitats in the vicinity of the proposed wind farm site, or in the vicinity of the proposed cable crossing.

Although remote and undeveloped, much of the proposed site has been physically disturbed. Evidence of casual use and despoliation can be deduced from the trash that litters the area and the rutted all-terrain vehicle (ATV) trails that cross the site. The various field teams that have been on site have noted the debris and the illegal dumping, including components of an old offshore aquaculture system, and the destruction that has occurred to both vegetation and the wetland from ATV use. The original wetland area has in places been severely damaged, allowing unnatural pools of water to collect and invasive plants to thrive. The Point also appears to be an informal destination for local youths. The latter have recently built an illegal camp in an area identified locally as Melford's Field. In summary, although formally undeveloped, the proposed wind farm site is not pristine habitat. It has in fact been considerably damaged by casual use.

3.2 Terrestrial Environment

The proposed site is well suited for the placement and installation of wind turbines. Its proximity to the open sea, minimal elevation above sea level and relatively flat topography provide ideal conditions. There are essentially four habitats types on Pubnico Point: forest, barrens, bogs and seashore. There are no naturally occurring lakes or streams on the site, though there are small puddles and stillwaters and some water flow associated with channels created by the ATVs. Except in areas of open bog, vegetation throughout much of the area is dense, in some places impenetrable, but the area is not heavily treed.

3.2.1 Geology and Topography

As previously noted, Pubnico Point is located within the Tusket Islands Unit (Unit 831) of the Beaches and Islands District of the Atlantic Coast Theme Region of Nova Scotia. This area is characterized by submerged coastlines, long headlands and inlets (Davis and Browne, 1996). Drumlins occur onshore and as offshore islands. Glaciofluvial deposits are common, especially eskers. Glacial deposits provide an ample sediment supply allowing for extensive tidal marsh development particularly in the inner reaches of the inlets.

The Project site itself is relatively flat and, at its maximum elevation, is no more than 20-25 m above sea level. On the east side of the harbour the proposed cable route rises from sea level to the site of the proposed substation which is approximately 15 m above sea level.

The geology of Pubnico Point consists of Cambro-Ordovician (500 to 580 million years ago) bedrock of the Meguma Group. Much of the Pubnico Point falls within the Halifax Formation and is made up of slate, siltstone and rare limestone at base. The southernmost portion of the Point is of the Goldenville Formation and comprises mainly greywacke and slate. Over some of the proposed project site, glacial



In northern portion of wetland, there is a sharp gradient to upland environment

scouring has left the bedrock in locations no more than a few centimetres below the surface, or protruding above the surface.

These underlying geological conditions pose specific challenges for detailed engineering, particularly in the context of site preparation and construction. Pyritic slate, sometimes associated with these geological formations, is of potential concern. As indicated in Section 2.2.1, the geotechnical investigations undertaken at the sites of the first two wind turbine generators to be constructed and at the abandoned quarry indicate that sulphide sulphur levels are below limits specified in the Regulations for Sulphide Bearing Material Disposal. Further geotechnical investigations will be instigated as is required for detailed engineering. If pyritic slate is present at any location and if amounts of excavated materials greater than 500 m³ are to be excavated in situ, AWPC will follow the requirements of the *NS Environment Act's* Sulphide Bearing Material Disposal Regulations. Throughout the detailed engineering, proper investigation and best management practices will be implemented to further minimize any risk.

3.2.2 Hydrology and Wetlands

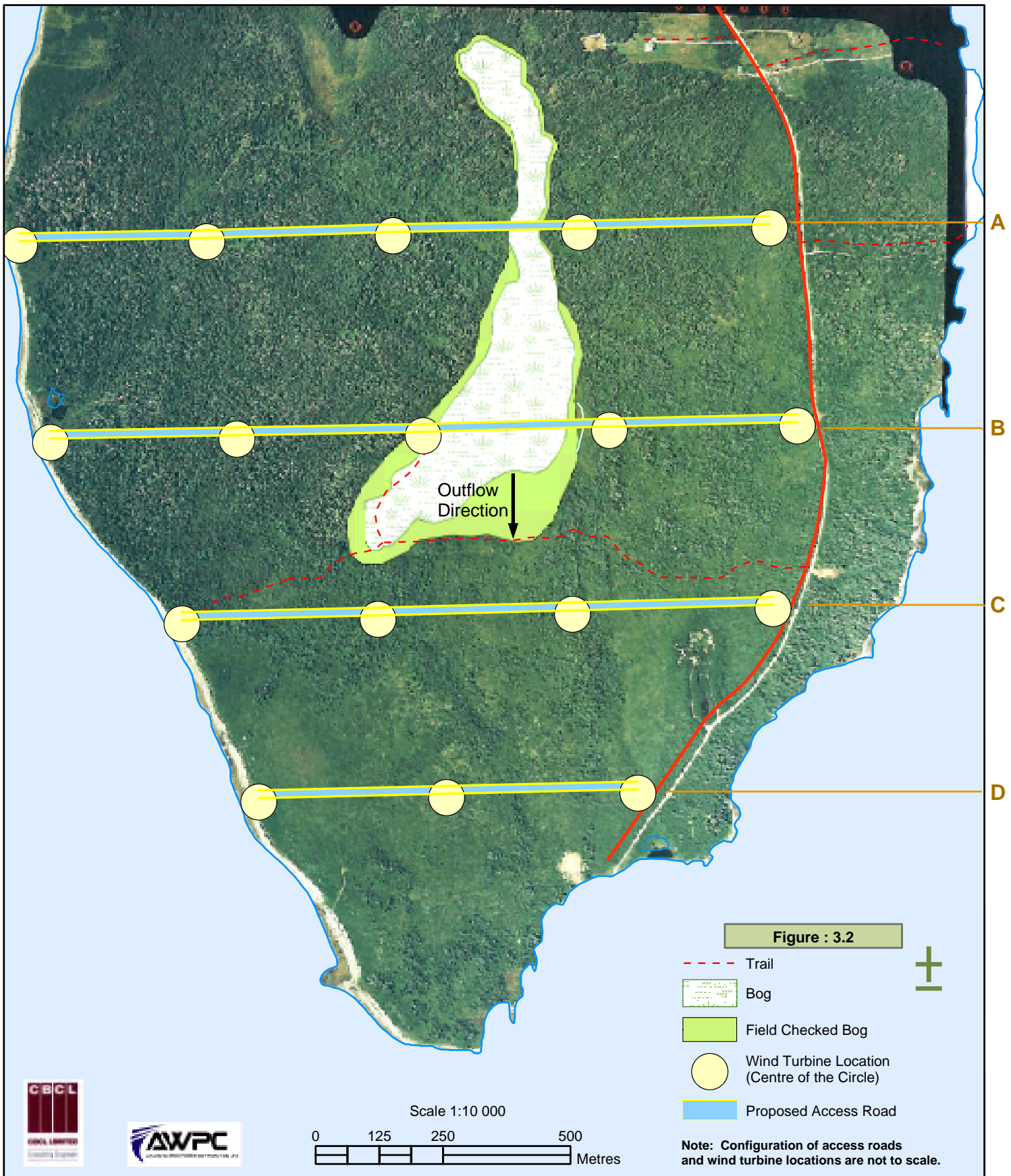
The wetlands on the Lower Pubnico peninsula, identified in the Wetlands Inventory Database (NSDNR, 2002), had been classified based on normal colour aerial photograph interpretation at a scale of 1:10,000, dated 2000. The southern-most of the wetlands is located in the area of the proposed wind farm. This wetland had been classified as bog, and subclassified as 40% tree bog and 60% shrub bog in the database. Vegetative communities in the bog were described as having a low level of interspersed and arranged in roughly concentric areas radiating from the centre. The information on this wetland had not been previously field checked to verify the boundary, the classification, or the subclassification.

The wetland was field checked and evaluated by the study team. According to the Wetlands Inventory Database Maps, the wetland was approximately 13 ha in extent. Based on the field observations, the wetland area is approximately 19 ha. This differential is shown in Figure 3.2. In the southern part of the wetland there is a portion of treed bog that is not encompassed by the existing definition of the wetland boundary. To the west of the open bog/shrub bog area, there is another portion of treed bog that is outside the defined wetland boundary. To the north and east of the wetland, the boundary between forest and wetland is much more discernible. The water table is closer to the surface in the south and west with the result that there is a larger area of forested bog.

As depicted on Figure 3.2, the wetland runs north-south through the site. Fieldwork confirmed that there were no feeder streams to the wetland. The area receives input in the form of run-off from the surrounding forest located upland of the wetland and from direct precipitation. One outflow was observed, i.e., surface water was observed to be flowing in a small channel from the south of the wetland, but was not discernible as a channel further to the south in the alignment of Row C (see Figure 3.2). The channel in the vicinity of the wetland was bordered by a mature stand of Willow (*Salix sp.*). Willows are endemic to riparian areas, indicating that this area is likely wet during the growing season. Although this was the only area where flowing water was observed during field investigations in June, 2003, the entire southern perimeter of the wetland was wetter than its perimeter to the northeast and west.

The wetland itself resembles a basin bog. According to the Canadian Wetland Classification System (1997), basin bogs are:

LOCATION OF WETLAND - PUBNICO POINT



“situated in basins with a flat surface across the entire peatland. There are no surface feeder streams. Water is received from precipitation (rain and snowmelt) and runoff from the immediate surroundings of the basin” (National Wetlands Working Group 1997).

The upland forest soils consist of a shallow horizon of organic soils over a horizon of reduced silty-sand soils with some clay. In some areas bedrock is at, or just below, the surface. In no case within the open bog portion of the wetland were bedrock or mineral soils encountered in the 40 cm deep soil profile pits that were dug. In contrast, in all cases in the upland forests, mineral soils or bedrock were encountered within 20 cm in the profile pits.

The wetland is a *Sphagnum*-dominated peatland, approximately 19 ha in size. It is composed of three subclasses of wetland which are present in roughly concentric spheres radiating from the geographic centre of the bog:

- The central open bog is characterised by low-creeping shrubs and scattered emergent species. This area is dominated by mosses (*Sphagnum* sp.), sedges (*Carex* sp., *Eriophorum vaginatum*); other species include Small Cranberry and Bog Laurel;
- Shrub bog is present particularly in the western and the southeastern portion of the wetland. Shrub bog is defined as a type of bog comprised of low compact shrubs providing greater than 25% cover. This area is characterised by small shrubs: Leather-leaf and Labrador-tea. The pervasiveness of *Sphagnum* and *Carex* is evident; and
- The outer perimeter of this wetland is treed bog. The subclass is defined as having stunted evergreen species providing greater than 25% cover, and typically includes Black Spruce and Tamarak. This area resembles a more terrestrial environment and grades to poorly drained forest.



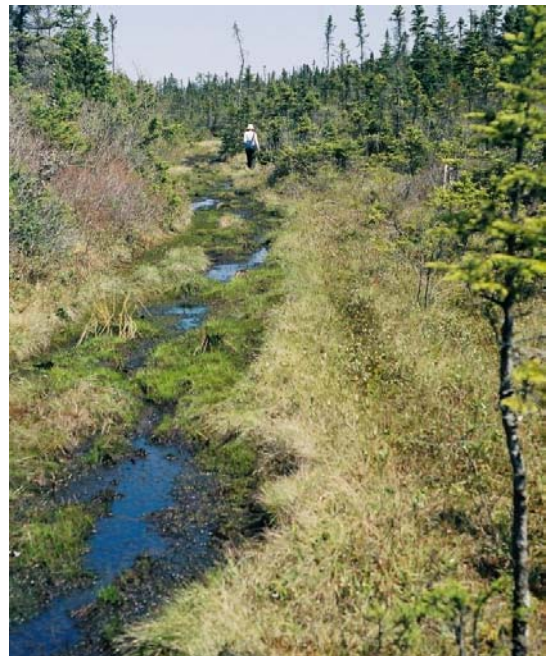
Outflow observed in the southern portion of wetland

To the north of the central open region is a narrow “neck” of open bog/shrub bog with open water channels that have been created by recreational vehicles. At the most northern reach of the bog is a small open wetland region that resembles a fen lawn. The water table is near the surface (<15 cm), and the botanical community is dominated by sedges with some grasses. This area has also been greatly disturbed by recreational vehicles. To the west of the narrow neck, the area is characterized by a coastal barren ecosystem; to the east the area is a poorly drained forest ecosystem.

The Nova Scotia Wetland and Coastal Habitats Inventory Database makes no reference to this wetland having any designation or protected status. Although somewhat greater in size than published records indicated, the wetland has been degraded by ATV use and does not provide a particularly diverse habitat for birds, fauna or plants. The execution of an evaluation undertaken in accordance with the Wetlands Evaluation Guide (North American Wetlands Conservation Council, 1992) confirmed its low intrinsic value. This evaluation is included as Appendix E.



Channels created in northern “neck” of bog from ATV use



3.2.3 Flora

Early in the Project, CBCL Limited contacted Bob Ogilvie, Curator, Special Places, Heritage Stewardship Section, at the Nova Scotia Museum with respect to the rare plant species that might be found in the vicinity of the proposed project site. In the spring of 2003, there were further telephone communications with representatives of NSDNR with respect to both habitats and plant surveys to facilitate the preparation of this report.²⁰ There were no field records for the project site, but a number of terrestrial plant species-at-risk were known to be present in the general area, i.e., in the 10 km grid within which the study area is located. Based

²⁰ A member of the study team spoke with Tony Duke and Lawrence Benjamin with respect to significant habitats and to Mark Elderkin with respect to the execution of plant surveys.

on the information received from the museum, Table 3.1 identifies the 11 plant species-at-risk that might have been expected to be found in the 10 km grid.²¹

Table 3.1: Terrestrial Plant Species Identified as Potentially at Risk at Pubnico Point **

<i>Scientific Name</i>	<i>Common Name</i>	<i>Notes***</i>
Species known to be present in the general area, i.e., a 10 km grid which the study area is located		
<i>Alnus serrulata</i>	Serrulata Alder	Lakeshores in south-western Nova Scotia.
<i>Suaeda richii</i>	a type of sea blite – Rich’s seepweed	Saline soils, salt marshes, coastal.
Species that may also be found in the area:		
<i>Limosella subulata</i>	Atlantic Mudwort	Brackish beaches, sandflats.
<i>Carex deflexa</i>	sedge	Dry, sandy, mixed coniferous woods, rock crevices.
<i>Eleocharis rostellata</i>	Beaked Spikerush	Confined to salt marshes, south-western portion of province.
Species that are found in areas adjacent to the proposed site:		
<i>Agalinis maritima</i>	Maritime Agalinis	Abundant in salt marshes along coast.
<i>Eleocharis tuberculosa</i>	Long-tubercled Spikerush	Sandy or boggy lake margins, coastal plain areas, Great Pubnico Lake. Ranked as awaiting COSEWIC designation in Canada (Zinck, 1997).
<i>Euthamia galetorum</i>	Goldenrod	Lake shores, sandy beaches, damp peaty soils.
<i>Samolus valerandi</i> ssp. <i>Parviflorus</i>	Water-pimpernal or Brookweed	Brackish meadows, tidal banks, edges of salt marshes.
<i>Spiranthes lucida</i>	Shining Ladies’-tresses	Alluvial soils, damp rocky shores, thickets, and meadows.
<i>S. ochroleuca</i>	Yellow Ladies’-tresses	Dry sandy barrens near rivers, roadsides, fields.

** Nova Scotia Museum Environmental Screening 02-02-30a – Point Pubnico; from the following sources:

- The NSDNR Rare Plant Species Review Committee;
- Pronych and Wilson, 1993, *Rare Plant Atlas for Nova Scotia*. Published by the Nova Scotia Museum;
- Roland and Zinck, 1998, *Roland’s Flora of Nova Scotia*, Published by Nimbus Publishing and the NS Museum.

*** Zinck, M. 1998. *Roland’s Flora of Nova Scotia*. Third Edition. Nimbus Publishing and Nova Scotia Museum, Halifax, N.S. Two volumes, 1297 p.

As stated in Section 1.6.1, a plant survey was executed in the early summer of 2002 by a recognized botanist. At that time of the year, most of the late flowering species were sufficiently developed to permit identification while the spring flowering plants were not yet senescent. Most of the non-woody species at the site were in bloom or sufficiently developed to ascertain that they were not species of concern. The field team sampled each of the vegetation types encountered, but spent a disproportionate amount of time surveying the bog because of its potential for rare species, especially spikerushes, sedges and orchids.

It is recognized that rare or unusual plants are most often found in unique or very specific habitat conditions. Aside from the bog, Pubnico Point accommodates an unremarkable habitat mix of wet mixed forest, or coastal scrub forest, of a type that abounds in Nova Scotia. There are no lakes or defined streams on the site. The shorelines are rocky, without mudflats or saltmarshes, and there are no headlands. A small stand of

²¹ Since all federally endangered plant species in the province are also listed as rare by the Nova Scotia Museum, the list provided by the Museum is considered comprehensive.

Juncus gerardii yielded no *Suaeda* and therefore no *S. richii*. Of the remaining 10 species of concern that had been flagged, only one, the Urban Yellow Spikerush (*Eleocharis flavescens*), might be expected to find suitable habitat at Pubnico Point. The rest are species of lakeshores, tidal marshes and beaches, or drier meadows. The field team looked diligently for rare species, and attempted to identify every species encountered; it is, thought unlikely that there are rare species at the site that were overlooked.

As described above, much of the proposed site has been disturbed, particularly by the all-terrain vehicle trails which permeate the area. Especially prominent are two trails which run along the east and west seashores in the scrub vegetation zone between the forest and shoreline. These trails, along with the central road, have provided access and disturbed ground for colonization by typical roadside plants that are not indicative of the native vegetation assemblage of the site. No exhaustive survey of these locations was attempted.

Four prominent vegetation types were identified within the site; these can be described as follows:

■ Forest

The forested area is dominated by White Spruce (*Pinaceae Picea glauca*), Black Spruce, Balsam Fir (*Pinaceae Abies balsamea*), Red Maple (*Aceraceae Acer rubrum*) and Mountain-Ash (*Pyrus Aucuaria Gaertn*) with an understory, usually dense, of ericaceous species from the barrens. Much of the forest appears to be even-aged, possibly arising after a fire (see footnote #19). Pure stands of Balsam Fir are reasonably open, but the vegetation over most of the site is very dense. The forest floor is wet, with a pronounced hummock-and-hollow topography. There is a thick carpet of moss and occasional pools of standing water.

■ Coastal Barrens

The coastal barrens are characterized by an extremely dense mixture of Highbush Blueberry (*Vaccinium corymbosum*), huckleberry, alder and stunted Mountain-Ash which forms a 2 m canopy, within which there are scattered islands of Red Maple and White Spruce. In some places, the barrens are more open and are characterized by Labrador-tea, Pale Laurel (*Kalmia polifolia*) and Sweet Gale (*Myrica gale*) which form a dense carpet about 1 m high. Thick beds of moss lie underfoot, and the entire area appears to be seasonally wet. Vegetation in the barrens is tangled and frequently impenetrable.

■ Seashore

Seashores on both the east and west sides are characterized by bare rock and cobble to the high-tide mark, where an intermittent cover of typical marine beach species begins. American Beech Grass (*Ammophila breviligulata*) and Beach Pea (*Lathyrus maritimus*) form confluent bands along the upper beach. There is a brief transition zone between the beach and the forest, occupied by barrens species mixed with species specialized for a coastal habit. The seashores are disturbed by ATV trails.

■ Wetland Areas

The characteristics and extent of the wetland is detailed above in Section 3.2.2.

78 species of vascular plants were identified at the site (see Table 3.2). Specimens of some species, especially sedges and grasses, have been deposited in the St. Francis Xavier University herbarium. The study team did not attempt a complete inventory of roadside species, or those along the obviously disturbed shorelines, because these habitats have been created as a consequence of road construction and other interventions. The more conspicuous species in these areas, however, are listed in Table 3.3.

Table 3.2: Vascular Plants Confirmed at Pubnico Point, 30 June - 1 July 2002

<i>Scientific Name</i>	<i>Common Name</i>	<i>Notes</i>
<i>Abies balsamea</i>	Balsam Fir	canopy tree in forest
<i>Acer rubrum</i>	Red Maple	common in forest and barrens
<i>Alnus viridis</i>	Downy Alder	throughout
<i>Alnus incana</i>	Speckled Alder	throughout
<i>Ammophila breviligulata</i>	Beach Grass	confluent at top of beach
<i>Andromeda glaucophylla</i>	Bog-Rosemary	
<i>Aralia nudicaulis</i>	Wild Sarsaparilla	forest understorey
<i>Arethusa bulbosa</i> *	Dragon's-Mouth	occasional in central bog
<i>Aronia melanocarpa</i>	Black Chokeberry	
<i>Aster radula</i>	Aster	occasional
<i>Aster acuminatus</i>	Wood Aster	no flowers. disturbed ground near seashore
<i>Aster sp.</i>	Aster	no flowers. <i>A. nemoralis</i> or <i>A. puniceous</i>
<i>Betula papyrifera</i>	White Birch	occasional. Possibly <i>B. cordifolia</i>
<i>Calopogon tuberosus</i> *	Grass-Pink	two plants found in central bog
<i>Calystegia sepium</i>	Wild Morning-Glory	between seashore and forest
<i>Carex echinata</i> *	sedge	common in clumps in bogs
<i>Carex exilis</i> *	sedge	dominant plant in bogs
<i>Carex nigra</i> ?*	sedge	scales wider than expected
<i>Carex pauciflora</i> *	sedge	occasional in bogs
<i>Carex paupercula</i> *	sedge	in bogs
<i>Carex trisperma</i> *	sedge	clumps beneath balsam fir in forest
<i>Chaemodaphne calyculata</i>	Leather-Leaf	
<i>Coptis trifolia</i>	Gold-Thread	in moss beneath balsam fir
<i>Cornus canadensis</i>	Bunchberry	common throughout
<i>Cyperus dentatus</i> *	Cyperus	flower heads incompletely developed
<i>Cypripedium acaule</i>	Pink Lady's-Slipper	scattered throughout barrens
<i>Deschampsia flexuosa</i> *	Common Hair Grass	
<i>Drosera rotundifolia</i>	Round-Leaved Sundew	abundant throughout bogs
<i>Dryopteris intermedia</i>	Evergreen Wood Fern	
<i>Empetrum nigrum</i>	Black Crowberry	bogs
<i>Erigeron annuus</i>	Daisy Fleabane	disturbed ground near shoreline
<i>Gaylussacia baccata</i>	Huckleberry	canopy in bog; also in forest
<i>Gaylussacia dumosa</i>	Bog Huckleberry	
<i>Heracleum lanatum</i> *	Cow-Parsnip	disturbed ground near the coast
<i>Holcus lanatus</i> *	Velvet-Grass	
<i>Honckenya peploides</i> *	Seabeach Sandwort	
<i>Iris versicolor</i>	Blue Flag	wet places throughout

<i>Scientific Name</i>	<i>Common Name</i>	<i>Notes</i>
<i>Juncus effusus*</i>	Soft Rush	scattered clumps in bogs
<i>Juncus gerardii</i>	Black Grass	small stand in tidal mudflat
<i>Juncus</i> sp.	Rush	probably <i>J. canadensis</i>
<i>Juniperus communis</i>	Common Juniper	barrens
<i>Kalmia polifolia</i>	Pale Laurel	throughout barrens and forest
<i>Larix laricina</i>	Larch	occasional
<i>Lathyrus maritimus</i>	Beach Pea	confluent band above high tide mark
<i>Ledum groenlandicum</i>	Labrador-tea	throughout barrens
<i>Linnaea borealis</i>	Twinflower	
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	forest understorey
<i>Melampyrum lineare</i>	Cow-wheat	single plant in forest
<i>Mertensia maritima*</i>	Sea Lungwort	one large plant, upper beach
<i>Monotropa uniflora</i>	Indian Pipe	beneath canopy balsam fir
<i>Myrica gale</i>	Sweet Gale	abundant in barrens
<i>Osmunda cinnamomea</i>	Cinnamon Fern	occasional in bog
<i>Oxalis acetosella</i> L.	Wood-Sorrel	
<i>Picea glauca</i>	White Spruce	dominant in landward forest
<i>Picea mariana</i>	Black Spruce	common in forest and around bogs
<i>Plantago maritima</i>	Seashore Plantain	
<i>Poa palustris*</i>	Fowl Meadow Grass	open areas
<i>Pteridium aquilinum*</i>	Bracken Fern	common in forest
<i>Rhododendron canadense</i>	Rhodora	
<i>Rosa nitida?</i>	Swamp Rose	wet ground near shore
<i>Rosa virginiana</i>	Common Wild Rose	wet ground near shore
<i>Rubus hispidus</i>	Dewberry	
<i>Rubus pubescens</i>	Dwarf Raspberry	
<i>Rumex crispus</i>	Curled Dock	in grass along shoreline. <i>R. pallidus</i> expected
<i>Sagina procumbens</i>	Pearlwort	a few plants along upper shore
<i>Sarracenia purpurea</i>	Pitcher-Plant	bogs
<i>Scutellaria galericulata?</i>	Marsh-Scullcap	no flowers
<i>Solidago sempervirens</i>	Seaside Goldenrod	along seashore
<i>Solidago</i> nr. <i>rugosa</i>	Rough Goldenrod?	no flowers
<i>Solidago</i> sp.	Goldenrod	no flowers. probably <i>S. ellioti</i>
<i>Sorbus americana</i>	Mountain-Ash	abundant in forest and barrens
<i>Thelypteris simulata*</i>	Bog Fern	throughout
<i>Trientalis borealis</i>	Starflower	in moss beneath balsam fir
<i>Vaccinium angustifolium</i>	Lowbush Blueberry	common in bogs
<i>Vaccinium corymbosum</i>	Highbush Blueberry	dominant in barrens, also in forest
<i>Vaccinium oxycoccus</i>	Small Cranberry	in moss of bogs
<i>Viburnum nudum</i>	Witherod	scattered throughout

<i>Scientific Name</i>	<i>Common Name</i>	<i>Notes</i>
<i>Viola nr. cucullata</i>	Violet	no flowers

(*) An asterisk indicates that a voucher specimen has been deposited in the Herbarium of St. Francis Xavier University.

Table 3.3: Common Roadside Species along Access Road

<i>Scientific Name</i>	<i>Common Name</i>	<i>Notes</i>
<i>Cerastium arvense</i>	Field Chickweed	disturbed shoreline
<i>Echinochloa crusgalli</i>	Barnyard Grass	
<i>Hieracium piloselloides</i>	Hawkweed	
<i>Potentilla simplex</i>	Cinquefoil	
<i>Raphanus raphanistrum</i>	Wild Radish	disturbed shoreline
<i>Rhinanthus crista-galli</i>	Yellow Rattle	
<i>Sisyrinchium atlanticum</i>	Blue-Eyed Grass	
<i>Stellaria graminea</i>	Grass-Leaved Stitchwort	
<i>Trifolium pratense</i>	Red Clover	
<i>Trifolium repens</i>	White Clover	

The area where the submarine cable will come ashore on the east side of Pubnico Harbour is also disturbed. On the upper side, bordering Route 3, there is a small stand of even-aged White Spruce, with a sparse understory. Toward the shoreline the site has been cleared of trees and maintained as an open sward of grass and wildflowers. All the plants observed were typical roadside species. There is a laneway from the road to the shore and a small derelict building located nearby. Trash and litter is scattered throughout the vegetation in this area. Two old apple trees at the edge of the forest testify to the previous use of the land as farmed.

One plant found to be quite abundant in various parts of Pubnico Point was thought at the time of the initial survey to be a COSEWIC listed threatened species, the long Tubercled Spikerush (*Eleocharis tuberculosa*). The plant was photographed and a specimen taken to the Nova Scotia Museum. On examination of the immature achenes, Marian Munro, the Curator of Botany at Nova Scotia Museum, confirmed that the specimen was not *E. tuberculosa*, i.e., it was not a threatened species (see Section 1.6.1). Mature specimens will be collected in September and identified.

Based on the research and field work undertaken, no rare or endangered plant species have been found on site.

3.2.4 Fauna

Nova Scotia lies within the Canadian Biotic Province, which includes New England, southern Quebec, southern Ontario and parts of the western Great Lakes. The composition and distribution of the fauna in Nova Scotia is influenced by a number of factors including climate, colonization routes, natural barriers, suitable habitats (source food and shelter), introductions and extinctions and the impacts of human settlement. Nova Scotia has 57 recorded land-mammal species.

Table 3.4: Status of Fauna of Concern

<i>Scientific Name</i>	<i>Common Name</i>	<i>NSDNR Status</i>	<i>ACCDC Ranking</i>	
			<i>G-rank</i>	<i>S-rank</i>
<i>Lynx canadensis</i>	Canada Lynx	Red	G5	S1
<i>Alces alces</i>	Moose	Red	G5	S1
<i>Martes americana</i>	American Marten	Red	G5	S1
<i>Glaucomys volans</i>	Southern Flying Squirrel	Yellow	G5	S1
<i>Sorex gaspensis</i>	Gaspé Shrew	Yellow	G3	S2
<i>Sorex dispar</i>	Long-tailed or Rock Shrew	Yellow	G4	S1
<i>Martes pennanti</i>	Fisher	Yellow	G5	S1
<i>Microtus chrotorrhinus</i>	Rock Vole		G4	S2

Sources: Nova Scotia Department of Natural Resources, i.e., General Status Ranks of Nova Scotia, and General Status Ranks Wild Species, 2000
Atlantic Canada Conservation Data Centre
COSEWIC list

The Tusket Island Region, of which Pubnico Point is part, is defined within the Atlantic Upland Life Zone, which is characterized as having a cool and humid environment with many conifers and bogs. The mammal species that might be expected to be found in Nova Scotia and that would be considered to be at risk or sensitive to human activities are identified in Table 3.4; they include the Canada lynx (*Lynx canadensis*), moose (*Alces alces*), American Marten, Southern Flying Squirrel, Gaspé Shrew (*Sorex gaspensis*), Long-tailed or Rock Shrew (*Sorex dispar*), Fisher (*Martes pennanti*) and Rock Vole (*Microtus chrotorrhinus*). Two of the identified species, i.e., the Canada Lynx and the American Marten, are identified in the Species at Risk list promulgated by the *Nova Scotia Endangered Species Act*. The Canada lynx is only found in Cape Breton; it is therefore not a species of concern with respect to the project area. The American Marten is considered endangered in Cape Breton; there have also been sightings in southwestern Nova Scotia, but there is a lack of data with respect to the latter area. The Moose is also considered a species at risk in the province. Appendix F provides ACCDC Ranks and Qualifiers.

According to experts contacted at the NSDNR, Wildlife Division, and the review of the Department's "Significant Habitat of Nova Scotia Database", the southern portion of Pubnico Point is not considered, based on the current level of knowledge, significant habitat for any of the identified fauna species. The disturbed habitat at the site is unlikely to be conducive to the American Marten, the Fisher, the Southern Flying Squirrel or either of the shrews. Based on the field programs that have been executed and observations from local informants, the southern portion of Pubnico Point does not appear to provide significant habitat for the identified fauna. A few deer summer and overwinter in and on the vicinity of the site; fox and hare have been seen.²² Local residents have also indicated that a limited amount of hunting and trapping for hare, muskrat and deer did take place in the past, but little occurs today. It might be argued that in the past the Point might have offered suitable habitat for some of the mammal species expected in this Life Zone, but due to settlement patterns and the consequences of the 1940s forest fire, the value of the habitat has been eroded.

Based on the research undertaken, no rare or endangered fauna rely on habitat in or in the vicinity of the Project site.

²² Personal communication, Raymond d'Entremont, August, 2003.

3.2.5 Birds

Based on the field program executed, the research undertaken of secondary databases and consultation with knowledgeable birders and federal and provincial agencies, 10 birds of special concern were identified that were known or suspected to breed in the 10 km square which includes Pubnico Point; these birds are identified in Table 3.5.

Table 3.5: Status of Birds of Concern Known or Suspected to Breed within 10 kms of Pubnico Point

<i>Scientific Name</i>	<i>Common Name</i>	<i>NS DNR Status (if not green)</i>	<i>ACCDC Ranking</i>		<i>Breeding Status</i>
			<i>G-rank</i>	<i>S-rank</i>	
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	YELLOW	G5	S1B	Confirmed
<i>Bartramia longicauda</i>	Upland Sandpiper		G5	S1B	Probable
<i>Sterna dougallii</i>	Roseate Tern	RED	G4	S1B	Confirmed
<i>Sterna hirundo</i>	Common Tern	YELLOW	G5	S3B	Confirmed
<i>Sterna paradisaea</i>	Arctic Tern	YELLOW	G5	S3B	Confirmed
<i>Cephus grylle</i>	Black Guillemot		G5	S3	Confirmed
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo		G5	S3B	Possible
<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	YELLOW	G5	S2S3B	Probable
<i>Dolichonyx oryzivorus</i>	Bobolink	YELLOW	G5	S3B	Probable
<i>Icterus galbula</i>	Baltimore Oriole		G5	S3B	Possible

Sources: Erskine, A.J., 1992, Atlas of Breeding Birds of the Maritime Provinces. Nimbus Publishing Company and the Nova Scotia Museum.
Nova Scotia Department of Natural Resources.
Atlantic Canada Conservation Data Center.

Thirty-seven species of bird were identified at the Project site during the field program undertaken in early June, 2003; these are identified in Table 3.6. With the exception of a few species that would normally breed on the offshore islands, all were local breeders (their presence at this time of year leads to that conclusion). All species are globally secure (G-ranking) and most are secure at the sub-national level (S-ranking) (see Appendix F). None of the mainland species are listed at the yellow or red levels used by the Province of Nova Scotia; the Common Tern is a yellow-listed species (see Table 3.4), but it breeds on the offshore islands, not on the mainland.²³

Although there were no special techniques used to locate the Black-billed Cuckoos during the June breeding survey, e.g., playback of their calls, the survey was scheduled to ensure that if present they would be heard. Cuckoos are known to arrive late in the season in Nova Scotia. Cuckoos are not readily seen, but during the

²³ The local tern expert, Ted d'Eon, indicated in an interview in August, 2003 that it was an unusual occurrence to see terns in the area of the proposed wind farm site as it is not a foraging area for these birds. He indicated that Common and Arctic Terns do sometimes forage for minnows and herring in the shallow waters at the top of Pubnico Harbour, i.e., 10 to 12 kilometres distant from the site. They are most likely to cross the peninsula on a straight path from The Brothers to these waters, i.e., on a flight path to the north of West Pubnico, not in the vicinity of the proposed wind farm.

breeding season are vocal, and the ornithologist is familiar with their call. Their absence in this area is strongly supported by John Kearney who has not recorded a Black-billed Cuckoo in his 95 birding trips to the site in five years.

Table 3.6: Birds (with their ACCDC and Provincial statuses) Present at the Project Site

<i>Scientific Name</i>	<i>Common Name</i>	<i>ACCDC Ranking</i>	
		<i>G-RANK</i>	<i>S-RANK</i>
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	G5	S5B
<i>Ardea herodias</i>	Great Blue Heron	G5	S5B
<i>Somateria mollissima</i>	Common Eider	G5	S5B,S5M,S5N
<i>Circus cyaneus</i>	Northern Harrier	G5	S5B
<i>Bonasa umbellus</i>	Ruffed Grouse	G5	S5
<i>Catoptrophorus semipalmatus</i>	Willet	G5	S4B
<i>Actitis macularia</i>	Spotted Sandpiper	G5	S5B
<i>Larus argentatus</i>	Herring Gull	G5	S5B,S5N
<i>Larus marinus</i>	Great Black-backed Gull	G5	S5B
<i>Sterna hirundo</i> *	Common Tern	G5	S3B
<i>Zenaidura macroura</i>	Mourning Dove	G5	S5B
<i>Aegolius acadicus</i>	Northern Saw-whet Owl	G5	S4B
<i>Colaptes auratus</i>	Northern Flicker	G5	S5B
<i>Cyanocitta cristata</i>	Blue Jay	G5	S5
<i>Corvus brachyrhynchos</i>	American Crow	G5	S5
<i>Corvus corax</i>	Common Raven	G5	S5
<i>Poecile atricapilla</i>	Black-capped Chickadee	G5	S5
<i>Poecile hudsonica</i>	Boreal Chickadee	G5	S3S4
<i>Catharus ustulatus</i>	Swainson's Thrush	G5	S5B
<i>Catharus guttatus</i>	Hermit Thrush	G5	S5B
<i>Turdus migratorius</i>	American Robin	G5	S5B
<i>Vireo solitarius</i>	Blue-headed Vireo	G5	S5B
<i>Parula americana</i>	Northern Parula	G5	S5B
<i>Dendroica petechia</i>	Yellow Warbler	G5	S5B
<i>Dendroica magnolia</i>	Magnolia Warbler	G5	S5B
<i>Dendroica coronata</i>	Yellow-rumped Warbler	G5	S5B
<i>Dendroica virens</i>	Black-throated Green Warbler	G5	S5B
<i>Mniotilta varia</i>	Black-and-White Warbler	G5	S5B
<i>Setophaga ruticilla</i>	American Redstart	G5	S5B
<i>Geothlypis trichas</i>	Common Yellowthroat	G5	S5B
<i>Passerella iliaca</i>	Fox Sparrow	G5	S4B
<i>Melospiza melodia</i>	Song Sparrow	G5	S5B

<i>Scientific Name</i>	<i>Common Name</i>	<i>ACCDC Ranking</i>	
		<i>G-RANK</i>	<i>S-RANK</i>
<i>Zonotrichia albicollis</i>	White-throated Sparrow	G5	S5B, SZN
<i>Junco hyemalis</i>	Dark-eyed Junco	G5	S5
<i>Quiscalus quiscula</i>	Common Grackle	G5	S5B
<i>Carpodacus purpureus</i>	Purple Finch	G5	S5B
<i>Carduelis tristis</i>	American Goldfinch	G5	S5

*The Common Tern is listed as Yellow by the Department of Natural Resources; all other species in this list are Green.

Although Erskine (1992) shows 92 species of birds breeding, or suspected to breed, in the 100 square kilometre area in which the study site is located, 37 species were recorded during the survey. The study site comprises less than 4% of the 100 square kilometres, and shows very little habitat diversity, so the much lower number of breeding species documented in the survey is not at all surprising.

Discussions with personnel at the Canadian Wildlife Service indicate that there are no known species of concern at the study site. The tern colonies on the offshore islands are of recognized importance. The islands where the terns breed are 2.5 km offshore and will not be directly impacted. Although terns will occasionally fly over the peninsula as indicated above, their vision is extremely good and they are not likely to have their attention diverted by prey, since they do not forage over land. This is in contrast to hawks which hunt over land, and could therefore miss seeing the rotor blades because their focus has shifted to foraging. Consultations²⁴ with the Nova Scotia Department of Natural Resources, indicated they were currently unaware of any nesting raptors, or other species of concern under Provincial jurisdiction in, or within many kilometres of, the study site. This has subsequently been confirmed by two birders familiar with the proposed site.²⁵

In addition to those species of special concern known or suspected to breed in the region, some 84 other species known or suspected to breed in the area, which includes the coast and islands, many of which are located in a 10-15 km radius of the proposed site. Since 1966, several Breeding Bird Surveys have been undertaken in this general area though no such work was done in the period from 1983 to 1990. Examination of the records for the last 10 years in the region indicates superficial declines in the following species:

- the Great Blue Heron;
- the Tree Swallow (*Tachycineta bicolor*);
- the Bank Swallow (*Riparia riparia*); and
- the Barn Swallow (*Hirundo rustica*).

The Canadian Wildlife Service has indicated that they have records of Harlequin Ducks occurring at West Pubnico, some 5.5 km to the north of the site, and at St. John Island.²⁶ Under the *Species at Risk Act*,

²⁴ Personal communication, Peter MacDonald, Regional Biologist, Nova Scotia Department of Natural Resources, June, 2003.

²⁵ Personal communications, John Kearney and Raymond d'Entremont, August, 2003.

²⁶ Observation received from Canada Wildlife Service dated August 11, 2003. The study team was unable to confirm or access the referenced records. It is assumed that the St. John Island referenced is in fact Johns Island, an island at the mouth of Pubnico Harbour. Local birders could not confirm sightings of Harlequin Ducks at either West Pubnico or Johns Island. See also 3.1 and footnote #18.

Harlequin Ducks are considered to be of special concern within their range, i.e., a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats. Provincially, the Harlequin Duck has been listed since 2000 on the Wildlife Species Protected under the *Endangered Species Act*.²⁷ The species winters on rocky shores in the Atlantic Region and moves inland in the spring to breed along fast flowing turbulent rivers. Neither the proposed site nor the waters of Pubnico Harbour, however, present typical habitat for the Harlequin Duck.

The breeding species of greatest local concern in the region is the Roseate Tern (*Sterna dougallii*). This species, which is secure globally, is rare throughout its range in Nova Scotia. It has been confirmed that the Roseate Tern is breeding on The Brothers approximately 4 km distant from the proposed project site. In 2003 there were a record 90 nests on the islands. The study team has been told that it is extremely rare to see a Roseate Tern anywhere in the vicinity of Pubnico Harbour.²⁸ It is not clear where the Roseate Terns forage, but it is thought to be either further out to sea or further to the west in the vicinity of the Tusket Islands.

Ducks that are known to winter in the area, i.e., in the vicinity of the site and Pubnico Harbour, include: American Black Duck, Greater Scaup (*Aythya marila*), Common Eider (*Somateria mollissima*), Common Goldeneye (*Bucephala clangula*) and Bufflehead (*Bucephala albeola*); rarely does one see any of these birds flying overland, especially in winter. Other species known to winter in the area include the Common Loon (*Gavia immer*), Red-necked Grebe (*Podiceps grisegena*) (both exceedingly rare over land in winter); and the following gulls: Iceland (*Larus glaucoides*), Black-headed (*Larus ridibundus*), Glaucous (*Larus hyperboreus*), and Bonaparte's (*Larus philadelphia*).²⁹

Over and above the birds that breed or winter in the area, concern has been expressed by the federal and provincial authorities consulted about the species that may migrate through or across the proposed wind farm site. Given the importance of the Atlantic coastline as a migratory bird flyway, this is a legitimate concern. The proponent is also aware that migratory birds, their eggs, nests and young are protected under the *Migratory Birds Convention Act* and associated regulations and that any activity which is shown to significantly affect migratory birds requires a permit from Environment Canada. Based on the information that has been compiled, including the observations from several birders who are familiar with the area, the site is not a recognized foraging or stopping area on the principle flight paths. Pubnico Point may on occasion be the first landfall for migrating passerines, but it is not considered a migratory bird flyway comparable to that over either Brier Island or the Tusket Islands (Ted d'Eon, personal communication, August 2003).

As indicated in Section 1.6.2, the study team's ornithologist circulated an e-mail to the birding fraternity via NatureNS in the province in an effort to elicit whatever information was available with respect to the site and surroundings as both bird habitat and relevance to migratory patterns. Responses were received from two parties who had knowledge either of the site or the general area. One respondent, John Kearney, a naturalist and anthropologist at the Coady International Institute at St. Francis Xavier University lived approximately 2 km from the site in the 1990s, and has records of 95 birding visits to Pubnico Point. He suggested the study

²⁷ The following description is provided: "Less than 250 Harlequin Ducks winter on the coast of Nova Scotia. The eastern sub-species which occurs here, has declined. Little is known about it other than it breeds along rivers in Labrador and Newfoundland. This species is at risk because of its small population size and other factors including illegal hunting and oil spills." (DNR <http://www.gov.ns.ca/natr/WILDLIFE/endngrd/specieslist.htm>).

²⁸ Personal communication, Ted d'Eon, acknowledged expert on The Brothers Roseate Tern colony, August, 2003.

²⁹ Personal communication, Raymond d'Entremont, August, 2003.

team contact Raymond d’Entremont who has lived on Pubnico Point his entire life and has birding records for the area since 1979. A second, Ian McLaren, Professor Emeritus, Dalhousie University, also responded.

Based on the information received, the area is neither a "birding hotspot", nor a significant area for shorebirds. Both Kearney and d’Entremont indicated that the best time to see birds in the area, as would be common to much of southwest Nova Scotia, would be during the spring and fall migrations. At daylight in the spring, Kearney indicated that songbirds could regularly be seen on the shores and foraging over the seaweed. After 8:00 a.m., he would find them resting and foraging in the further reaches of Pubnico Harbour, i.e., north of the proposed site. d’Entremont indicated that birds spend more time in the area during the fall as opposed to the spring migration as they prepare for their flight south. Compared to other locations in southern Nova Scotia recorded as hosting substantial migrations during either or both the spring or fall seasons, the southernmost reaches of Pubnico Point accommodate an increased number of birds at these times of year, as might be expected, given the location, but not vast numbers that warrant specific note.

Although he often saw eiders and gulls, and occasionally in August Semiplumbed Sand Pipers (*Calidris pusilla*), Kearney does not consider the area of the proposed windfarm significant for shorebirds. This would appear to be a view shared by both d’Entremont and McLaren. The former indicated that he had seen sandpipers at the salt marsh some 5 km up Pubnico Harbour on their migration south, but not at the site itself. McLaren indicated that the point was not good shorebird habitat.

Neither Kearney nor d’Entremont considered raptors frequent visitors to Pubnico Point. The latter indicated that raptors sometimes move through the area during the passerine migration, and he has seen Sharp-shinned, Hawks (*Accipiter striatus*), Merlins (*Falco columbarius*), American kestrels (*Falco sparverius*) and Red-tailed Hawks (*Buteo jamaicensis*) in the general area. Peregrine Falcons (*Falco peregrinus*) are, however, rarely seen.

Because of the concern with respect to bird migrations and the presence within 5 km of the Project site of a breeding colony of Roseate terns, birds have been identified as a VEC.

3.2.6 Herptiles

Gilhen (1984) lists no species of amphibians and reptiles known to the study area, though the more up to date herptological atlas documents nine species. The herptological survey turned up five species, all of which have been documented in the area before (Table 3.7) and are ranked at green on the provincial scale. A conversation with local residents suggested the presence of “a big turtle in the pond,” which likely refers to Snapping Turtles (*Chelydra serpentina*); none, however, were found despite a rigorous search of all standing water. Although the study area had excellent habitat for the yellow-listed, Four-toed Salamander (*Hemidactylium scutatum*), and one occurrence is recorded in the NS Herptological Atlas database, none were found despite a directed search for this species.

Based on the research and fieldwork undertaken, no rare or endangered herptiles have been found on site.

Table 3.7: Amphibians Present at the Project Site

<i>Scientific Name</i>	<i>Common Name</i>	<i>ACCDC Ranking</i>	
		<i>G-RANK</i>	<i>S-RANK</i>

<i>Scientific Name</i>	<i>Common Name</i>	<i>ACCDC Ranking</i>	
		<i>G-RANK</i>	<i>S-RANK</i>
<i>Plethodon cinereus</i>	Redback Salamander	G5	S5
<i>Bufo americanus</i>	American Toad	G5	S5
<i>Pseudacris crucifer</i>	Spring Peeper	G5	S5
<i>Rana clamitans</i>	Green Frog	G5	S5
<i>Rana sylvatica</i>	Wood Frog	G5	S5

3.2.7 Bats

Bats belong within the order *Chiroptero* and the family *Vespertilionidae*. They are small mammals, generally weighing less than one kilogram, and the only mammals capable of sustained flight. As detailed in Table 3.8, Nova Scotia is home to six native species of bats.

Table 3.8: Native Bats Species of Nova Scotia

<i>Scientific Name</i>	<i>Common Name</i>	<i>Distribution with in Nova Scotia</i>	<i>Seasonal Activity</i>	<i>COSEWIC Status History</i>	<i>NSDNR Status</i>	<i>ACCDC Ranking</i>		
						<i>G-Rank</i>	<i>N-Rank</i>	<i>S-Rank</i>
<i>Myotis lucifugus</i>	Little Brown Bat	Common throughout	Hibernator	Native	YELLOW*	G5	N5	S4
<i>Myotis septentrionalis</i>	Long-eared Bat	Uncommon throughout	Hibernator	Native	YELLOW	G4	N4	S2
<i>Pipistrellus subflavus</i>	Eastern Pipistrelle	Uncommon to rare, western mainland	Hibernator	Native	YELLOW	G5	N4 N5	S1?
<i>Lasionycteris noctivagans</i>	Silver-haired Bat	One record, southwest Nova Scotia	Probably Migratory/ Hibernator	Native	YELLOW	G5	N5	S1?
<i>Lariurus borealis</i>	Red Bat	Rare, probably widespread	Migratory/ Hibernator	Native	YELLOW	G5	N4 N5	S2?
<i>Lasiurus cinereus</i>	Hoary Bat	Uncommon throughout	Migratory/ Hibernator	Native	YELLOW	G5	N5	S2?

Source: Natural History Guide of Nova Scotia, Volume 1: Topics

Nova Scotia Department of Natural Resources. 2003. General Status Ranks of Wild Species in Nova Scotia.

*Sensitive to human activity or natural events.

The nocturnal habits and flying abilities of bats make them difficult to study leading to a general lack of available information. Bats use daytime roosts between nightly feeding excursions. Some species roost in caves, rock crevices, between shingles on buildings, or even in houses, while others roost in trees. They generally forage within 3-4 kms of their roosting areas. All of Nova Scotia's bats feed on insects, primarily moths and night flying beetles, but they are highly opportunistic and will prey on any available insects including mosquitos and blackflies. Many species are important as pollinators and seed dispensers; many provide natural insect control.

Three of the six the provincial bat species, i.e., the Red Bat, the Hoary Bat and the Silver Haired Bat, are known to migrate south each fall, while the others hibernate locally.³⁰ They are thought to follow similar migration routes as birds, but little study has been done to confirm this theory. The three bat species that are known to over-winter in Nova Scotia utilise caves and abandoned mines, and the most suitable cave habitats for bat hibernation are found in the provinces interior and in the Cape Breton lowlands. The following paragraphs identify the primary characteristics of the bats found in the province.

Little Brown Bat

The most common bat in the province is the Little Brown Bat. These are typically cave or house dwellers and can form large colonies. The provincial population is estimated at approximately 300,000 individuals. The largest known hibernaculum is Hayes Cave (South Maitland, Hants County) where in 1997 there were estimated to be approximately 9,000 individuals. A smaller colony (c.3000 bats) has been identified at an abandoned gold mine at Lake Charlotte, Halifax County. There are approximately 10 other known hibernaculae containing a few hundred or fewer individuals, but none are located on or near the project site.

Long-Eared Bat

The Long-eared Bat is considered uncommon and solitary, with usually only a few in any one hibernaculum. One known hibernating colony has been located in Dutch Settlement, Halifax County. This species is most often found summering in dense forest stands and raising their young beneath exfoliating tree bark and in tree cavities.

Eastern Pipistrelle

According to Bat Conservation International Inc, the Eastern Pipistrelle is one of the most common bat species found throughout the eastern forest and south to South America. Although the eastern pipistrelle is considered uncommon in Nova Scotia, with only one confirmed sighting in the province in 1965, a local bat enthusiast has stated that a few individuals are usually present at any hibernaculum he has visited (Moseley 1997). The Eastern Pipistrelle is sensitive to cold temperatures and is thought to hibernate from early fall to late spring. In summer, they are believed to roost in tree foliage or in high tree cavities and crevices, feeding near edge habitats and areas of mixed agricultural uses.

Silver-Haired Bat

The Silver-haired Bat is also a forest roosting bat, especially in areas of old growth forest. They feed predominately in disturbed areas, sometimes at the tree tops, but more often in clearings, along roadsides and watercourses. They migrate south in the fall to hibernate in forested areas, or occasionally in the entrances to caves.

Red Bat

The Red Bat is considered a “tree bat” preferring to roost in the open, under the foliage of deciduous and evergreen trees. They typically feed along forest edges, clearings and around streetlights. Red Bats are

³⁰ Dr. Hugh Broders, Bat Biologist at St. Mary’s University, worked for a short time on what is a migratory route for birds off Briar Island. They expected to find large numbers of bats, but did not. He did not think breeding or hibernating bats at the project site would be a concern given the poor habitat that it offers (personal communication, August, 2003). Andrew Hebda, Curator of Zoology at the NS Museum, agreed with this conclusion (personal communication, August, 2003).

generally solitary and come together only to mate in the spring or to migrate in the fall. These long-distance migrations are thought to follow the same migratory routes along the Atlantic seaboard as many birds.

Hoary Bat

The Hoary Bat is Nova Scotia's largest bat. It roosts in trees. It migrates in the fall and is capable of hibernating in the open on tree trunks, well camouflaged by its grey, grizzled hair.

Consideration of the Theme Regions, particularly subareas 510-560 and 410, 420 and 430 which have been identified as areas with the potential for cave habitats suitable for bats, suggests that the Project site is not ideal territory for bats. The ornithologist saw no evidence of bats on site during the execution of his field program, and Andrew Hebda, Curator of Zoology at the Nova Scotia Museum of Natural History, did not consider the Pubnico Point area likely to provide productive bat foraging or roosting habitat (Personal communication, August, 2003). This is not to say that there are no bats in the area. Indeed, local residents have indicated that Little Brown Bats are present in the area. Based on their preferred habitat, however, the lack of caves, the stunted natural vegetation and coastal environment, there is no evidence to suggest that the study site is of special value to bats.

3.2.8 Noise

The proposed site has ambient noise levels consistent with a rural environment. Apart from wind, birds, herptiles and the sounds associated with the passage of boats in Pubnico Harbour, the only man-made sounds that would currently be heard on site would be the noise generated by ATVs.

3.3 Marine Environment

Pubnico Harbour is a South-to-North oriented arm of the sea that extends approximately 14 km inland on the western coast of Nova Scotia. Portions of its inland reaches are shallow and characterized by extensive intertidal salt marshes. The lower (southern) reaches, including the shores in proximity to the Project site are rocky and exposed to the weather and waves of the Gulf of Maine. Several small streams, Welchards Brook, Bog Brook, Deadhorse Brook and Long Savannah, empty into Pubnico Harbour; there is no large river draining into the harbour that collects water from an extensive watershed or facilitates salmonoid migration inland.

The surrounding land is largely a thin mantle of glacial till underlain by Precambrian quartzites and slates (Loring et al, 1996). The tidal range in Pubnico Harbour is 2.9 m (mean) and 4.1 (large) with a tidal current of 0.13 m/s (mean) to 0.20 m/s (peak) (Gregory et al 1993). Storm berms of weathered cobble on both the east and west and east margins of the mouth of the harbour indicate that the area has been exposed to sporadic, high energy events during the Holocene period.

The harbour itself is deep and wide with plenty of room for vessels to move safely around each other. The harbour channel is approximately 370 metres wide and about 22 metres deep. The sides of the channel rise to a shelf which is approximately 7 metres deep, becoming progressively shallower towards the shorelines.

3.3.1 Physical Characteristics of Pubnico Harbour Bottom

A sediment survey in the early 1990's by Loring et al (1996) revealed similar grain size characteristics throughout Pubnico Harbour, indicating homogeneous tidal velocities in the steep-sided inlet. Typical modal

diameters for sediments were less than 64 microns, and the spectra indicated continuous, low-energy sorting punctuated by sporadic, high-energy events. Coarse material is present in the channel, and an increase in settled flocculant material is evident at the outermost stations, near the proposed cable placement. This is due to the broadening of the Inlet at the mouth, leading to decreased mean tidal current speeds.

A borehole and diver survey of the route of the proposed crossing was undertaken in March, 2003 indicates that for the first 1.5 m the seabed is composed primarily of fine gravel with silt. There are some isolated areas of cobbles, boulders and rock outcrops, but the preferred channel appears to be free of outcrops (see Section 2.2.2).

3.3.2 Marine Plants

The rocky intertidal zone at the site of the cable entry on the east side of Pubnico Harbour is dominated by exposed bedrock (igneous and metamorphic rocks dominated by schists), weather-rounded boulders and storm-deposited cobble (see Appendix C). The biotic communities of the intertidal zone are dominated by macroalgae (*Ascophyllum nodosum*, *Fucus vesiculosus*, *F. spiralis* and *F. serratus*) attached to boulders, cobble and bedrock outcrop; ranging from 60% cover at the top of the zone to 70-100% in the lower intertidal. In the lower intertidal, attached to hard substrata are juvenile sporophytes of kelp (*Laminaria longicuris* and *L. digitata*), Irish Moss (*Chondris crispis*) and various other algae. Substantial accumulations of large drift kelp are trapped in the lower portions of the eulittoral zone (these are derived from proximal, subtidal assemblages of macro-algae in growth position). Areas between the hard substratum in the lower eulittoral and shallow subtidal zones have accumulations of sand and mud that support sparse beds of seagrass (*Zostera marina*). The presence of this angiosperm in the habitat adds an unusual component to the rocky littoral environment.

In the subtidal areas close to shore are dense beds of both *L. longicuris* and *L. digitata*. Both species usually occur in deeper waters at other sites in the province. Perhaps because the waters of Pubnico Harbour are so turbid, the depth range of the subtidal plants is truncated and displaced upward (A.R.O Chapman personal communication). The coastal waters around Pubnico are nutrient-rich due to local upwelling and tidal mixing (Gagne 1981). Because of this, and the relative protection of the site from ocean swell, subtidal plants from this area are large and fast-growing (A.R.O Chapman personal communication).

Overall, this is a diverse, topographically complex marine habitat supporting a diverse and dense assemblage of marine plants, which in turn provides habitat to many invertebrate species.

On the eastern side of Pubnico Harbour where the proposed cable enters the channel, the intertidal zone differs from that on the western side in both profile and substratum (see Appendix C). The upper littoral environment has been modified by anthropogenic armoring of the coastline, presumably to protect the beach and navigation mark installation. The substratum is largely storm-deposited cobble overlying sand deposits. The intertidal algal zone has a very low proportional cover of bedrock outcrop, a high cover of unconsolidated sediment (coarse sands), a low cover of *Ascophyllum nodosum* and *Fucus spp.* and a high cover of *Enteromorpha* and *Phyllophora spp.* on hard substrata. Immediately offshore, *Laminaria spp.* and *Ascophyllum nodosum* plants are visible at low tide, breaking the surface. This habitat is considerably less diverse and species-rich than that on the west side of the harbour.

3.3.3 Marine Invertebrates

The sessile animal communities in the rocky intertidal area on the west side of Pubnico Harbour constitute a rich benthic assemblage typical of the more diverse sections of the Atlantic coast of Nova Scotia, including barnacles, mussels and littorinid snails (*Balanus balanoides*, *Mytilus edulis* and *Littorina littorea*) on hard substrata. Also present on hard substrata and on the macro-algal fronds are spirorbid worms. Dense populations of Hermit Crabs are evident in the intertidal, but other crabs are remarkably scarce. In areas of sand and sandy mud infaunal polychaetes (*Arenicola spp.* and *Nereis spp.*) are abundant. Periwinkles (*Littorina littorea*) are very abundant in the intertidal, as are predatory gastropods such as *Thais lapillus* (See Appendix C).

In the shallow subtidal areas of Pubnico Harbour, abundant populations of the Slipper Limpet (*Crepidula fornicata*) and the large Moon Snail (*Euspira heros*) are common. No Sea Urchins (*Strongylocentrotus droebachiensis*) were sighted in the shallow subtidal, which is unusual for this habitat in Nova Scotia (W.G. Wharton personal communication). The species is susceptible to periodic die-backs due to pathogenic disease associated with warm water events (Scheibling 1998), and it may be that their absence is temporary (G. Wharton personal communication).

Overall, the western side of the cable alignment constitutes a diverse marine habitat of complex topography and tidal pools that support a rich assemblage of invertebrates sustained by ample supplies of benthic algal shelter and food produced *in situ* and delivered in the form of drift algae. The presence of Seagrass on soft substratum adds to the biodiversity of the locale.

Pubnico Harbour supports a large and lucrative fishery for the American Lobster (*Homarus americanus*) that extends well outside the confines of the harbour (i.e., the harbour is home port to a lobster fishing fleet that fishes far beyond the harbour area). There is also a small crab fishery, targeting Rock Crab (*Cancer irroratus*) and Jonah Crab (*Cancer borealis*), but also taking small numbers of Green Crab (*Carcinus maenas*) and Toad Crab (*Hyas araneus*) (B. Emin personal communication).

3.3.4 Fish

Pubnico Harbour provides habitat for various species of marine fish of the continental shelf including Haddock (*Melanogrammus aeglefinus*), Pollock (*Theragra chalcogramma*), Cod (*Gadus morhua*), Herring (*Clupea harengus*), Mackerel (*Scomber scombrus*) and Flounder (*Pleuronectes americanus*).

Other fish species that are known to migrate into Pubnico Harbour include Gaspereau, Striped Bass, Trout, Eel and Smelt.

Gaspereau (*Alosa pseudoharengus*) is a catadromus species that enters the rivers of Nova Scotia to spawn between April and June. During that period it is more common in Pubnico Harbour than at other times of the year. In the past, significant commercial fisheries have occurred in the nearby Tusket River (Leim & Scott, 1968). Pubnico Harbour is not a significant spawning area for this species, although individual schools occasionally feed within the harbour (J. LeBlanc personal communication).

Striped Bass (*Morone saxatilis*) sustain a small recreational fishery in Pubnico Harbour (G. Stevens, personal communication). This species is anadromous and largely coastal in its distribution. In early spring larger fish

migrate along the coast from south to north, and then back from north to south in December. Fish that are less than two years old do not migrate (Leim & Scott, 1966). Spawning takes place in larger rivers in early June.

Both Speckled (brook) Trout (*Salvelinus fontinalis*) and Brown Trout (*Salmo trutta*) occur in Pubnico Harbour (G. Stevens, personal communication). Speckled Trout are native to Nova Scotia and are a favourite species for recreational anglers. This species occurs largely in freshwater, but moves into the saltwater estuaries and coastal areas in response to increasing temperatures or crowding in rivers and streams (Leim & Scott, 1966). Some stocks overwinter in saltwater, but stay within the region of their freshwater habitat. The Brown Trout is a native of northern Europe, and has been successfully introduced to North America. The Speckled Trout are more abundant than the Brown Trout in Pubnico Harbour, and both species undergo a localized migration (less than 2 nautical miles seaward). Both Speckled and Brown Trout overwinter in Pubnico Harbour, but populations are sparse (G. Stevens personal communication).

Eels enter the harbour in two distinct migrations: the first between April and June (elvers returning to freshwater) and the second from September to November (mature adults returning to the sea) (Leim & Scott, 1966). The eels are caught commercially near the foot of the harbour (Public Works and Government Services Canada, 2003). Eels are catadromous, living in freshwater and returning to the sea to breed.

Pubnico Harbour is one of the three most significant recreational fishing areas for smelt in Nova Scotia. Smelt enter the harbour near the end of December and leave in March, after spawning. The fishery takes place through the winter ice in the upper reaches of the estuary. The area of the proposed cable crossing is ice-free during the winter, and is not an area where smelt are fished.

3.3.5 Marine Mammals

There are 21 species of whales, dolphins and porpoises and six species of seals that occur in the waters around Nova Scotia. The number and variety of marine mammals in near shore waters increases during the spring and summer (Davis & Browne, 1996). Fin Whales (*Balaenoptera physalus*) and Harbour Porpoises (*Phocoena phocoena*) frequent inshore areas (including waters off Pubnico Harbour, but not within the harbour confines according to local fishers), feeding on Herring. The most common marine mammals stranded on Nova Scotian shores are the Minke Whale (*Balaenoptera acuterostrata*), the Pilot Whale (*Globicephala meleana*), the Atlantic White-sided Dolphin (*Lagenorhynchus albirostris*) and the Harbour Porpoise (Marine Animal Response Society, 2003). Although these mammals have not been seen by the local fishers within Pubnico harbour, they are known to occur in the waters of the approaches to the Bay of Fundy, outside the harbour.³¹ The harbour itself is frequented by Harbour Seals (*Phoca vitulina*).

3.4 Atmospheric Environment

3.4.1 Climate

Southwest Nova Scotia is dominated by a circumpolar westerly airflow, common to this mid-latitude area of North America. The prevailing westerlies (see Figure 2.3) are responsible for bringing air from the interior of the continent to the Atlantic Region. Conflicting air masses, which can originate in the Arctic or the Gulf of Mexico, cause migratory low pressure systems that result in more storm events in the Atlantic provinces than

³¹ The Yarmouth County Coastal Resources Mapping Project indicates that harbour porpoises have been in the waters off the coast of Pubnico Point, not in the harbour itself.

in any other part of the country. The regional climate is classified as a modified continental type. A continental climate is typically characterized by a wide range in temperature, whereas a maritime climate is characterized by a reduced temperature range because the ocean supplies heat in the winter and provides cooling in the summer.

The surface climate of the study area is dependent on these air streams and their fronts. Cold Arctic air masses predominate in the winter and cooled tropical air causes stratified cloud and extensive fog banks, formed as moist warm air moves over the cooler surface, in spring and summer, July is the peak fog month with haze/fog events approximately 71% of the time. The mean total precipitation is highest in the winter months, with 60% of days in November through March having precipitation. The lowest precipitation occurs in the summer months, i.e., July through September.

3.4.2 Air Quality

Air quality in any region is influenced by the concentrations of air contaminants in the atmosphere. Air contaminants are emitted by both natural and anthropogenic sources. Contaminants released into the atmosphere by these sources are transported, dispersed, or concentrated by meteorological and topographical conditions. As a result of contaminants released to the atmosphere elsewhere in North America and the dominance of the westerly air stream, the study region, as is all of eastern Canada, is subject to the long distance deposition of contamination. However, as there are few, if any, existing developments and industries contributing to pollutant levels in the region, there are at present no air quality concerns in this part on Nova Scotia.

3.5 Socio-economic Environment

3.5.1 Key Settlements and Local Population Trends

The study area is located in the Municipality of the District of Argyle on the eastern coast of Yarmouth County. The population of the district in 2001 was 8,688; this represents a decline of 2.9% from the 1996 census data. The municipality comprises 3,751 private households on a land area of 1,518.57 sq. km., which results in a density of 5.7 residences per sq. km. This is a rural part of the province with a dispersed settlement pattern that is largely located in small communities in proximity to the coast.

Argyle has strong cultural and traditional ties to the Acadian and Loyalist settlers who, for many generations, have lived and fished the productive Lobster Bay and Gulf of Maine waters. The Municipal Planning Strategy for the Municipality indicates that West Pubnico (comprising Upper West Pubnico, West Pubnico, Middle West Pubnico and Lower West Pubnico) is the focal point of social and economic activity within the area; this community has a current population of approximately 1,890. There are, however, seven Pubnicos in the area that date from the mid-17th century making them among the oldest European settlements in Canada and the oldest Acadian settlements in the world.

3.5.2 Existing Land Use and Economic Activity

The closest properties to the Project site are at the end of the paved road approximately 300 m distant from the northern boundary of the proposed site. There are three residential properties in this location, but only two are currently occupied. Local kids have recently built an illegal “camp” on a site called Melford’s Field. The camp is a small, but a well-built temporary structure serviced by a generator. It is visible from the site

where the cables are expected to come to shore, but will not be directly impacted by the project. There is an abandoned quarry located on the project site close to Route 335 (see Figure 2.2). This facility has not been worked for some time, although a local company continues to collect previously blasted materials. Other uses on and adjacent to the site include hiking, ATVing, hunting and trapping (hare, muskrat and deer). There are no commercial agricultural or forestry activities on the site. There are no designated trails to or on the site; users walk on the road, the paths created by the ATVs and along survey cuts.

The fishery is the primary economic driver for the communities on either side of Pubnico Harbour. As stated in a recent edition of “Coastal Community News”, “the fisheries here are booming with many small fish plants, boat-building enterprises, and other marine related operations all looking very busy.” (Milsom, 2003). The service and administrative sectors also generate local employment. Tourism is not an employment mainstay, but is becoming more important. The peninsula was settled in the mid 17th century by the French, and the area around West Pubnico is the location of the oldest Acadian settlement in Nova Scotia. With the Musée Acadien and the development of Le Village Historique Acadien,³² the community of West Pubnico is the emerging centre of tourism on the peninsula. The golf course and the community’s proximity to the waters of the Upper Harbour, which can be explored by sea kayak, add to the attractions. Few visitors to the area, however, venture to the point. In total, there are some 20-30 bed spaces to accommodate visitors within a 15 km radius of the Project site. Visitors to the peninsula consist of those who have family roots or an Acadian interest in the area, those who are en route to or from Yarmouth and those who return to enjoy the quiet and beauty of the area.

3.5.3 Commercial and Recreational Fishery

Fishing is the primary economic activity in the Municipality of the District of Argyle. The waters in southwest Nova Scotia including Lobster Bay and the Gulf of Maine support a rich nearshore and offshore fishery. Pubnico Harbour is located in the NAFO Area 4Xo and in Lobster Fishing District 34. Within Pubnico Harbour there are three working commercial wharfs: Dennis Point, Lower East Pubnico and Charlesville. Dennis Point in West Pubnico is the largest and the homeport for approximately 110 vessels 40 feet in length or greater. Additional wharfage is proposed for Dennis Point, and dredging for its construction is underway. Disposal of the dredged sediment associated with the construction of the new wharf space will take place outside the harbour. The wharf at Lower East Pubnico is home to approximately 30 vessels, and the wharf at Charlesville primarily serves Charlesville Fisheries.

The traditional fishery in the waters off Pubnico Point is the lucrative inshore lobster fishery, making the Lower West Pubnico fishery, one of the most valuable in Atlantic Canada. Opening season catches can be as high as 10,000 pounds per day. The season runs from the last Monday of November to May 31 each year. Although some lobster traps are set within the harbour, most fishing occurs in the waters outside Pubnico Harbour. Approximately 75 lobster boats of 44’ 11” berth in Pubnico Harbour at the Dennis Point wharf. The average vessel draws 5-6’ of water.

Although, the principle commercial catch is lobster, groundfish activities are also important to the local economy. Groundfish are fished in the waters off southwest Nova Scotia year round. Approximately 25 groundfish draggers, ranging in length from 45-65’ berth in Pubnico Harbour. A 58’ groundfish vessel draws approximately 10’ of water. Herring is fished primarily from May to October. The 10 herring seiners/

³² Le Village Historique Acadien is a project that is involving the construction, restoration and preservation of Acadian Village buildings of the 1800s. It became part of the Nova Scotia Museum Complex in 2003.

offshore scallop vessels are the largest vessels that berth in Pubnico Harbour. They range for 70 to 110' in length and draw about 14' of water. When fishing, the boats normally leave port at dusk and work through the night to return to port before dawn. Tuna is fished commercially in the waters off Pubnico Point and beyond from July to October.

During the summer months, approximately 10 skiffs collect rock weed (*Fucus spp*) in the northeastern part of the harbour for subsequent processing into caragreen for a variety of products including fertilizer and fish meal.³³ A rock weed skiff, loaded down with 4 tonnes of harvest, will draw about 3 feet. Irish Moss is not harvested in the harbour, but is grown in onshore tanks by Acadia Sea Plants in Charlesville.

Other species caught commercially in and in the vicinity of Pubnico Harbour include eels which are caught commercially at the foot of the harbour.

The inshore waters are also increasingly being leased for aquaculture. The Aquaculture Division lease/licensing registrar of the NS Department of Agriculture and Fisheries identifies six locations in Pubnico Harbour where licenses have been given for aquaculture production. Three sites are considered to be active; these are: 0739, 0955 and 1031 (the latter includes the expansion 1031X). Lease holders have exclusive water rights within their lease boundaries regardless if the site is active or not. Table 3.9 provides further information on the aquaculture sites and Figure 3.1 identifies the sites in relation to the proposed submarine cable corridor.

Table 3.9: Licensed Aquaculture Sites in Pubnico Harbour

<i>NS License Number</i>	<i>Approximate Centre Coordinate</i>	<i>Area in Hectares</i>	<i>Species</i>	<i>Site Status</i>
1031	43.660733N, 65.777317W	26.27	Blue Mussels (<i>Mytilus edulis</i>)	Active
1031X (Expansion)	43.6625N, 65.777167W	62.50	Blue Mussels	Proposed
0739	43.651992N, 65.774686W	35.00	American Oyster (<i>Crassostrea virginica</i>), European Oyster (<i>Ostrea edulis</i>), Blue Mussels, Sea Scallops (<i>Placopecten magellanicus</i>), Bay Quahog (<i>Mercenaria mercenaria</i>), Cod	Active
1054	43.636167N, 65.778667W	7.57	American Oyster, European Oyster, Blue Mussels	Issued
0955	43.606667N, 65.784W	4.28	Steelhead Salmon (<i>Salmo salar</i>)	Active
0837	43.595833N, 65.7935W	2.59	Atlantic Salmon, Steelhead Salmon	Issued

³³ Approximately 10 rockweed harvesters work within the harbour as is required by their license. The season is open year round, but such harvesting is generally considered a summer job (June to October) since the harvesters are lobster fishermen during the balance of the year. According to two harvesters consulted, they harvest approximately 4 tons of rock weed a day and up to 600 tons per season. It is sold to Acadia Sea Plants in Charlesville for processing.

<i>NS License Number</i>	<i>Approximate Centre Coordinate</i>	<i>Area in Hectares</i>	<i>Species</i>	<i>Site Status</i>
0840	43.591333N, 65.798W	2.59	Atlantic Salmon, Steelhead Salmon	Issued

Although license number 0955 is considered active according to the provincial aquaculture registrar, the site is not currently in use. The owner, Ocean Trout Farms Ltd., does not anticipate raising fish at this location for at least two years, nor do they have concern about the proposed submarine cables corridor which would be approximately 1 kilometre away (Garnet, personal communication 2003).

The harbour is also used for recreation. A small floating dock at Dennis Point, provides a safe anchorage for small pleasure craft during the summer months, and the waters at the north of the harbour provide opportunities for kayakers. Recreational fishing in the immediate area includes the fishing of Bluefish (*Pomatomus saltatrix*) and Mackerel off local wharves and the fishing of smelt in winter in the upper reaches of the harbour. In past years, a Bluefish tournament has been organized off the Dennis Point Wharf, but this tournament did not take place in 2003.

There are at least 14 fish processing facilities located within the harbour, processing lobster, crab, scallops, finfish, groundfish and rock weed. These are:

- Acadian Fish Processors Ltd., Lwr West Pubnico;
- De La Tour;
- Little Island Fisheries;
- Comeau Seafood (Sealife Division), Middle East Pubnico;
- Charlesville Fisheries Ltd., Lwr East Pubnico;
- D'Eon Fisheries Limited, General Delivery, Pubnico;
- East Side Fisheries Ltd., General Delivery, Pubnico;
- I C Fish Smokers., Lower West Pubnico;
- Martine Marie Fisheries Ltd., Middle Pubnico General Delivery, Middle West Pubnico;
- Pubnico Ledge Fisheries Ltd., Lwr West Pubnico;
- R J M Fisheries Ltd., Middle East Pubnico;
- Skipper Fisheries Ltd., General Delivery, Pubnico;
- Inshore Fisheries Limited, General Delivery, Pubnico; and
- W S Fisheries Ltd., General Delivery, Pubnico.

Three boat building yards operate in Pubnico Harbour; they test and sail vessels from their own marine slipways. They are:

- Belliveau R. Contracting & Boat Building Ltd. Pubnico;
- D'Eon Boatbuilding Ltd., Middle West Pubnico; and
- James D'Entremont Boat Builders, Pubnico.

As indicated in Section 3.5.2, the fisheries in the communities around Pubnico Harbour are booming. Commercial and recreational fishing do take place in the harbour, but the greater part of the commercial fishery relies on safe access through the harbour to the open sea. The maintenance of unimpeded safe navigation is therefore of critical importance to this sector.

Consultations with the Harbour Master at Dennis Point and local fishermen, including those that set lobster traps in the vicinity of the proposed submarine cable, have indicated that its installation and presence should cause no interference with the fishery (see also Section 3.5.1). As indicated in Section 2.2.2, there will at no time be an exclusion zone imposed at or in the vicinity of the proposed cable corridor.

3.5.4 Cultural Resources

The history of human occupation of Nova Scotia has been retraced back to 11,000 years ago. The earliest inhabitants have been named by archaeologists as the Palaeo-Indians. This time period is relatively unknown archaeologically with the exception of the Debert/Belmont Paleo-Indian complex outside of Truro. There are no known sites of this period in close proximity to the study area. The principal archaeological investigator, however, has seen two late Paleo-Indian plano points in a private collection in Yarmouth.

The Paleo-Indian period is followed by one labeled the Archaic period which is represented by a number of named traditions generally associated with a particular subsistence approach. These include the Maritime Archaic which focused on marine resources, and the Shield Archaic which concentrated on interior resources such as caribou and salmon. The other potential group present in the study area has been named the Laurentian Archaic and is generally considered to be a more diverse hunting and gathering population utilizing all resources. Archaic period artifacts are well represented in private collections from the Tusket River sites. Of special interest is the Bain site collection from the Cheggogin River which represents the only Maritime Archaic habitation site to be excavated in the province (Davis, 1991).

The final precontact period has a number of labels with the most common being Woodland. It is basically the continuation of the Archaic way of life with the addition of a new technology - ceramics. The presence of earthenware ceramics is used by archaeologists to identify the end of the Archaic and the beginning of the Woodland period at approximately 2,600 years ago. It is during this time that the first exploitation of marine mollusks such as clams and mussels is found in the archaeological record. Characteristic shell midden sites of this period are known from sites on some of the Tusket Islands. Given the high energy shoreline at Pubnico Point, mollusk resources would not be found in this type of environment. In all probability, such sites are more likely to be situated in the more sheltered regions at the head of the harbour. It is worth noting that there is no local knowledge of precontact artifacts having been found in or near the study area.

The Woodland period ends with the arrival of the Europeans and the beginnings of recorded history. This does not, however, end the presence of First Nations involvement throughout the region. The initial phase of contact, known as the Protohistoric period, was a time when various alliances were formed, notably between the Mi'kmaq and the French. This lasted until the signing of the Treaty of Peace and Friendship renewed with the British.

The contact between the indigenous peoples and the Acadians is best illustrated in that the name Pubnico evolved through many variations from the Mi'kmaq word *Pogomkook*, meaning "land under cultivation" (Fergusson, 1982). This extended community is divided socially and geographically into two parts. The first is East Pubnico, located on the east side of Pubnico Harbour, and comprised of Lower East Pubnico, Centre East Pubnico, Middle East Pubnico, East Pubnico and Pubnico Head; the second is West Pubnico, located on the west side of the harbour and comprised from south to north of Lower west Pubnico, Middle West

Pubnico, West Pubnico and Upper West Pubnico. The general name, Cap de Sable, also included the Pubnico area.

As no definitive evidence for significant archaeological resources were encountered, the study area history is summarized from *Place Names and Place of Nova Scotia*.

In 1651 Phillippe Mius D'Entremont received a grant of land from Charles La Tour and arrived to settle on it. By 1671 three families, including six adults and eight children were settled at Pobomkom. In 1748, fifteen Arcadian families were living at Cap de Sable, twelve leagues (30 miles) from Tebok (Chebogue). In 1758, the Acadians were deported, but many of them returned late in the 1760s. Late in 1761, it was reported by Lieutenant-Governor Belcher that twenty families had moved into the Pubnico and Yarmouth area and that more were coming in the spring. Some English people settled in East Pubnico beside French neighbours. At Middle East and East Pubnico, the grantees' names were: Benjamin Selley, Philip Brown, Walter Larkin, Angel Amiro, Charles and Ezra Belliveau and Thomas Owen. The whole of West Pubnico as well as Centre east and Lower East Pubnico was granted in 1784 to Benoni d'Entremont and other Acadian French who returned from New England. At Pubnico Head, settlement had begun by 1814 (Fergusson, 1982).

The pedestrian survey of the proposed wind farm corridors did not reveal any areas of high potential for significant archaeological resources. Indeed there are numerous factors which would inhibit human occupation of this area. The predominant terrain as identified in the Theme Regions is the unit known as 831 Tusket Islands (Davis and Browne, 1996). The negative features of this unit are:

- submerging coastline;
- boulder/cobble shoreline;
- high energy shoreline that severely limits colonization by animals;
- wetlands, including bogs and swamps;
- shallow soils; and
- the forests on Pubnico Point are mainly Black Spruce and Birch, and newly cut and burned areas contain Poplar.

The only area which was deemed to be of potential for significant heritage resources was the eastern extension of the third corridor. This area contains the remains of two stone walls, one of which has been extensively disturbed by modern activity. The other has been impacted by the same activity as the first and by ATVs accessing a camp on the shore. This wall has a remnant that contains evidence for some antiquity in the form of lichen growth. Although it is a general observation, it appears that this feature could be several hundred of years old. A site visit with the former owner of the property confirmed that the walls were there in his youth; he also indicated that there had been a well on the property which had been filled in. This structure has subsequently been destroyed. Milford d'Entremont was not aware of any other structures on or near the property, but did state that his family tradition held that this was the site of the first inhabitants of the area. A careful survey of this general area and a detailed assessment of the proposed trench location, 80 metres to the south of the undisturbed wall, failed to produce evidence for any significant resources. It should be noted that at some point in the past a considerable portion of this area has had the surface soils removed by mechanical means. Based on the negative evidence and the fact that this was the prime location for habitation on the point, it is assumed that if a site existed, it has now been destroyed.

The study team also noted the presence of stone walls and possibly a culturally modified landscape to the east of the first corridor; this area was not investigated in detail because it is not located within the Project development area. Similarly the study team took note of an old mine site that was identified on the 1871 Church's map of the area. It would appear that the site corresponds to a modern rock and gravel extraction pit. Again since this feature lies outside the project development area, it was not investigated in detail.

Based on the research and field work that has been done, there is no evidence to suggest that there are archaeological resources in the area. Dr. Stephen Davis' report, conducted under Heritage Research Permit A2003NS30, was provided to the Nova Scotia Museum. The Curator, Special Places, concurs with Dr. Davis' recommendation that the Project, as designed, be allowed to proceed. A copy of the Curator's letter, dated May 8, 2003, is provided in Appendix B.

3.5.5 Planned Land and Water Uses

Pubnico Point is zoned for mixed use which includes residential, commercial, and institutional uses. Based on discussions that have taken place with both staff at the Department of Property Inspection and Public Works for the Municipality of Argyle and representatives of the local business community, the principle planned development is the proposed construction of the new wharf space at Dennis Point. The execution of this work will include dredging and ocean disposal of approximately 85,000 cubic metres of material and the construction of a new wharf. The proposed ocean disposal site is located at latitude 43° 34.73N and longitude 65° 48.42W (NAD83), or better described as seawards of the fairway buoy at the entrance to Pubnico Harbour. Phase I, the dredging and disposal, is scheduled to begin in July, 2003, and be completed by mid November. Phase II, the wharf construction, is scheduled to begin in June, 2004, and be completed by mid November, 2004. There will be continued construction in the same window in 2005 (Public Works and Government Services Canada, 2003).

The only other planned work that has been identified involves the widening of the wharf at Lower East Pubnico by Public Works and Government Services Canada.

3.6 Consultation

One of the guiding principles of the *CEAA* is public participation. AWPC has been proactive in this regard and has involved the local communities and the local municipality, i.e., Municipality of the District of Argyle, from the outset of Project planning. The following paragraphs summarize the consultations that have taken place. AWPC has also met with the elders of the Acadian Band and a member of the study team has discussed the Project with representatives from the Native Council of Nova Scotia.

3.6.1 Public Consultation

On January 8, 2002, AWPC publicly presented its development plan at a regularly scheduled meeting of the Council of the Municipality of the District of Argyle. This presentation was also televised on East Link Cable, and therefore widely available to residents of the area. Shortly after that presentation, a brief written summary and visual illustration of the wind farm was delivered to Council.

In April, 2002, AWPC met with the Municipal Council's planning committee. The purpose of the meeting was to update the Committee as to the status of the ongoing development plans and to provide additional technical information about the equipment to assist the Committee in their evaluation of the Project. The

Committee supported AWPC's suggestion to have a local open house about the Project as providing an opportunity for the planning committee and Council, as well as the community, to learn more about the nature of a wind farm operation and about the industry in general. This in turn it was felt would assist Council to gauge the mood of its community as it moved forward with municipal planning choices. Details of the open house are provided below.

The Municipality's interest in accommodating PPWF is shown by their agreement to amend their bylaws to address what had been a height restriction on all new structures. A public meeting was convened by the planning committee on June 4, 2002, to obtain public input into the proposed bylaw amendment. Notice of the event was formally advertised as legally required. The attendees voiced no opposition to AWPC's development plans, nor to Council's intent to change the bylaw. The discussion involved a sharing of views on what is a reasonable requirement with respect to set-offs of windmills from residential units. The Municipality has now fully reviewed and amended their bylaws to enable the development of a wind farm at Pubnico Point.

More recent meetings between members of the study team with both staff with the local municipality and the general public in the vicinity of the site confirm the strength of local support for the Project. As indicated in section 3.5.3, there have been discussions with fishermen in the community including those local lobster fishermen who set traps in the vicinity of the proposed cable route across Pubnico Harbour. All were aware that certain sections of the cable might not be buried. This issue was also discussed at the Open House at which time fishermen from all sectors had the opportunity to review both the proposed cable crossing location and how it would be layed. Further consultation took place with two rock weed harvesters in August, 2003³⁴; both stated that they did not see the laying of the cable or the use of the SAP as an issue. All are supportive of the Project, including the proposed cable route as long as the latter is constructed in the manner described and in a period outside the commercial lobster season³⁵. A letter indicating the support of those who set traps in the vicinity of the cable corridor is provided in Appendix G. Members of the Project team have also met with and presented the Project to a recognized local ornithologist who lives and works in the community. Because of his acknowledged expertise on the local colony of Roseate Terns, his opinion was sought on the likely impact of the Project on these birds. His observations are provided in Appendix G. Finally recent consultations have taken place with Raymond d'Entremont, a local resident and birder, and John Kearney, an anthropologist and birder, who lived in the area in the 1990s. d'Entremont acknowledged that the development of the wind farm may result in some bird mortalities, but on balance he felt that the Project should be allowed to proceed. Kearney expressed the view that any type of development would result in a loss of habitat and might result in bird mortality; he suggested that residential development could be equally, or even more destructive, than the proposed wind farm.

AWPC is committed to a strategy of positively engaging the community throughout the planning and development process. The level of consultation demonstrated to date will be continued to ensure that all interests are kept informed about the Project as it progresses. AWPC will also remain engaged with the Municipality and with others to work towards a successful and productive development for the community.

³⁴ Personal communications with Edward d'Eon and David Suretten.

³⁵ The following four fishermen set lobster traps over or in the vicinity of the proposed cable corridor across Pubnico Harbour: Carl d'Entremont, Kenneth d'Eon, Dennis d'Eon and Blanchard Nickerson.

3.6.2 Open House at Pubnico

On May 22, 2002 between 6:00 and 9:00 pm, AWPC held an open house in the Fire Hall at West Pubnico and formally introduced the PPWF to the community. The event was advertised in the Yarmouth Vanguard, the community newspaper, on the local cable television community bulletin board, on CJLS radio and via posters placed throughout the community. A front page story was also done by the Yarmouth Vanguard in advanced of the open house and a follow-up story with photographs made the paper the following week.

A register of attendees was maintained and in excess of 40 attendees signed in. Since many attendees did not sign the register, it is estimated that a total of 80, or more, actually visited the open house.

A survey form requesting feedback on the open house (Appendix H) and reaction to the proposed wind farm was distributed to attendees. Eight completed survey forms were received, and most of the comments were very supportive. One respondent had some residual concerns with respect to the noise, but saw this initiative as producing much less air pollution than either coal, oil or nuclear generating systems. Another respondent, although somewhat supportive, expressed concern about its impact on the landscape, on local property values and on continued public access to the end of Pubnico Point. These questions are addressed in Section 4.0.

3.6.3 Consultation with the Aboriginal Peoples

Given the long occupancy of southwest Nova Scotia by the Mi'kmaq, it is not inconceivable that there might have been some traditional activities take place on and in the vicinity of Pubnico Point. As has been stressed in several places, however, the inhospitable terrain and coastline in this area has not been conducive to human settlement at any time. The rocky shore is inhospitable for small craft and the land offers little in the way of sustenance. In contrast, there are much more hospitable shores and lands further north on the peninsula and elsewhere along the south shore which have been used and settled by both pre and post contact peoples.

Despite the lack of evidence of past or present use of the Point by the aboriginal communities, the study team has met with and discussed the area with both the elders of the Acadian Band and with representatives of the Native Council of Nova Scotia. The following paragraphs provide additional information.

i) Acadian First Nation

AWPC asked the Membertou Corporate Division to determine and facilitate discussions with the most relevant First Nation community with respect to the proposed Project. Due to their proximity to the Pubnico site and their long association with the region, the Acadia First Nation was identified as having the highest degree of relevance to the Project. The next closest First Nation's community, Bear River, is 1.5 hours distance.

The Acadian First Nation is located in Yarmouth and has an estimated band membership of over 600 located not only on the main reserve, but in five satellite reserves in Wildcat, Ponbook, Milton, and Gold River. Like all First Nations, Acadia runs their band government via an elected chief and council and manages several businesses. Of particular note, Acadia manages a highly successful fisheries operation with LFA 34 lobster, full bay scallop and 4x/5y groundfish dominating their species mix.

To date two meetings have taken place. At the first a representative of Membertou Corporate Division met with the Chief of the Acadia First Nation and her senior officials³⁶ to present the parameters of the Project and to initiate discussion. A second meeting with the Economic Development Officer and a number of elders took place in Dartmouth and involved not only representation from the Membertou Corporate Division, but the principles of AWPC, CBCL Limited and Dr. Steve Davis who had conducted the archaeological field investigations on Pubnico Point. The details of the Project and of the field programs conducted were presented and discussed. The principle issues raised at the meetings were as follows:

- concerns about the potential effects on the LFA 34 lobster fishery as a result of the proposed submarine cables;
- potential concerns relating to the traditional use of the Project site and surrounding areas, based primarily upon the historical use of the Pubnico site by a particular family in Acadia; and
- the socio-benefits to Acadia.

These specific matters are further addressed in Section 5.0. In general terms, the representatives appeared interested in the nature of the Project, i.e., the generation of wind power, and in meeting further with AWPC to discuss the potential of the industry in Nova Scotia. AWPC have committed to keep the Acadian Band fully informed of progress with the Project and to meet with them as circumstances warrant.

ii) Native Council of Nova Scotia (NCNS)

The NCNS represents through 14 local associations approximately 20,000 aboriginal people in the province who do not reside on reserve lands. The Project site is located on the boundary between two such local associations, i.e., the Shelburne and Yarmouth associations. Information about the Project, associated maps and information on the field programs that have been undertaken have been provided to the NCNS. Representatives of the NCNS have met with the membership of the local associations in both Shelburne and Yarmouth. The issues that have been raised pertain to the potential of the Project to:

- adversely impact their food and commercial fisheries;
- disrupt any archaeological resources that may exist on Pubnico Point; or
- inhibit access to the shores of Pubnico Point.

These concerns mirror those that have been raised by others; they do not raise new concerns. Since information on the field programs has been transmitted to the NCNS, their concerns have largely been addressed. Recent discussions have also confirmed that the NCNS, if the concerns are addressed, are supportive of the generation of wind power in this part of the province. AWPC has committed to keeping the NCNS fully informed as the Project progresses and will respond promptly to any further questions that they may pose.

3.7 VECs and Socio-economic Issues Identified

In accordance with the requirements of both *CEAA* and the *Nova Scotia Environment Act*, this assessment focuses upon those valued ecosystems components (VECs) and socio-economic issues that are of relevance to the Project site and the proposed Project. Based on the works that are proposed, the data that has been compiled, the field work that has been executed and the consultations that have been undertaken, the

³⁶ Representing Acadia: Chief Deborah Robinson, Lisa Francis (Economic Development Officer), Curtis Falls (Fisheries Manager) and two members from the Band's Commercial Fisheries Committee.

following VECs and socio-economic issues have been identified and will provide the focus for the analysis in Section 4.0.

- marine water quality
- surface and groundwater quality
- wetland
- birds
- intertidal habitat
- marine mammals
- air quality
- tourism
- navigation
- commercial fishery
- quiet enjoyment of the area
- safety
- public access to Pubnico Point;
- aboriginal interests
- landscape
- property values