

### **4.1 Overview and Approach**

The environmental assessment methodology has been developed to meet the regulatory requirements of the *CEAA* and the assessment regulations of the *Nova Scotia Environment Act*. In general, the approach has been designed to produce an assessment document that:

- is focused on issues of greatest concern;
- clearly addresses regulatory requirements;
- addresses issues raised by the public and other stakeholders;
- integrates engineering design and mitigative measures into a comprehensive environmental management planning process; and
- integrates cumulative effects assessment into the overall assessment of environmental effects.

Figure 4.1 depicts the key steps in the assessment process.

The environmental assessment evaluates the potential effects, including cumulative effects, of each Project phase (construction, operation and decommissioning), as well as malfunctions and accidents, with regard to each VEC or socio-economic issue. The term “issue” refers to broad themes that are of prolonged interest to the inhabitants of the study area, to the authorities and agencies that have responsibility in that area and to provincial and federal interests.

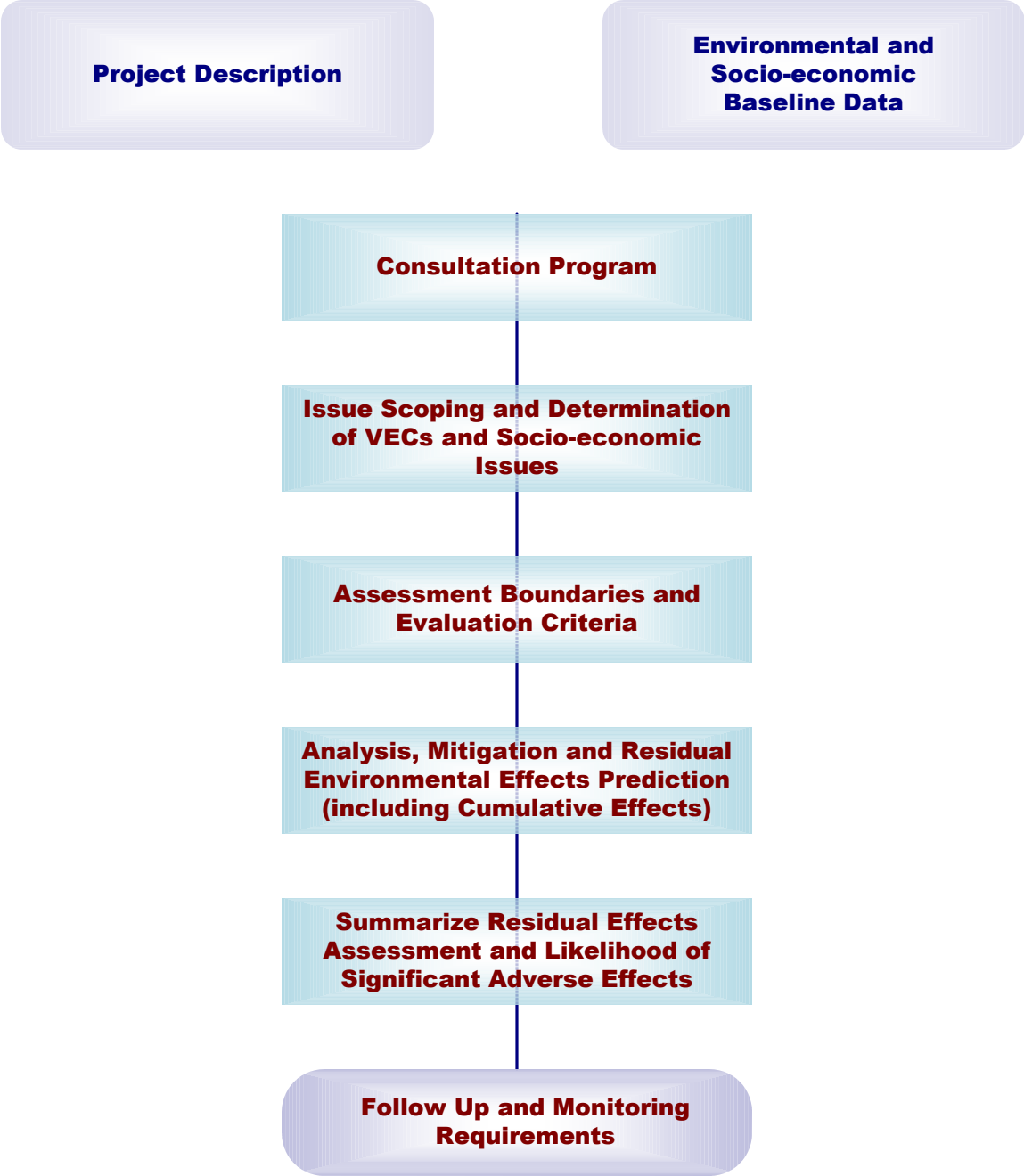
The VECs and socio-economic issues of concern that relate to the development and operation of the proposed wind farm at Pubnico Point were determined through reference to pertinent technical literature, through consultation, as a result of recent work done on comparable projects elsewhere and through the execution of selected fieldwork. Consultations included discussions with key authorities, stakeholders, aboriginal peoples, and the general public in the Project area, as well as environmental regulatory staff at the provincial and federal levels. A list of those who have contributed advice and information to the study team is provided in Appendix A.

An assessment pursuant to *CEAA* must address potential cumulative effects. The discussion of cumulative effects for this assessment is fully integrated into the assessment of environmental effects for each VEC or socio-economic issue. The overall assessment of residual environmental effects includes the consideration of cumulative effects. The principal economic activity in the Project area is the commercial fishery. Based on discussions with the Municipality and other agencies the only new project that may act cumulatively with the proposed Project is the development of the new wharf space at Dennis Point.

### **4.2 Issues Scoping and Selection of Valued Ecosystem Components and Socio-economic Issues**

It is impractical, if not impossible, for an assessment to address all of the potential environmental effects that might be directly or indirectly associated with a proposed undertaking. An important part of the assessment process, therefore, is the early identification of VECs and socio-economic issues upon which the assessment may be focused to ensure a meaningful and effective evaluation. This section outlines the steps that were taken to identify the VECs and socio-economic issues and thereby bring focus to this assessment.

**Figure 4.1: Environmental Assessment Methodology**



The key activities included consultation within the study area and with representatives of the local municipality; regulatory agency consultation; preliminary research including the review of pertinent documentation about comparable projects; the involvement of specialists to undertake field programs; and the study team's professional judgement. The public consultation program that was undertaken together with the work that was done with the aboriginal peoples is detailed in Sections 3.6.

Regulatory requirements, as well as the consultations that took place with regulators and other government officials, provided critical input to both the issues scoping process and the identification of the permits and approvals that are required to execute the Project. Pertinent legislation and guidelines have been referenced as appropriate throughout this assessment. More specifically the VECs and socio-economic issues considered in this assessment, as well as the methodological approaches, were derived from *CEAA* and the Guidelines for Screenings of Inland Wind Farms prepared by NRCAN for the WPPI Program. Account has also been taken of the requirements of the Nova Scotia Environment Act and associated regulations.

The informed professional judgement of the assessment team, particularly those who have executed the various field programs, and the local knowledge that the proponent brought to the process were important inputs in the determination of the VECs and socio-economic issues. The study team drew on its collective knowledge and experience and considered the input and opinions expressed by others, the relevant regulations and guidelines, comparable environmental assessments and other pertinent research. All of these factors informed the selection of the VECs and socio-economic issues that are described in section 4.6 and are subject to evaluation in Chapter 5.

### **4.3 Boundaries**

As referenced in Section 1.3, an important factor in the assessment process is the determination of spatial and temporal boundaries for the assessment, i.e., those periods during which, and the areas within which, the VECs and socio-economic issues are likely to interact with, or be influenced by, the Project. Temporal boundaries encompass the times that Project activities, and their effects, overlap with the presence of a VEC or socio-economic issue. Spatial boundaries are the areas within which the Project activities are undertaken and the facilities are located, and the zone of influence of effects of the Project, i.e., of emissions, effluents and discharges. Such boundaries are identified for each VEC and socio-economic issue as an integral part of the analysis.

### **4.4 Evaluation Criteria**

As referenced in section 1.3, the term "criteria" applies to those considerations that were used to assess the effects of the Project on the ecological and socio-economic environment. Since a Memorandum of Understanding has been signed between the federal RAs, i.e., NRCAN and DFO, and the Government of Nova Scotia represented by NSDEL, consideration has to be given to the different definitions of "environment" and "environmental effect" as they appear in *CEAA* and the *Nova Scotia Environment Act*. Under *CEAA*, the environment is defined in section 2(1) as follows:

*"the components of the earth" and includes:*

- a) land, water, air, including all layers of the atmosphere;*
- b) all organic and inorganic matter and living organisms; and*
- c) the interacting natural systems that include components referred to in paragraphs a) and b)".*

In *CEAA*, the definition of environmental effect is:

- “a) any change that the project may cause in the environment, including any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing, that is of historical, archaeological, paleontological or architectural significance, and*
- b) any change to the project that may be caused by the environment.”*

The comparable definition of “environment” provincially is as follows:

*“Environment” means the components of the earth and includes*

- (i) air, land and water;*
- (ii) the layers of the atmosphere;*
- (iii) organic and inorganic matter and living organisms;*
- (iv) the interacting systems that include components referred to in subclauses (i) to (iii); and*
- (v) for the purpose of Part IV, the socio-economic, environmental health, cultural and other items referred to in the definition of environmental effect.”*

In the provincial legislation “*environmental effect*” means in respect of an undertaking

- a) any change, whether positive or negative, that the undertaking may cause in the environment, including any effect on socio-economic conditions, environmental health, physical and cultural heritage or on any structure, site or thing including those of historical, archaeological, paleontological or architectural significance, and*
- b) any change to the undertaking that may be caused by the environment, whether that change occurs inside or outside the Province.*

Because of the slighter broader definition of socio-economic effect in the provincial legislation, the study team looked at socio-economic consequences of the Project beyond those strictly derived from an effect of the Project on the ecological environment.

Section 16(1)(b) of *CEAA* requires that the significance of environmental effects be determined. Accepted practice in meeting this requirement involves establishing and applying evaluation criteria for the determination of significance. Guidance documents prepared by the Canadian Environmental Assessment Agency list criteria that should be taken into account in deciding whether adverse environmental effects are significant. These criteria include, among other factors, the following:

- Magnitude;
- Geographic extent;
- Duration;
- Frequency;
- Reversibility; and
- Ecological and/or socio-cultural context.

These criteria have been considered in the analysis presented in Chapter 5 on the Project’s effects on each VEC and socio-economic issue.

#### **4.5 Analysis, Mitigation and Residual Effects Prediction**

The assessment focuses on the evaluation of potential interactions between the VECs and socio-economic issues and the various Project activities outlined in the Project description, i.e., in Chapter 2. A standard evaluation system has been developed to ensure that potential effects are clearly and completely evaluated. Residual environmental effects are those that remain after mitigation and control measures are applied. The prediction of residual environmental effects follows three general steps, as suggested by the Canadian Environmental Assessment Agency:

- Determining whether an environmental effects is adverse;
- Determining whether an adverse environmental effects is significant; and
- Determining whether an significant adverse environmental effect is likely to occur.

Many, if not all potential adverse effects, can be avoided through the application of good engineering and construction practices, the careful timing of activities and the adherence to appropriate environmental management techniques.

The effects evaluation for each VEC and socio-economic issue is conducted by Project phase, i.e., construction, operation, and decommissioning and for malfunctions and accidents. For each phase, the study team selects those Project activities that may result in a positive or negative effect on the VEC or socio-economic issue. To determine if there are adverse effects, the study team took the following factors into account:

- Negative effects on the health of the biota;
- Loss of rare and endangered species;
- Loss of critical and/or productive habitat;
- Fragmentation of habitat;
- Transformation of natural landscapes;
- Discharge of persistent and/or toxic chemicals;
- Reductions in the capacity of renewable resources to meet the needs of present and future generations; and
- Loss of current use of lands and resources for traditional purpose by aboriginal peoples.

The analysis evaluates the interactions between Project activities and the VEC or socio-economic issue and determines the significance of any residual adverse environmental effects, i.e., effects that may persist after all mitigation strategies have been implemented.

To determine and appreciate the relevance of residual effects following mitigation NRCan suggest the application of the definitions of impact as detailed in Table 4.1.

**Table 4.1: Level of Impact After Mitigation Measures**

<i>Level</i>	<i>Definition</i>
High	Potential impact could threaten sustainability of the resource and should be considered a management concern. Research, monitoring and/or recovery initiatives should be considered.
Medium	Potential impact could result in a decline in resource to lower-than-baseline but stable levels in the study area after project closure and into the foreseeable future. Regional management actions such as research, monitoring and/or recovery initiatives may be required.
Low	Potential impact may result in a slight decline in resource in study area during life of the project. Research, monitoring and/or recovery initiatives would not normally be required.
Minimal	Potential impact may result in slight decline in resource in study area during construction phase, but should return to baseline levels.

Source: NRCan, Environmental Impact Statement, Guidelines for Screenings of Inland Wind Farms under the Canadian Environmental Assessment Act. Wind Power Production Incentive (WPPI) Program.

As not all consequences of Project development and operation on the identified VECs and socio-economic issues are adverse, the above table has been supplemented by the following two definitions:

- No impact, i.e., where the consequences of that phase of the Project have no effects on the specific VEC or socio-economic issue; and
- Beneficial impact, i.e., where the consequences of that phase of the Project enhance the specific VEC or socio-economic issue.

#### **4.6 VECs, Socio-economic Issues and Pathways**

As detailed in Section 3.7, the following VECs and socio-economic issues have been identified and provide the focus for the analysis that is presented in Chapter 5:

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

Before there can be either an ecological or socio-economic effect, there has to be a linkage or pathway between the Project and the VEC or socio-economic issue. If no linkage or pathway can be shown to exist, there can be no impact. Each of the identified VECs and socio-economic issues are described briefly below; the order of their listing is not intended to suggest relative importance. To determine whether the Project will have an impact on a VEC or socio-economic issue, the linkage or pathway, if any, is identified.

#### ***4.6.1 Marine Water Quality***

Pubnico Harbour is an important marine estuary which provides wharfage for both commercial and recreational vessels, locations for commercial and recreational fishing and sites for aquaculture. As the retention of the marine water quality is of importance to these and other local interests, marine water quality was identified as a VEC. There are three possible pathways associated with the development of the wind farm that may have adverse consequences for marine water quality; these are:

- the disturbance of sediments during the laying of the cables across Pubnico Harbour;
- sediment run-off from land to the marine waters during the works necessary to construct the WTGs and associated infrastructure; and
- the accidental release of hazardous materials such as fuels, oils and lubricants.

#### ***4.6.2 Surface and Groundwater Quality***

There are no domestic wells downstream of the wind farm site and no defined watercourses on the site. There is, however, a wetland on-site. Based on the geotechnical investigations that have taken place to date, it is becoming increasingly unlikely that there will be any problems associated with acid drainage, but ground water is being retained as a VEC. The possible pathways that may have adverse consequences for groundwater quality are:

- the disturbance of sediments during the construction of the WTGs and the associated access roads;
- acidic runoff from pyritic slates, if any are found; and
- the accidental release of hazardous materials such as fuels, oils and lubricants.

#### ***4.6.3 Wetland***

Wetlands provide an important link between freshwater and terrestrial ecosystems. The wetland on the site of the wind farm was identified as a VEC on the basis of regulatory requirements and professional judgement. As discussed in Section 3.2.2, the extent of the wetland when field-truthed was larger than had been determined from provincial databases. This wetland has not been recognized provincially as important, and an evaluation undertaken in accordance with the Wetlands Evaluation Guide confirmed its low intrinsic value (see Appendix E). Further, this wetland has been severely degraded by the extensive use of ATVs in and through the area. This latter activity has changed both the character of the wetland and the flow of water in the area. The pathways that may aggravate the damage that has occurred are:

- the grubbing and clearing of land for access roads, WTG sites and related works;
- the construction of the access roads to the WTGs and the associated disturbance of sediments;
- the construction of the concrete pads for those WTGs that impinge on the wetland and the associated disturbance of sediments;
- the accidental release of hazardous materials such as fuels, oils and lubricants;
- acidic run-off from pyritic slates, if any are found; and
- pedestrian and vehicular access to the site area.

#### **4.6.4 Birds**

Birds breed, visit and fly over Pubnico Point; they also breed and feed on the waters and islands off Pubnico Point. Birds have been identified as a VEC on the basis of regulatory requirements and professional judgement. The pathways associated with the Project that may adversely affect birds include the following:

- those activities that may cause adverse consequences to marine water quality (see Section 4.6.1);
- the construction of the access road and towers;
- the WTGs as freestanding structures and the rotating blades; and
- lights on the WTGs.

#### **4.6.5 Intertidal Habitat**

The intertidal zone in the reaches of Pubnico Harbour that will be crossed by the submarine cable system is rich and provides habitat for a range of benthic organisms and invertebrates, including lobster. Intertidal habitat has been identified as a VEC on the basis of regulatory requirements and professional judgement. The possible pathways that may have adverse consequences for the intertidal area are as follows:

- those activities that may cause adverse consequences to marine water quality (see Section 4.6.1); and
- the physical disturbance of the area during the laying of the submarine cables.

#### **4.6.6 Marine Mammals**

Marine mammals, particularly the Harbour Porpoise, have been identified by the regulatory authorities as species of concern with respect to the Project. The pathways associated with the Project that may adversely affect marine mammals are:

- those activities that may cause adverse consequences to marine water quality (see Section 4.6.1); and
- blasting.

#### **4.6.7 Air Quality**

Air quality is important to the health of both the ecological environment and to the human population. As dust was raised as a concern during the review of the draft documentation, air quality has been identified as a VEC. The pathways associated with the Project that may adversely affect air quality are:

- the generation of dust during the construction of the WTGs and the associated access roads.

#### **4.6.8 Tourism**

Wind farms are a relatively new phenomenon in Atlantic Canada and, based on experience elsewhere, the PPWF may attract visitors. As the potential for increased visitation to the area was raised as an issue during the review of the draft documentation, it has been identified as a socio-economic issue. The pathways associated with the Project that may impact on tourism include:

- the construction activities and the transportation of the component pieces; and
- the WTGs themselves.

#### **4.6.9 Navigation**

Pubnico Harbour is home to a commercial fishing fleet and to other commercial and recreational craft that rely on the ability to move uninhibited through the harbour to open water. Navigation was identified as a VEC, or socio-economic issue, by the regulators. The pathways associated with the Project that may impact on navigation are:

- the placement and existence of the submarine cables; and
- the lighting on the WTGs.



#### ***4.6.10 Commercial and Recreational Fishery***

The waters of Pubnico Harbour support both a commercial and recreational fishery. Of particular importance to the local economy is the lobster fishery. As indicated in Section 3.5.3, the commercial lobster fishery is of substantive commercial importance to the local communities and, indeed, to the province. Not only is Pubnico Harbour home to many lobster boats, but four local lobster fisherman set traps in the vicinity of the proposed cable corridor. The fishery was therefore identified as a VEC on the basis of its importance to the local economy, regulatory requirements and professional judgement. The pathways associated with the Project that could have an adverse impact on the fishery are:

- those activities that may cause adversely consequences to marine water quality (see Section 4.6.1); and
- the placement of the submarine cables.

#### ***4.6.11 Quiet Enjoyment of the Area***

The Project is being developed in a distinctly rural area where intrusive noise from human activity is minimal. People in the area value the peace that exists. Noise was identified as an issue by a respondent to the Open House survey. The pathways associated with the Project that may cause noise are:

- during construction, noise generated by the construction vehicles and the activities taking place at the site; and
- during operation, the noise that will be generated by the turbines themselves.

#### ***4.6.12 Safety***

Safety is a concern that has been raised by the public with respect to the operation of the wind turbines. The primary concern is icing during winter weather. Safety is therefore identified as a socio-economic issue. The pathways associated with the Project that may cause safety hazards include:

- construction activities; and
- icing.

#### ***4.6.13 Public Access to Pubnico Point***

A number of participants at the Open House and members of the aboriginal community questioned whether public access to Pubnico Point would be restricted as a result of the development of the wind farm. Public access has therefore been identified as a socio-economic issue based on public concern. The pathways associated with the Project that may restrict access are:

- the measures, if any, that will be employed during project construction and operation to inhibit people's access to Pubnico Point.

#### ***4.6.14 Aboriginal Interests***

The Acadian First Nation and the Native Council of Nova Scotia raised a number of questions, or issues, that they sought information upon with respect to the Project. These, in part, mirror other VECs, but will be addressed again with respect to the expression of aboriginal concern.

#### ***4.6.15 Landscape***

A respondent to the survey at the Open House questioned how the landscape would change as a result of the development of the wind farm and the issue has also been raised by the regulators. Landscape has therefore been identified as a socio-economic issue. The pathway is:

- the presence of the wind farm on the landscape.

#### ***4.6.16 Property Values***

A respondent to the survey at the Open House questioned whether property values would change as a result of the development of the wind farm. Property values therefore have been identified as a socio-economic issue based on input from the public. The pathway is:

- the presence of the wind farm and the resultant effect on property values.

This section presents a detailed account of the environmental assessment of the residual effects of the proposed Project on 16 VECs and socio-economic issues. Recommendations for mitigation are identified where applicable. The analysis also takes into account the consequences of the proposed Project interacting cumulatively with other activities, but particularly with the commercial fishery and the construction of the new wharf infrastructure at Dennis Point.

### ***5.1.1 Marine Water Quality***

The maintenance of the quality of the marine waters in Pubnico Harbour and around Pubnico Point is important, not only for the commercial and recreational fisheries, but for the birds and aquatic species that breed and feed in these waters.

*Pathways:* as identified in Section 4.6.1, there are three possible pathways that may have adverse consequences for marine water quality: the disturbance of marine sediments during the laying of the cables, sediment run-off from land, and the accidental release of hazardous materials, such as fuels, oils and lubricants.

*Boundaries:* the spatial boundaries associated with the laying of the cable corridor that may affect marine water quality depend, in part, on the state of the tide at any point in the lay and, in part, on the technical efficiency of the laying process. As detailed in Section 2.2.2, there will be no side-casting associated with the use of the jetting sled, and the sediment plume, based on work at comparable locations, is considered to be comparable to that caused by a small fishing boat in very shallow water, i.e., the spatial boundaries associated with the use of the jetting sled are anticipated to be defined by the line of the lay plus a small margin on either side.

The spatial boundaries associated with sediment run-off from Project works on land and the accidental release of hazardous materials, such as fuels, oils and lubricants, potentially include the waters of the southern portion of Pubnico Harbour and waters around Pubnico Point. Most effects of siltation on the marine environment, if any, are likely to be temporary, and to occur during the construction phase of the project. Effects from an accidental release of hazardous materials could potentially be of longer duration and could occur at any point in the lifetime of the Project.

Any one of the identified pathways could adversely affect marine water quality in the vicinity of the Project works and beyond. Although there may be some minimal opportunity for one or more of these pathways to have adverse consequences on the receiving environment during Project operation, the principle period of concern is during the period of Project construction.

*Project Construction:* as stated in Section 2.2.2, it will take approximately 18 days to lay the cables using the jetting sled. Based on the experience and professional knowledge of the operator, the amount of sediment that will be disturbed will be minimal and the harbour bottom will have returned to a pre-construction state within hours. The use of a floating silt curtain is not considered practical for this cable lay. It is, however, proposed that a member of the lay crew be charged to visually monitor water turbidity in the vicinity of the work. If

any substantive change occurs in the turbidity due to construction activities, the work will stop and the regulatory authorities will be notified.

Prior to construction, the WTG corridors and assembly areas will be cleared and grubbed, foundations prepared and works executed. During these activities, there is a potential for erosion and the transportation of sediment to the surrounding marine waters. The severity of erosion and sediment transport depends on several factors including precipitation, soil type, slope, vegetation cover and distance. Given the topography and the fact that the vegetation on the greater part of the site will remain untouched, sediment transportation to the marine environment will be negligible. This is reinforced by the requirement to maintain buffer zones between the Project site and the shoreline. As referenced in Section 2.1, the amended land use bylaw for the Municipality of Argyle requires a minimum buffer of between 44.5 m and 47.6 m between the WTGs and the shoreline; this buffer applies to the western side of the site. On the east, all of the WTGs are located to the west of Route 335, the public road serving the site. The likelihood of sedimentation from the construction of the WTGs or the access roads is minimal. This will be further reinforced through the use of proven methods to control run-off and erosion. Such measures will include:

- specific procedures for the storage and handling of excavated materials;
- timely revegetation of areas after construction; and
- installation of temporary erosion control measures in vulnerable areas, e.g., drainage barriers, sediment fences, plastic sheeting, straw (or hay) crimping, mulches, etc.

Particular attention will be taken to install appropriate measures to control run-off and resultant sedimentation arising from the works necessary to install the cables between Route 335 and the high watermark. These will be detailed in association with the contractor as part of the EPP. The amount of sediment reaching the marine waters is anticipated to be negligible. Should any such events occur during construction, not only are they likely to be of limited duration, but the sediment on reaching the marine waters would dissipate very quickly in the high energy oceanographic regime that characterizes the Point. Erosion and sedimentation, if they occur, will be temporary, since all areas to be disturbed by construction will be stabilized both during and after construction.

As detailed in Section 2.2.1 and footnote #12, the results of geotechnical investigations undertaken at the first two WTG sites and at the abandoned quarry show no significant traces of sulphide bearing material. Further geotechnical investigations will be undertaken to facilitate the engineering of the access roads and other WTG sites. As detailed in Section 5.1.2 below, should there be a need to disturb sulphide bearing materials on any part of the site, appropriate actions will be taken to isolate the sulphide-rich source material from the atmosphere and surface run-off in accordance with applicable guidelines and regulations. It is also noted that the marine environment is itself high-buffered and would not be severely impacted in the highly unlikely event that acidic run-off should reach this environment.

Accidental releases of hazardous materials could occur during any phase of the Project and might include petroleum hydrocarbons and possibly solvents and paints. Accidental releases of chemicals could occur from storage facilities or vehicles. The severity of an accidental event would depend on the chemical characteristics and volume of the release and its proximity to the marine waters. Relatively small amounts of fuel and hydraulic fluid spilled during the operation of construction equipment or the servicing of the turbines are the most likely types of accidental releases. Standard practices for the handling, storage and use of

potentially hazardous materials will be developed as part of the EPP and enforced throughout all phases of the Project. The following mitigative measures shall also be applied:

- All hazardous material stored on the Project site shall be labeled according to WHMIS regulations;
- Frequent inspection and maintenance of equipment will be undertaken to identify and repair fuel leaks;
- The fuelling and maintenance of mobile vehicles and large equipment will not be permitted within either 50 m of the shoreline or of the wetland;
- Used oil, filters and other products associated with equipment maintenance shall be collected and disposed of in accordance with regulatory requirements; and
- All spills shall be immediately reported to the Environmental Emergency # (1-800-565-1633).

Given the buffers and sedimentation controls that will be in place, it is highly unlikely that sediments will reach the marine environment. Given these circumstances, tides and winds are unlikely to aggravate the distribution of any sedimentation.

In summary, through the use of standard and accepted industry procedures and mitigation measures, adherence to applicable regulations and guidelines, and waste management planning, the construction phase of the Project is unlikely to result in a significant adverse effect on marine water quality.

*Project Operation:* Project interactions with marine waters during Project operation are anticipated to be minimal. The most likely interface is an accidental release of a hazardous material during turbine maintenance or when machinery is necessary to facilitate repairs. In summary, by adhering to applicable regulations and guidelines, implementing mitigation measures and applying good management practices as referenced above, the operation of the proposed Project will not result in a significant adverse effect on marine water quality.

*Project Decommissioning:* Project interactions with marine waters during Project decommissioning are anticipated to be comparable to those interactions associated with construction with the one proviso: unless directed to the contrary, the turbine foundations would remain in place thereby avoiding any disturbance to marine waters or causing unwarranted disturbance to the Project site.

As detailed in Section 2.3.3, it is anticipated that when the time comes for the submarine cables to be decommissioned, the available technologies will have advanced, and there will be machinery available that works like a jetting sled, but in reverse. Such machinery already exists to lift cables in water depths greater than 100 ft. The environmental consequences of such work would be anticipated to be comparable to those associated with burying the cable both in the intertidal zone and in the deeper channel.

Through the use of standard and accepted industry procedures and mitigation measures, adherence to all applicable regulations and guidelines, and waste management planning, the decommissioning of the Project is not predicted to have a significant adverse effect on marine water quality.

*Malfunctions and Accidents:* beyond the accidental release of a hazardous material identified above, malfunctions are most likely to involve the stoppage of one or more turbines or a break in one or other of the transmission cables. The measures advocated to minimize erosion or sedimentation during construction would be adopted to address the consequences of any malfunction in equipment.

Malfunctions and accidents are not predicted to have a significant adverse effect on marine water quality.

*Cumulative Assessment:* the construction of the submarine cables and the first two turbines may take place in the same timeline as the dredging and dumping of materials associated with the construction of the Dennis Point wharf. The construction of the balance of the turbines will take place in parallel with the construction of the wharf. The development and operation of the Project will also take place in parallel with the commercial fishery and other related activities occurring in and in the vicinity of Pubnico Harbour. As detailed in Section 5.1.9, AWPC, or its contractor, will liaise with the Harbour Master to ensure that any interference with navigation is minimized. If the above mitigative measures are employed to inhibit erosion and prevent the transport of sediment to the marine waters, and if all necessary actions are taken to prevent accidental releases of hazardous materials, the proposed Project will not act cumulatively with the activities at the Dennis Point wharf or other activities to cause an adverse impact on the marine waters.

*Sustainable Use of Renewable Resources:* no significant adverse environmental effects on marine water quality are predicted; therefore, further assessment regarding the sustainable use of the marine waters is not required.

*Residual Environmental Effects Assessment:* **the Project is not anticipated to have a significant residual environmental effect on marine water quality, i.e., minimal.**<sup>37</sup>

### ***5.1.2 Surface and Groundwater Quality***

The maintenance of the quality of the surface and groundwater on-site is important to the maintenance of habitat quality, particularly that associated with the wetland (see Section 5.1.3). The principle concern is the possible presence of sulphide bearing material in the bedrock and the need to disturb that bedrock. As detailed in Section 2.2.1 and footnote #12, the results of geotechnical investigations undertaken at the first two WTG sites and at the abandoned quarry show no significant traces of sulphide bearing material. Further geotechnical investigations will be undertaken in support of the detailed engineering.

Should sulphide bearing materials be present and disturbed, the main concern is degradation of water quality. There are no down gradient wells to be impacted, and no streams or watercourses. Typical problems associated with the release of sulphide bearing materials include depressed pH and alkalinity, elevated concentrations of iron, manganese, aluminum, arsenic and nickel. Upon exposure to the atmosphere or oxygenated waters, bedrock formations containing sulphide mineralization can produce acidic drainage characterized by high total dissolved solids, low pH (2.0 to 4.0) and elevated concentrations of sulphate and metals. If pyritic slate is found at the Project site and is disturbed in the absence of appropriate mitigative measures, its disturbance could have adverse consequences on the surface and groundwater at the site, including the wetland. Surface waters, particularly those associated with the wetland, could also be adversely effected by sediment run-off and erosion associated with the construction of the access roads, the foundations for the WTGs and associated lay-down and working areas.

*Pathways:* the pathways that may adversely effect surface and groundwater quality include the disturbance of sediments during the construction of the WTGs and the associated access roads, the release of sulphide bearing materials and the accidental release of hazardous materials such as fuels, oils and lubricants.

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<sup>37</sup> This categorization determined by the criteria laid out by NRCAN in the Environmental Impact Statement Guidelines for Screenings of Inland Wind Farms and depicted in Table 4.1.

*Boundaries:* the spatial boundary encompasses those areas which will be subject to construction involving trenching or blasting of the bedrock. The temporal boundaries are primarily associated with Project construction, but the effects, if mitigative measures are not applied, could extend into the period of Project operation.

*Project Construction:* to facilitate detailed engineering design, AWPC has commissioned a geotechnical survey of selected areas of the Project site. The results of this work to date have shown that there are no sulphide bearing materials in the locations tested. This work will continue and will determine the presence or absence of sulphide bearing material in the bedrock and whether or not it is net acid producing. These tests will influence how certain works, including the placement of the concrete pads, are designed. It is noted that there are no domestic wells down gradient of the Pubnico Point site and no streams or watercourses. AWPC will respond to the findings of the tests in a manner that will ensure that construction activities do not cause adverse environmental consequences from sulphide bearing material. In the event that acidic rock cannot be avoided, the EPP will detail the mitigative measures that will be deployed.

Related construction work including clearing and grubbing has the potential to cause erosion and the transportation of sediment to adjacent areas including, in places, the wetland. The discussion of this and the mitigation that will be employed to address the issue is provided in Section 5.1.1 above. Similarly Section 5.1.1 should be referenced with respect to consideration of accidental releases of hazardous materials and how such eventualities would be handled.

In summary, through the use of standard and accepted industry procedures and mitigation measures, adherence to applicable regulations<sup>38</sup>, the construction phase of the Project will be undertaken in an environmentally responsible manner and is unlikely to result in a significant adverse effect on surface or groundwater.

*Project Operation:* Project interactions with surface and groundwaters during Project operation are anticipated to be minimal. The most likely interface is an accidental release of a hazardous material during turbine maintenance or when machinery is necessary to facilitate repairs. In summary, by adhering to applicable regulations and guidelines, implementing mitigation measures and applying good management practices as referenced above, the operation of the proposed Project will not result in a significant adverse effect on surface and groundwater quality.

*Project Decommissioning:* the decommissioning of the Project would involve the dismantling and removal of the WTGs and the reasonable rehabilitation of the Project site. There would be no excavation of bedrock involved, and the underground cables and concrete pads at the site would remain in place. In summary, the decommissioning of the site will be undertaken in an environmentally responsible manner.

*Malfunctions and Accidents:* beyond the accidental release of a hazardous material identified above, malfunctions are most likely to involve the stoppage of one or more WTGs or a break in one or other of the transmission cables. The measures advocated to minimize erosion or sedimentation during construction would be adopted to address the consequences of any malfunction in equipment. .

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<sup>38</sup> Sulphide Bearing Material Disposal Regulations pursuant to Section 66 of the *Environment Act*.

*Cumulative Assessment:* there are no proposed other works that will take place in or in the vicinity of the site that might act cumulatively with the proposed Project to cause a significant adverse effect on surface and groundwater. It is likely, however, that ATV use in the area will continue and that there will continue to be degradation to the site as a consequence of this use.

*Sustainable Use of Renewable Resources:* N/A.

*Residual Environmental Effects Assessment:* **the Project is not anticipated to have a significant residual environmental effect on the surface and groundwater, i.e., low.**

### **5.1.3 Wetland**

Wetlands provide distinctive habitat and serve as an important link between freshwater and terrestrial ecosystems. AWPC acknowledges the “Federal Program Wetland Conservation” and its objective to “promote the conservation of Canada’s wetlands to sustain their ecological and socio-economic functions, now and in the future.” As detailed in Section 3.2.2 and depicted on Figure 3.2, it is proposed that the wind farm be constructed in the vicinity of a 19 ha wetland and that two access roads be constructed across it. The evaluation of this wetland (Appendix E) indicates that it has little intrinsic value. Nevertheless, the intent of the proposed layout is to ensure the retention of, or to enhance the current value.

*Pathways:* the pathways that could have an adverse impact on the wetland include the grubbing and clearing of land, the construction of the access roads to the WTGs, the construction of concrete pads, i.e., those that impinge on the wetland, and the associated disturbance of sediments and dust that may be associated with such activities. Other pathways include accidental spills of fuels, lubricants, or hydraulic fluids, acidic run-offs from the pyritic slates, if any are found, and pedestrian and vehicular access to the wetland.

*Boundaries:* the spatial boundary at its outer limit is the physical extent of the wetland, but the area of direct interference will be much smaller. The temporal boundaries are primarily associated with Project construction.

*Project Construction:* construction activity can affect a wetland in several ways. The movement of heavy machinery, for example, can result in the physical disturbance of plant communities and substrates. Other activities such as clearing and grubbing, trenching and backfilling could result in the sedimentation of inundated portions of the wetland. Run-off from exposed acid bearing slates, if such are disturbed, could adversely affect the wetland as a result of elevated acidity or the mobilization of metals, and the smothering of plant communities as a result of the deposition of iron floc. Trenching could alter the hydrologic regime by changing groundwater flows. In turn, this could result in increased or decreased water levels depending on whether groundwater is directed into the wetland or drained from it. Wetland and wetland flora and wildlife species could also be affected by accidental spills of fuels, lubricants or hydraulic fluids.

The most severe impact to the wetland is likely to be as the result of the construction of the access roads. These roads will physically dissect the wetland into three parcels. The environmental concern is the fragmentation of the larger contiguous wetland and thereby disruption, to some degree, of the existing wetland habitat and function. Ecologically, it is preferable to maintain large uninterrupted areas of habitat. The fragmentation of wetland habitat, while it increases edge conditions, usually results in a loss of species



diversity. The access road, depending upon how it is constructed, could potentially impact the subsurface water flows within the peat substrate, in addition to inhibiting surface water movement. Based on the following assumptions concerning the proposed access roads and turbine pads it has been calculated that approximately 1.0 hectare of the wetland may be directly impacted by construction activities:

- The service roads were assumed to have a designed footprint width of 15 m; and
- The turbine pads and associated maintenance area were assumed to have a designed footprint area of 6.09 metres by 87.4 metres (i.e., 200' x 287').

A critical component of detailed engineering will be the preparation of the design specifications of the access roads for Rows A and B both of which will be constructed across the wetland (see Section 2.2.4). The design of these roads will have to take into account both water and nutrient flows in the wetland and will probably include one or more appropriately sized culverts.

The wetland is considered to have low intrinsic value (see Section 3.2.2 and Appendix E), and a significant portion has been degraded by ATV use. No rare plant species or fauna species has been identified in or in the vicinity of the Project area. There is also some evidence that invasive plant species (e.g., iris) are now establishing themselves in parts of the wetland. Although the amount of wetland habitat that would be disturbed by the Project is not large enough to have any substantial adverse effect on current wetland species, the proposed works in the absence of effective mitigation could further degrade the function of this wetland. The fact that the access roads will be used only intermittently suggests that there would be minimal deterrence for most wildlife species traversing from one end of the wetland to the other.

The design and construction of the access roads will take into consideration a number of key factors including dust control, and the hydrology and nutrient flow associated with the wetland area. The detailed engineering of the access roads, particularly Rows A and B, will address the maintenance of these functions. This will likely involve the integration of appropriately sized culverts into their design. Construction timing may also be important. Construction during the winter months, for example, is the optimum time to work in wetlands for a number of reasons:

- it reduces the impact of dust on vegetation as plants are not in leaf;
- injury to plants is reduced as the plants are dormant; and
- snow cover, if available, can be compacted to protect vegetation from traffic movements.

It can also be more economical to work in wetlands while they are frozen. The EPP will address the issues of erosion control, dust control and vegetation protection.

Accidental releases of hazardous materials could occur during any phase of the Project and might include hydrocarbons, and possibly solvents and paints. Relatively small amounts of fuel and hydraulic fluid spilled during the operation of construction equipment or the servicing of the turbines are the most likely causes of accidental releases. Standard practices for the handling, storage and use of potentially hazardous materials will be developed as part of an EPP (see Sections 2.6 and 5.1.1).

As described in Section 3.3.2, the wetland has been degraded by ATVs. The presence of the wind farm may further increase access to parts of the area, including the wetland, by ATVs and individuals other than project personnel. AWPC has committed to keeping the general public out of construction areas in the interests of safety and may install barriers to inhibit public vehicular movements along the access roads during Project

operation. This will, however, not preclude the continued use of ATVs in the area. It is therefore probable that there will be continued physical disturbance to wetland habitat.

Good engineering design, effective construction practices and the adoption of the following mitigation measures, together with adherence to all applicable regulations and guidelines and good waste management planning practices, will ensure that the construction stage of the Project will not aggravate the further degradation of the wetland. In addition to measures to control erosion, siltation and dust and the incorporation of effective culverts in Rows A and B, (see Sections 5.1.1, 5.1.2 and 5.1.7), a revegetation program will be undertaken in those areas disturbed by construction. This would include the design, selection, and installation specifications to re-establish plant material similar to what is common to the wetland. Of particular importance is the re-establishment of vegetation along the edges of the access roads where they penetrate the wetland. The EPP will address how the wetland edges adjacent to the access road could be restored. The key factors associated with the design and implementation of an effective revegetation program include:

- species selection;
- plant source availability; and
- plant installation.

Plant selection will be governed by the guidelines and regulations for the use of local native species and will focus on identifying those species that are dominant within the wetland. This might include Ericaceae, Myrica, Ilex, sedges and grasses. Plant source availability may also be governed by guidelines and regulations concerning field collection techniques. Since it is often difficult to acquire native species from nurseries, other approaches, including field collection and seeding, may have to be adopted. The study team is interested in working with the regulatory agencies to identify, or develop, ways to acquire such plant species. Species selection and species availability should be integral components of Project design and detailed in the EPP. There are one or two nurseries in the province that have experience in propagating native wetlands species, but good planning and sufficient notification is essential to ensure the availability of the required species.

An alternative for plant acquisition is the controlled harvesting of wetland plant material from the site. This may be the best way to ensure that the correct species are used, i.e., the plant material comes from the proposed alignment.<sup>39</sup> Another option for effective revegetation would involve locating native seed sources and hydroseeding the disturbed edges of the access roads and other areas.

The construction of the access roads and the foundations of the WTGs will fragment the wetland, but will not result in a substantive loss of critical habitat. Through the use of standard and accepted industry procedures and identified mitigation measures, adherence to applicable regulations and guidelines, and waste management planning, the construction stage of the Project will not result in a significant adverse effect on the functioning of this wetland.

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<sup>39</sup> The methodology would involve the careful selection by a qualified professional of selected wetland plant material and the removal of vegetative mats measuring no larger than 1 metre square and about 20 centimetres deep from the alignment. This would be best done when the wetland is frozen as it protects the harvested plant materials. The vegetative mats would be stored on site until such time as they are reinstalled along the edges of the access road, or wherever disturbance has occurred. The material is set back into the landscape at grade and, with the spring thaw, would melt into the wetland. This practice has been successfully implemented elsewhere including a 6 hectare site in Anchorage, Alaska, supervised by a member of the project team.

*Project Operation:* Assuming the successful installation of Rows A and B, Project operation should have minimal further effect on the wetland, and the wetland should settle to a new equilibrium. The most likely pathway for further impact is an accidental release of a hazardous material during turbine maintenance or when machinery is necessary on site to facilitate repairs. ATVs will likely continue to use the lands in this area, maintenance vehicles will use the access roads as required and others, including pedestrian visitors to the site, will travel through and around the area of the wetlands unimpeded. Through the application of applicable regulations and guidelines, the implementation of mitigation measures and the application of good management practices, the operation of the proposed Project will not result in a significant adverse effect on the wetland.

*Project Decommissioning:* the decommissioning of the Project would involve the dismantling and removal of the WTGs and the reasonable rehabilitation of the Project site. There would be no excavation of bedrock involved, and the underground cables and concrete pads at the site would remain in place. In summary, the decommissioning of the site will be undertaken in an environmentally responsible manner.

*Malfunctions and Accidents:* beyond the accidental release of a hazardous material, malfunctions are most likely to involve the stoppage of one or more of the WTGs. The measures advocated to address spills and minimize sedimentation would be applied as appropriate.

Malfunctions and accidents are not predicted to have a significant adverse effect on the wetland.

*Cumulative Assessment:* although the construction and operation of the proposed Project will occur in the same timeframe as the construction of the Dennis Point wharf, there is no spatial connection between the latter and the wetland. There are no known works that will take place in or in the vicinity that might act cumulatively with the proposed Project to cause a significant adverse effect on the wetland. It is likely, however, that the ATV use of the area will continue and that there will continue to be some degradation to the site. The proposed Project will not act cumulatively with this ATV use to cause a significant adverse impact on the wetland.

*Sustainable Use of Renewable Resources:* N/A.

*Residual Environmental Effects Assessment:* **the Project is not anticipated to have a significant residual environmental effect on the wetland, i.e., low.**

#### **5.1.4 Birds**

Birds breed, visit and fly over the Project site. It is also known that the Tusket Islands' area is home to several internationally valued species of bird (see Section 3.1) and that The Brothers, some 4 km distant from the Project site, is home to the Roseate Tern. This species, which is secure globally, is rare throughout its range in Nova Scotia.

*Pathways:* there are several pathways associated with the construction and operation of the Project that could have an adverse impact on the bird population of the area. These include:

- those activities that may adversely effect marine water quality;
- the construction of the access roads and towers;

- the WTGs as freestanding structures and the rotating blades; and
- lights on the WTGs.

*Boundaries:* the spatial boundaries encompass the entirety of the Project site and extend to include those areas that may be influenced by a pathway that may adversely effect bird habitat beyond the Project area. The temporal boundaries encompass both construction and Project operation.

*Project Construction:* clearly there will be a footprint where the wind towers are located and access roads constructed to the towers for construction, maintenance and decommissioning. This will result in some minimum habitat loss to locally breeding species. The Atlas of Breeding Birds has distributional resolutions of only 10 km (100 square kilometres). Of all the birds of special concern that are found in the 10 km blocks that includes Pubnico Point, only the Black-billed Cuckoo (S3B) might find appropriate breeding habitat in the Project site, but as detailed in Section 3.2.5 this seems unlikely. This species is narrowly distributed in the province, and the Project site does not represent a special refuge for them. During field work undertaken in early June, 2003, 37 species of bird were identified at the Project site (see Section 3.2.5 and Table 3.5). As indicated in Section 3.2.5, all identified species are globally secure and most are secure at the sub-national level. None of the mainland species are provincially listed at the yellow or red levels used by the Province of Nova Scotia. The Common Tern (*Sterna hirundo*) is a yellow listed species, but it breeds on the offshore islands, not on the mainland. It was also pointed out by a local birder that it was an unusual occurrence to see terns in the area of the proposed wind farm as it is not foraging area for these birds (see footnote #23). The same informant indicated that it would be extremely rare to see a Roseate Tern anywhere in the vicinity of Pubnico Harbour.

The Project site shows little habitat diversity. Construction activity will disturb lands in the vicinity of the four defined corridors east/west across the site for a limited period of time, i.e., weeks during the winter of 2003-2004 and through one breeding system. Beyond the access roads, the sites of the WTGs and the laydown areas, the balance of the site, i.e., the greater portion of the site, will not be disturbed. In the circumstances, Project construction is unlikely to severely impact the numbers or diversity of bird species breeding in the Project site.

*Project Operation:* the greater concern, beyond the small portion of habitat lost to the WTGs and access roads, are the effects of the rotating turbine blades. Another question is whether or not birds are attracted to lights. The field work executed in late spring of 2003 documented breeding birds. Not only is it widely thought that birds that are resident in the vicinity of wind farms quickly become acclimated to them (Kingsley and Whittam, 2001), but there are several strategies that can be employed to reduce bird mortality. These include the following:

- Painting the turbine blades to make them more visible to birds;
- Installing anti-perching devices;
- Ensuring that the WTGs are no taller than 100-150 m;
- Installing warning devices that employ sound or visual cues; and
- Using white strobe lighting.

Given that the towers which are to support the turbines are not of a latticework design, birds will not be attracted to them for perching (and therefore not fly into the blades upon approaching or departing the tower). They are also within the above suggested height recommendations. Further, water birds, i.e., gulls,

cormorants and ducks, are unlikely to be significantly affected, since they generally remain offshore, or at the shoreline.

The bird species most at risk are migrating raptors and song birds. According to Kingsley and Whittam, birds typically migrate at altitudes of greater than 500 feet (approximately 153 m), well above the top of the turbine blades. (Kingsley and Whittam, 2001). Collisions by migrants are most likely to occur during the first two hours after nightfall at the initiation of migration when birds are at a low climbing altitude (Bonneville Power Administration, 1987). The extent of migration through Pubnico Point has not been measured, but a local bird expert does not consider the spring movement of birds to this site to be large. The fall movement may include raptors, which are more likely to be crossing the point than flying along it.

Although Pubnico Point is a peninsula, it is a peninsula that lies adjacent to the mainland, i.e., it does not project out into the open water like the Chedabucto Peninsula, or the North Cape in Prince Edward Island where there is also an operating wind farm. Personnel at the latter site have been monitoring bird mortality for two years during migration and have had only two bird deaths to report, one from blade impact, another from a control area (Ron Estabrooks, Carl Brothers, P.Eng., pers. comm). The mainland to the east of Pubnico Point projects a further 11+ km. south, and islands beyond that project another 10+ km south. Peninsulas which project into the water, unlike Pubnico Point which parallels the shore, are natural landfalls for birds that have been windswept out to sea; such peninsulas can also act as funnels for birds, with the tip acting as a jumping off point for crossing water. Many birds avoid crossing water and follow land for as long as they can (Kerlinger, 1999). From the databases that have been examined, the field work that has been executed, and the insight that has been received from recognized birders with many years of experience in the area, Pubnico Point is not perceived as being a peninsula that draws a disproportionate number of migrants.

It is undisputable that wind turbines kill birds, but it is also important to put such kills into perspective. The following paragraph may help to address this issue:

“One American study estimated that an average of 2.19 birds are killed annually at each wind turbine in the United States. Outside of California, the estimated fatality rate drops to 1.83 (there is no published study of the impacts of wind turbines on birds in Canada). Therefore, based on 15,000 American wind turbines in operation approximately 33,000 birds are killed each year by wind turbines in the US. 26,600 in California alone. Although 33,000 is a lot of dead birds, the overall impact is small when compared with the millions of birds that travel over wind farms each year, not to mention the millions to hundreds of millions of birds that die due to collision with transmission lines, vehicles, buildings, and communication towers each year. Even if there were a million turbines in North America, they would likely not contribute to more than a few percent of all bird collision deaths attributed to human structures”. (Whittam and Kingsley, 2003).

As indicated above, bird deaths at North Cape over a two year period have been very low. From the research undertaken, the North Cape area would appear to accommodate a greater diversity of bird species than does the Project site. If there were no other factors at play, it might be deduced that deaths at the Pubnico site might be equally low. But there are many unknowns. There is also the matter of rain and fog, both which can exacerbate the effect of birds being attracted to red warning lights on turbines. Based on Environment Canada’s records at Yarmouth airport, there are an average of 120 days with fog and 161 days with

measurable precipitation based on 50 year records. The numbers at Pubnico Point are likely to be similar. These climatic conditions may influence the number of birds killed.

Because many species breed and feed along the shores, on the offshore islands and at sea, the quality of the marine waters was identified as a potential pathway. As detailed in Section 5.1.1, the Project is not anticipated to have a significant adverse residual effect on marine water quality. This is not therefore considered a pathway that would cause adverse impact to those birds that rely on marine water quality.

The Roseate Terns, an endangered species in Nova Scotia, breeds on The Brothers Islands, approximately 4 km off the coast of West Pubnico. This site has been recognized as internationally important. A local bird expert who has been monitoring the terns at The Brothers for about 30 years can “foresee no measurable negative effect or impact with the tern colony on The Brothers” (see Appendix G). From a knowledgeable local expert who is familiar with the breeding and migrating patterns of this valued species, this is an important endorsement of the Project.

Although the evidence compiled suggests that the operation of the Project will have some impact on the bird species who migrate and breed in and adjacent to the Project site, AWPC recognizes the importance of this VEC and is willing to discuss a reasonable bird monitoring protocol, perhaps similar to that executed at the North Cape. A draft Bird Monitoring Protocol is provided in Appendix I. Transport Canada will also require that the WTGs be equipped with lights. Those at the North Cape are equipped with red flashing lights that are triggered at dusk by an automatic sensor. AWPC would welcome an opportunity to meet with the pertinent regulatory agencies including NSDNR, the Canadian Wildlife Service and Transport Canada to discuss these and related matters. As Pubnico Point is not perceived as a peninsula that draws a disproportionate number of migrant birds, the mortality associated with the operation of the wind farm should be extremely low relative to other human induced factors, especially if risk reduction strategies are employed (PNAWPPM-IV, 2001).

In summary, although there will likely be some minimum impact on birds, the operation of the wind farm will not result in a significant adverse environmental effect on this VEC.

*Project Decommissioning:* the decommissioning of the Project would involve the dismantling and removal of the WTGs. Effects on the bird population, if any, would be comparable to those experienced during Project construction. In summary, the decommissioning of the Project site will not result in a significant adverse environmental effect.

*Malfunctions and Accidents:* beyond the accidental release of a hazardous material, malfunctions are most likely to involve the stoppage of one or more of the WTGs. The mitigative measures advocated to address spills would be applied. Malfunctions and accidents are not predicted to have a significant adverse impact on birds.

*Cumulative Assessment:* although the construction and operation of the proposed Project will occur in the same timeframe as the construction and operation of the Dennis Point wharf, the latter is not anticipated to have an adverse impact on birds. The two projects will not act cumulatively to cause a significant adverse impact on birds.

*Sustainable Use of Renewable Resources:* N/A.

*Residual Environmental Effects Assessment:* **the Project is not anticipated to have a significant residual environmental effect on birds, i.e., low.**

### **5.1.5 Intertidal Habitat**

As detailed in Sections 3.3.2 and 3.3.3, the rocky intertidal zone particularly on the western side of Pubnico Harbour is a rich and dynamic ecological area. It also provides good habitat for the American lobster (*Homarus americanus*) which is locally abundant and fished commercially in the harbour and beyond, including on and around the site of the proposed cable placement. The bottom in this area is a mix of mud/sand and cobble with rocky outcrops on the sides of the channel. This is optimal habitat for all stages of the lobster (MacKenzie and Moring, 1983). The presence of lobster habitat in and in the vicinity of the proposed cable corridor is of importance to the species itself and to the commercial lobster fishermen, particularly to those that set traps in that area.

*Pathways:* the pathways that could have an adverse impact on this habitat are those activities that could adversely impact marine water quality, i.e., those discussed in Section 5.1.1 above, and those activities necessary for the preparation of the trenches, including blasting. Blasting will occur, if it is necessary, in a small part of the intertidal area on the western side of the harbour.

*Boundaries:* as the analysis in Section 5.1.1 demonstrates there will be no significant Project impact on marine water quality. The activity that may have most impact on the intertidal zone is the laying of the submarine cables. The spatial boundaries of this activity are restricted to the corridor depicted on Figure 2.2. The temporal boundaries are those associated with construction.

*Project Construction:* as stated in Section 2.2.2, it will take approximately 18 days to lay the cables across the harbour using the jetting sled. To enable installation in the intertidal zone to take place within this timeframe, the trenches required will be prepared some days in advance during periods of low water. Blasting, if it is necessary, will take place in a very controlled manner in a staggered 1 m pattern at a detonation depth of 2 m. Rubber blasting mats will be placed on the top of each charge before detonation to mitigate the sound. The main disruption to habitat will be associated with the footprint of the installation. A loss of general rugosity may result from a flattening of sections of the area following cable placement. This change may affect juvenile life stages of the lobster, which rely on the shelter provided by spaces between cobble and boulders (Sainte-Marine Chabot, 2001). Appropriate habitat could be readily re-established by the assembly a boulder ridge parallel to any flattened sections of seabed.

In local discussions it became clear that the local fishermen in the area, including the lobster fishermen, were supportive of the Project as long as the cables were installed outside the commercial lobster fishing season<sup>40</sup> (see Section 3.6.1 and Appendix G). If the cables are laid outside the commercial lobster fishing season and are installed in the timeframe indicated, the disruption to the intertidal zone and the lobster habitat associated with it will be small in extent and of a very temporary nature.

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<sup>40</sup> Should construction of the submarine cables be necessary within the lobster season, AWPC will initiate discussion with the Harbour Master and the lobster fishermen most directly involved to discuss timing and to minimize adverse effects or interference during construction. Discussions would also be instigated with the pertinent regulatory authorities.

In summary, the construction of the Project will not result in a significant adverse environmental effect on the intertidal zone.

*Project Operation:* once the cables are installed, there will be no requirement to interfere further with the habitat in the intertidal zone as long as there are no malfunctions or breaks during Project operation.

In summary, the operation of the Project will not result in a significant adverse environmental effect on the intertidal zone.

*Project Decommissioning:* as detailed in Section 5.1.1, the submarine cables, including the SAP and those in the intertidal zone, will be removed as a requirement of regulatory permitting when the Project is decommissioned. This will not involve blasting, but equipment comparable to that required for their installation. Comparable measures will be employed to mitigate adverse effects. Decommissioning will not result in a significant adverse environmental effect on the intertidal zone.

*Malfunctions and Accidents:* the configuration of the submarine cables detailed in Section 2.2.2 is such that there is sufficient redundancy accommodated in the design to enable power to continue to the grid in the event of a break or malfunction in one of the cables. Any such break or malfunction would have to be repaired, which might involve the replacement of part of a cable. This would not require additional blasting.

Malfunctions and accidents are not predicted to have a significant adverse impact on the intertidal zone.

*Cumulative Assessment:* the construction of the submarine cable system will take place in the same timeline as the dredging and dumping of materials associated with the construction of the Dennis Point wharf. The installation of the cable system across the intertidal zone should be completed prior to the start of the 2003-2004 lobster season. AWPC has established and will maintain communications with the Harbour Authority to ensure minimal, if any, inconvenience to other harbour users, including those removing materials from the Dennis Point wharf site.

The proposed Project will not act cumulatively with other activities to cause an adverse impact on the intertidal zone.

*Sustainable Use of Renewable Resources:* no significant adverse residual environmental effects on the intertidal zone are predicted; therefore, further assessment regarding the sustainable use of the intertidal zone in the vicinity of the submarine cable route is not required.

*Residual Environmental Effects Assessment:* **the Project is not anticipated to have a significant adverse residual effect on the intertidal zone, i.e., low.**

#### **5.1.6 Marine Mammals**

As indicated in Section 3.3.5, there are 21 species of whales, dolphins and porpoises and six species of seals that inhabit the waters around Nova Scotia. Fin whales and harbour porpoises frequent the inshore waters around Pubnico Point, but not, according to local fishers, within the harbour confines.



*Pathways:* as identified in Section 4.6.6, there are two pathways associated with the construction and operation of the Project that could have an adverse impact on marine mammals, namely, those activities that may adversely effect marine water quality and blasting. Blasting will occur, if it is necessary, in a small area of the intertidal area on the western side of the harbour.

*Boundaries:* The spatial boundaries associated with those activities that may have adverse consequences for marine water quality relate to the laying of the submarine cables, an activity which is largely confined both in space and in time; and to the sediment run-off and the accidental release of hazardous materials, occurrences that could have broader spatial and temporal consequences. Further detail of the latter is provided in Section 5.1.1.

*Project Construction:* As detailed in Section 2.2.2, it will take approximately 18 days to lay the submarine cables across Pubnico Harbour. Blasting, if it is necessary, will occur only in the western intertidal zone and will be completed over several days during low tide periods. The blasting will take place in a very controlled manner in a staggered 1 m pattern at a detonation depth of 2 m. Rubber blasting mats will be placed on the top of each charge before detonation to mitigate the sound. It is anticipated that the transmittal of the sound waves from this activity would extend no more than 200 m beyond the location of the blast<sup>41</sup>, i.e., no effects from this activity would be transferred to the waters outside Pubnico Harbour.

Anthropogenic noise in the marine environment, as would arise from blasting, can cause physical damage and stress to marine mammals if they are located within a certain area. This impact can be mitigated by the avoidance of blasting activity when marine mammals are in the area, or by employing tactics that “scare” the mammals away. As indicated in Section 3.3.5, while harbour seals are commonly seen in the harbour, the harbour porpoise is not. It has been seen in the waters off the Point, some 700 m distant and more from the western intertidal zone. The harbour porpoise will not be adversely impacted by the blasting. The use of acoustic harassment devices (AHDs), i.e., seal scramblers, or acoustic deterrent devices (ADDs) may be an effective means to minimize the likelihood of harbour seals being in the vicinity of the intertidal area during blasting. AHDs are used to keep seals away from aquaculture facilities; they emit omni-directional sounds in the range of 190 to 205 dB, and have been found to be quite effective on a variety of marine mammals. Olesiuk et al (1995) determined that harbour porpoises are excluded within 400 m of an AHD, and their abundance is significantly reduced within a 3.5 km radius. ADDs were designed to deter marine mammals, and have been shown to effectively stop baleen whales from entanglement in fishing gear (Simmonds et al, 2002).

Given the location of the intertidal zone with respect to the open water, and with the placement of rubber blasting mats, and the use of ADDs, any blasting that may be required on the western inter-tidal zone is unlikely to impact either the harbour seal or the harbour porpoise.

*Project Operation:* Project interactions with marine waters during Project operation are anticipated to be minimal. The most likely interface is an accidental release of a hazardous material during turbine maintenance or when machinery is necessary to facilitate repairs. In summary, by adhering to applicable regulations and guidelines, implementing mitigation measures and applying good management practices, the

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<sup>41</sup> Mike Muise, Explosives Expert, Personal communication, September, 2003.

operation of the Project will not result in a significant adverse effect on the quality of the marine environment and will therefore not have an adverse effect on marine mammals.

*Project Decommissioning:* Project interactions with marine mammals during Project decommissioning are likely to be comparable to, and certainly not more severe than, those attributed to Project construction. Blasting would not be required to remove the cable from the intertidal zone.

Through the use of standard and acceptable industry procedures and mitigation measures, adherence to all then applicable regulations and guidelines, and waste management practices, the decommissioning of the Project is not predicted to have a significant adverse effect on marine mammals.

*Malfunctions and Accidents:* beyond the accidental release of a hazardous material or a malfunction that would require the replacement of one or more of the cables, malfunctions and accidents are more likely to involve the WTGs. Replacement or repair to the submarine cables would involve the use of divers. The consequences for marine mammals would be minimal. Such repairs would not require the use of blasting.

Malfunctions and accidents are not predicted to have a significant adverse effect on marine mammals.

*Cumulative Assessment:* the construction of the submarine cables, including the blasting if required, may take place in the same timeline as the dredging and dumping of materials associated with the construction of the Dennis Point wharf. At the same time, navigation in the harbour will continue with very minimal interference from the proposed works. If the above mitigative measures are employed to minimize the effects of blasting on marine mammals, the proposed Project will not act cumulatively with other activities taking place in the area to cause an adverse effect on marine mammals.

*Sustainable Use of Renewable Resources:* no significant adverse environmental effects on marine mammals are predicted; therefore, further assessment with respect to sustaining the present populations of marine mammals in the waters off Pubnico Point is not required.

*Residual Environmental effects Assessment:* **the Project is not anticipated to have a significant residual effect on marine mammals, i.e., minimal.**

### **5.1.7 Air Quality**

As indicated in Section 3.4.2, there are at present no air quality concerns in the area surrounding the location of the proposed wind farm. Wind farms also differ substantially from most other electrical generation facilities as they do use a combustion process and therefore do not produce any air emissions.

*Pathways:* as indicated in Section 4.6.7, the generation of dust during project construction may have adverse consequences for local air quality.

*Boundaries:* The spatial boundaries associated with the construction of the Project that may effect air quality can be defined in relation to the transportation of the component parts of the WTGs on unpaved roads, the clearing and grubbing of the site, and the works necessary to build both the access roads across the site and the foundation pads for the WTGs. The temporal boundaries relate to the period associated with construction.

*Project Construction:* As illustrated on Figure 2.9, construction will take place in phases beginning this fall and will continue on an intermittent basis through the spring and summer of 2004. Much of the work associated both with the clearing and grubbing of the vegetation and the construction of the access roads, activities that can generate considerable quantities of dust in dry windy weather conditions, will take place through the late fall and winter months. At this time dust is more likely to be kept down naturally through regular precipitation events. Should, however, dust become a problem, the site can be sprayed and dust kept under control.

In summary, through the timing of construction activities and the use of standard and accepted industry procedures and mitigation measures, the generation of dust can be controlled. The construction phase of the Project is unlikely to result in a significant adverse effect on air quality.

*Project Operation:* There are no air emissions associated with the operation of the Project. Once the access roads and the WTGs have been constructed there are no major sources of dust to impact upon air quality. The access roads will not be surfaced, but they will be used intermittently during Project operation and their use will not be a major source of dust.

In summary, the operation of the project will not result in a significant adverse effect on air quality.

*Project Decommissioning:* The decommissioning of the Project will involve the dismantling of the WTGs and their removal from the site as detailed in Section 2.3.3. The probability of dust being generated is comparable to the circumstances described for Project construction. If similar mitigative measures are employed, the dust will be suppressed and there will be minimal effects on air quality.

Decommissioning is not predicted to have a significant adverse impact on air quality.

*Malfunctions and Accidents:* Malfunctions are most likely to involve the stoppage of one or more of the WTGs or a break in one or other of the transmission cables. The works necessary to facilitate the repairs, particularly if it involved the use of heavy traffic on the unsurfaced access roads could generate dust, which would be local in nature, but could in dry and windy conditions influence the air quality of the surrounding area. Watering, as detailed above with respect to dust suppression, would work as an effective mitigation measure if such was required.

Malfunctions and accidents are not predicted to have a significant adverse effect on air quality.

*Cumulative Assessment:* Based on the above analysis, dust is the only matter associated with the construction and operation of the Project that could have an adverse effect on air quality. These effects are primarily associated with construction and are localized to the Project site. The proposed Project will not act cumulatively with other activities taking place in the area to cause a cumulative effect on air quality.

*Sustainable use of Renewable Resources:* N/A.

*Residual Environmental Effects Assessment:* **The Project is not anticipated to have a significant residual effect on air quality, i.e., minimal.**

### **5.1.8 Tourism**

As detailed in Section 3.5.2, West Pubnico is the emerging center for tourism on the peninsula. Few people, however, have any reason at this time to venture further south towards the Project site. This may change with the construction and operation of the wind farm. Not all wind farms become destinations, but some do. Visitation figures at the Atlantic Wind Test Site in PEI, for example, indicate that the number of people visiting the site has increased from approximately 1,200 in 1998 to around 65,000 since the new Vesta 47s were installed in 2001. These estimates are derived from guest book sign-ins, tour counts and interpretative center head counts. The numbers quoted do not include school bus tours. Visitors come year round and student guides are employed to take visitors around the site. As the first farm of its type in Nova Scotia, there is the possibility that the proposed Project will generate considerable interest.

*Pathway:* the construction and nature of the proposed facility may itself act as an attraction to visitors.

*Boundaries:* Both the construction and the operation of the proposed Project could attract people to the site, i.e., the temporal boundaries could be long term. Spatially, the boundaries will be the Project site itself though there may be some interest at a viewing site on the eastern side of the harbour.

*Project Construction:* the movement and handling of the large structural elements that will be involved in the construction of the WTGs may attract some curiosity visitation to the site. In the interests of safety, however, public access to the construction areas will be prohibited. It may be that AWPC may want to make someone available to explain to visitors what is happening on site. If such visitations are handled constructively, perhaps through the preparation of information sheets for distribution and the preparation of one or two information boards in proximity to a designated parking area and having someone on hand at key times to provide further explanations, an increase in visitors could be beneficial to the communities of West Pubnico.

*Project Operation:* Unlike the location of the wind farm on the North Cape of PEI, there are few other attractions to draw visitors to the area in the immediate vicinity of the Project site. There are no beaches, dunes or salt marshes; there are no cafes or restaurants. Until the Project is up and running, it is difficult to predict the extent to which it will attract visitors to the area. If people are attracted, it can be anticipated that the majority would visit during the summer months. Certainly the Municipality of Argyle would have an interest, as may other members of the local business community. AWPC would work with such interests to ensure that visitors were supplied with accurate information about the facility. AWPC, however, is not in the business of tourist promotion and although they might support entrepreneurial initiatives by others, they do not have plans to develop facilities to accommodate tourism on site.

The development and operation of the Project may attract additional people to visit the area which, if monitored and appropriately accommodated could bring economic opportunities and benefits to the local area. The challenge is a community one.

*Project Decommissioning:* Project decommissioning is unlikely to generate tourist visitation to the site.

*Malfunctions and Accidents:* in the interests of safety, no members of the general public will be allowed on site during construction nor during extreme weather events. A malfunction during Project operation will not effect tourism.

*Cumulative Assessment:* the attraction of people to the Project site, whether during Project construction or operation, means more vehicles travelling Route 335. This road is unpaved beyond the last residential house. Should the Project become a significant tourist attraction, the potential increase in traffic may require that the Municipality of Argyle consider improvements to the final stretch of this road and perhaps to provide adequate parking. It is suggested that AWPC work closely with the Municipality to monitor the public interest that is shown in the site and the pressure that increased traffic is placing on the roadway.

*Sustainable Use of Renewable Resources:* N/A

*Residual Environmental Effects Assessment:* **The Project may generate economic opportunities in the local area, i.e., beneficial impact.**

### **5.1.9 Navigation**

As detailed in Section 3.5.3 there are over 150 commercial fishing vessels that use the Dennis Point and East Pubnico wharves. Other commercial and recreational vessels also ply the waters of the harbour and use the commercial and private wharfage that is located within the harbour. It is probable that at least some of the structural components for the WTGs may arrive by ship or barge through the harbour. The harbour itself is wide and deep with plenty of room for vessels to move safely around each other. The harbour channel is approximately 370 m wide and about 22 m deep. The largest vessels using the harbour on a regular basis are the herring seiners, which draw about 14 feet of water. During the fishing season, these vessels leave port at dusk and work through the night to return to berth before dawn.

*Pathways:* the principal pathways associated with the development and operation of the Project that may interfere with navigation are the actual works to lay the submarine cable, the existence of the cable when in situ and the installation of lighting on the WTGs.

*Boundaries:* The spatial boundary very much relates to the footprint of the submarine cable. The temporal boundaries encompass both the period of construction and Project operation.

*Project Construction:* It is anticipated that the laying of the submarine cables will take place over 18 days prior to the opening of the lobster season in late November, 2003. Section 2.2.2 details how the cable will be laid and indicates that navigation in the harbour may be disrupted for short periods of time during this period, i.e., hours, not days. During the cable laying process, AWPC, or the contractors working on behalf on AWPC, will be in regular contact with the Harbour Master to coordinate activities and to ensure that shipping movements through the harbour are accommodated. At no time will navigation in the harbour be totally halted as a consequence of the laying of the submarine cables.

*Project Operation:* Once the cable has been laid, there will be no interference with the daily movement of shipping through the harbour. AWPC will install notices indicating where in the harbour the cable is situated to prevent anchoring over the cable and the risk of damage to the cable. At the Open House and in subsequent discussions with some fishermen, it was suggested that the lighting that will be installed on the WTGs could act as a beacon to those at sea, particularly during storm events. The lighting would facilitate navigation back to port.

*Project Decommissioning:* As detailed in Section 5.1.1, the submarine cables will be removed as a requirement of regulatory permitting when the Project is decommissioned. This will not involve blasting, but equipment comparable to that required for their installation. Comparable measures will be employed to mitigate adverse effects. Decommissioning will not result in a significant adverse effect on navigation.

*Malfunctions and Accidents:* The configuration of the submarine cables detailed in Section 2.2.2 is such that there is sufficient redundancy accommodated in the design to enable power to continue to the grid in the event of a break or malfunction in one of the cables. Any such break or malfunction would have to be repaired. This might involve its replacement and the works necessary to do so. Malfunctions and accidents are not predicted to have a significant adverse impact on navigation.

*Cumulative Assessment:* The construction of the submarine cables may take place in the same timeline as the dredging and dumping of materials associated with the construction of the Dennis Point wharf. At the same time, navigation in the harbour will continue with very minimal interference from the proposed works. AWPC has established and will maintain communications with the Harbour Master to ensure minimal, if any, inconvenience to other harbour users, including those working at the Dennis Point wharf.

*Sustainable Use of Renewable Resources:* N/A

*Residual Environmental Effects Assessment:* **the Project is not anticipated to have a significant residual effect on navigation, i.e., minimal.**

#### **5.1.10 Commercial and Recreational Fishery**

As detailed in Section 3.5.3, Pubnico Harbour is home to approximately 150 boats that fish commercially in the waters of southwest Nova Scotia. There is some limited commercial fishing that takes place in the harbour together with a seasonal recreational fishery.

*Pathways:* The pathways that could have an adverse impact on the commercial and recreational fishery are those activities that could adversely impact marine water quality, i.e., those discussed in Section 5.1.1 above, and those activities necessary for the laying of the submarine cable.

*Boundaries:* As the analysis in Section 5.1.1 demonstrates, there will be no significant Project impact on marine water quality. The activity that may have most impact on fish in Pubnico Harbour and therefore on some facets of the commercial and recreational fishery is the laying of the submarine cables. The spatial boundaries of this activity are restricted to the corridor depicted on Figure 2.2. The temporal boundaries are those associated with construction.

*Project Construction:* construction of the submarine cables could adversely impact those who have licenses to take lobsters in the vicinity of the cable lay. As it is proposed that the cable lay be undertaken outside the lobster season, those involved anticipate little or no impact and are supportive of the Project.

*Project Operation:* Once the cables are installed, there will be no interference with the commercial or recreational fishery nor with the waters of Pubnico Harbour. Malfunctions or breaks in the submarine cable during Project operation can be addressed by divers with minimum interference to navigation or the fishery. As stated in Section 2.2.2, at no time will navigation in the harbour be totally halted and at no time will there

be an exclusion zone imposed at, or in the vicinity of, the proposed cable corridor. In summary, the operation of the Project will not result in a significant adverse environmental effect on the fishery, commercial or recreational.

*Project Decommissioning:* As detailed in Section 2.3.3, it is anticipated that when the time comes for the submarine cables to be decommissioned, the available technologies will have advanced, and there will be machinery available that works like a jetting sled, but in reverse. Such machinery already exists to lift cables in water depths greater than 100 ft. The environmental consequences of such work would be anticipated to be comparable to those associated with burying the cable both in the intertidal zone and in the deeper channel. Through the use of standard and accepted industry procedures and mitigation measures, adherence to all applicable regulations and guidelines, and waste management planning, the decommissioning of the Project is not predicted to have a significant adverse effect on the commercial and recreational fishing.

*Malfunctions and Accidents:* The configuration of the submarine cables detailed in Section 2.2.2 is such that there is sufficient redundancy accommodated in the design to enable power to continue to the grid in the event of a break or malfunction in one of the cables. Any such break or malfunction would have to be repaired. This might involve its replacement and the works necessary to do so. Malfunctions and accidents are not predicted to have a significant adverse impact on the commercial and recreational fishery.

*Cumulative Assessment:* The construction of the submarine cables may take place in the same timeline as the dredging and dumping of materials associated with the construction of the Dennis Point wharf. At the same time, navigation in the harbour will continue with very minimal interference from the proposed works. AWPC has established and will maintain communications with the Harbour Authority to ensure minimal, if any, inconvenience to other harbour users, including those working at the Dennis Point wharf.

*Sustainable Use of Renewable Resources:* No significant adverse effects on marine water quality as a consequence of the Project are predicted; therefore the further assessment of the waters of Pubnico Harbour for a commercial and recreational fishery is not required.

*Residual Environmental Effects Assessment:* **The Project is not anticipated to have a significant residual effect on the commercial or recreational fishery, i.e., minimal.**

#### 5.1.11 Quiet Enjoyment of Area

As indicated in Section 3.2.6, the proposed site has ambient noise levels consistent with a rural environment. This is valued by local residents.

Public authorities around the world use the so-called dB(A), or decibel (A), scale to quantify sound measurement. Table 5.1 provides a typical of a range of noise events associated with common circumstances that is a useful reference.

**Table 5.1: Reference to Common Noise Events**

<i>Sound Level</i>	<i>Threshold of Hearing</i>	<i>Whisper</i>	<i>Talking</i>	<i>City Traffic</i>	<i>Rock Concert</i>	<i>Jet Engine 10 m Away</i>
dB(A)	0	30	60	90	120	150

*Pathways:* Noise will be generated during the construction and operation of the proposed Project. During construction the noise will be generated by the vehicles and activities on site. During Project operation, the rotation of the blades will generate some noise. During decommissioning, the noise associated with the WTGs will cease and will be replaced for a short period by the noise associated with deconstruction activity.

*Boundaries:* the spatial boundaries are defined by the distance construction, operational or decommissioning noise carries. The temporal boundaries associated with a specific noise relate to the phase of the Project involved, i.e., construction, operation or decommissioning.

*Project Construction:* in preparing the site and during construction activities, noise will be generated by construction vehicles and related activities.

Table 5.2 provides noise levels (dBA) for a variety of heavy duty construction equipment at varying distances. It can be expected that the most intense noise would occur during site preparation, assembly of the turbine towers and the mounting of the turbine nacelle. During this period a variety of light and heavy duty construction vehicles will operate within the Project site; these will include bulldozers, backhoes, cranes, dump trucks, ready mix concrete trucks and flat-bed trucks.

**Table 5.2: Typical Construction Equipment Noise Levels at a Distance of 30 m (100 ft)**

<i>Type of Equipment</i>	<i>Noise Level (dBA)</i>	<i>@ 250 m</i>	<i>@ 500 m</i>	<i>@1,000 m</i>
Dump truck	67.1 @ 30 m	58.1	55.1	52.1
Front end loader	80.2 @ 30 m	71.2	68.2	65.2
Bulldozer	80.2 @ 30 m	71.2	68.2	65.2
Crane	81.3 @ 30 m	72.3	69.3	66.3
Backhoe	81.3 @ 30 m	72.3	69.3	66.3
Ready-mix concrete truck	85.2 @ 30 m	76.2	73.2	70.2

Note: Table 5.2 is based on the assumption that sound pressure levels diminish with distance from a point source at a rate of approximately 3 dBA for every doubling of distance from the point source.

The nearest occupied residences are located approximately 300 m to the north of the northern site boundary. Table 5.3 provides noise levels associated with selected residential environments for reference purposes.

**Table 5.3: Noise Levels Associated with Common Environments**

<i>Location Description</i>	<i>Typical Sound Pressure Level (dBA)</i>
Rural Residential Environment	38-46
Suburban Residential	48-52
Urban Residential	58-62

Construction activities will take place in three principle phases (see Figure 2.9). By limiting construction activities to daylight hours five days a week, construction noise impacts may be significantly reduced. As distance from the site increases, noise levels will be mitigated. Nevertheless noise from construction activities may be heard by, but is unlikely to be a nuisance to, local residents within 500 m of the site.



Construction noise may also temporarily disrupt the activities of fauna and birds at or in the vicinity of the Project site.

In summary, although noise resulting from construction activities may cause some temporary inconveniences, the noise generated by the construction activities will not result in a significant adverse environmental effect.

*Project Operation:* rural areas are often more sensitive to noise intrusion than urban areas because of relatively low ambient noise levels. Such levels will vary and will depend on many factors including the nature of rural activities, e.g., the passage of boats, tractors, and other factors, including climatic conditions, e.g., wind. As indicated in Table 5.2, noise in a typical rural residential environment can be expected to be in the vicinity of 38-46 dBA. It has been found to be easier in practice to calculate the potential sound emissions from wind farms than to measure them, because to attain an accurate measurement the sound level has to be some 10 dB(A) above the background noise. With typical ambient background levels frequently greater than 30 dBA, this can be difficult. Reliance is therefore placed on calculation.

The amount of disturbance, absolute and relative, associated with a particular source depends on a number of factors including distance from the source, the level and type of background noise, the nature of the source (frequency, time pattern and intensity), the prevailing climatic conditions, topography, vegetation, etc. Table 5.4 provides noise levels (dBA) at defined distances for select wind turbines<sup>42</sup>. The noise levels at 200 metres (43.8 – 46.5 dBA) are equivalent to ambient rural noise levels, and are approximately what would be experienced in the interior of an average home (45 dBA). As the nearest occupied residence is approximately 300 metres distant from the northern row of turbines, the wind turbines should in most circumstances be inaudible at that distance.

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<sup>42</sup> Since AWPC has yet to select the type of turbine that will be used at Pubnico Point, for the purposes of this analysis, reference was made to the work done for the assessment of noise levels for the turbines proposed for the Toronto Waterfront.

**Table 5.4: Noise Levels of Various Wind Turbines at Select Distances**

<i>Type of Turbine</i>	<i>Total Height<sup>a</sup></i>	<i>Noise Levels (dBA) at Select Distances<sup>c</sup></i>
(Vestas) V47-660 kW	63.5-78.5 m <sup>b</sup>	46.5 @ 200 m 44.4 @ 250 m 42.7 @ 300 m 37.4 @ 500 m <sup>d</sup>
(Tacke) TW 600	71 m	44.3 @ 200 m 39.0 @ 300 m 35.6 @ 400 m
(NEG Micon) NM 750/48	69.1-94.1 m <sup>b</sup>	43.8 @ 200 m 43 @ 250 m 38 @ 300 m 35 @ 500 m

a Total Heights based on hub height and radius of blade circumference

b Depending on type of tower and/or base actual heights may vary

c Vestas V 47-660 kW noise levels (dBA) taken at 10 m with a wind speed of 28.2 km/h  
Tacke TW 600 noise levels (dBA) taken at wind speed of 28.8 km/h

d Vestas V 47-660 kW and NEG Micon NM 750/48 noise levels (dBA) taken at 500 m; Tacke TW 600 noise level (dBA) taken at a distance of 400 m

As a check on the above and as a means to estimate noise levels at the wind farm itself, a Danish noise calculated model was run based on the proposed configuration of 17 WTGs in four rows. Figure 5.1 shows the results. At a mid-point between four WTGs in the midst of the site, the noise level would be in the vicinity of 45-49 dBA, a noise level slightly less than might be anticipated in a typical suburban residential environment. Within 200 m or less the noise level is less than 45 dBA.

In summary, the noise levels associated with the operation of the proposed turbines will not result in a significant environment effect.

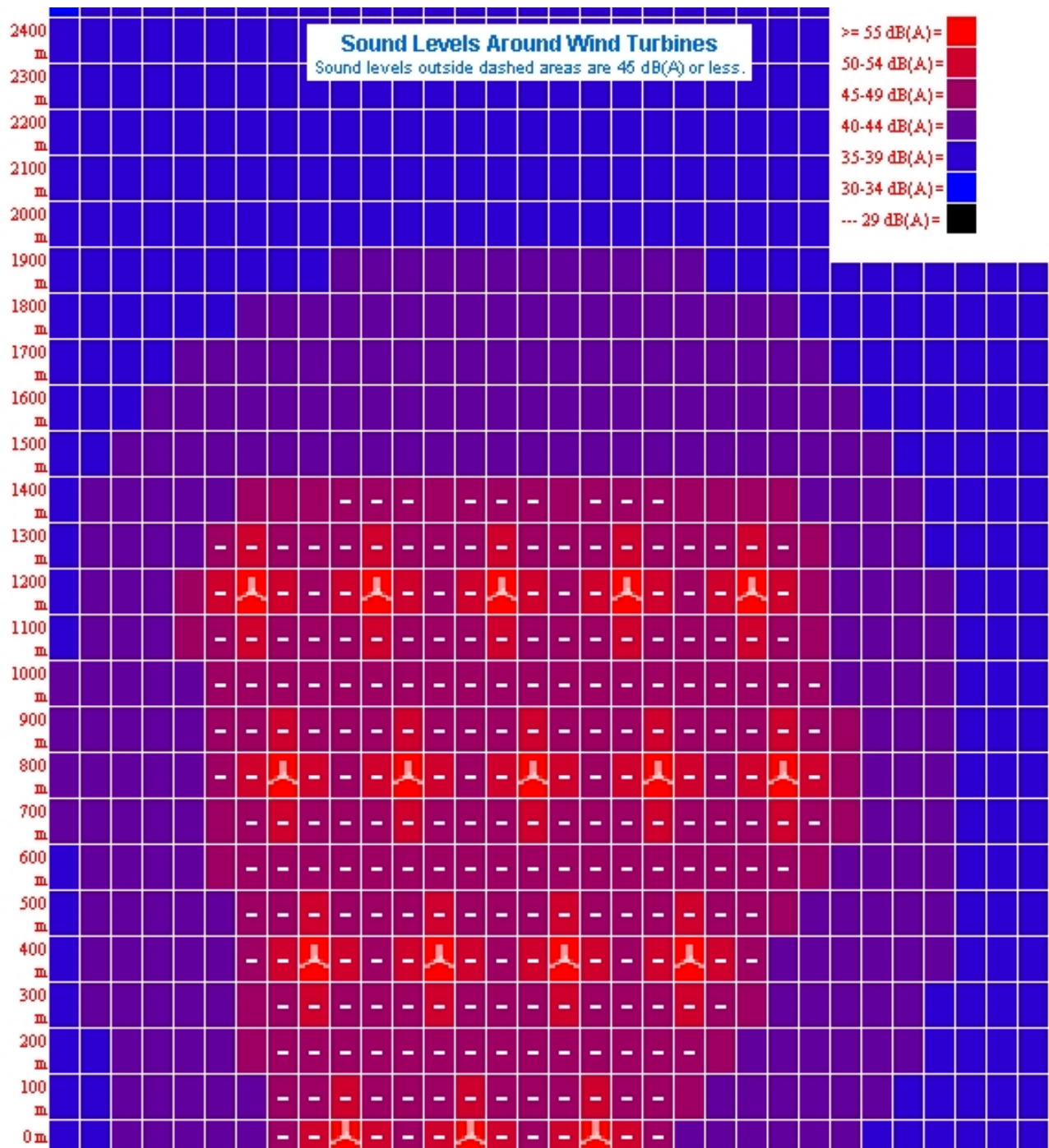
*Project Decommissioning:* the decommissioning of the WTGs would necessitate the use of vehicles and the activities associated with Project construction. As noise levels could be predicted to be comparable, the impact would likely be similar.

In summary, the noise impacts that would be associated with decommissioning will not result in a significant adverse environmental effect.

*Malfunctions and Accidents:* malfunctions and accidents are unlikely to cause any increase in noise levels apart, perhaps, for the temporary sounds associated with construction or emergency vehicles.

In summary, any noise that may be associated with malfunctions and accidents are not predicted to have a significant adverse environmental effect.

*Cumulative Assessment:* the distance between the Project site at Pubnico Point and construction activity at the Dennis Point wharf site will mitigate noise from both.



No. of turbines = 17

Source sound levels in dB(A) = 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100,

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Figure 5.1: Sound Modelling

In summary, noise that may be generated at Pubnico Point, particularly during construction, will not act cumulatively with noise associated with construction of the Dennis Point wharf to cause a significant adverse environmental effect.

*Sustainable Use of Renewable Resources:* N/A.

*Residual Environmental Effects Assessment:* **noise generated by the Project during construction, operation, or decommissioning, is not anticipated to have a significant residual effect, i.e., minimal.**

#### **5.1.12 Safety**

Icing of the blades is perhaps the most likely event to pose both technical and safety concerns. Icing is also the predominant safety concern expressed by the public with respect to wind turbines. As the aerodynamic properties of the blades are sensitive to even minor changes in the blade profile, icing of the blades can result in production issues. Icing is therefore a technical issue that is addressed through the application of sound and detailed engineering and quality control. Braking systems, pitch controls and related speed controls should prevent design limits from being exceeded. These controls automatically stop the turbine from turning at high wind speeds.

Icing occurs at temperatures below 0°C when there is humidity in the air. The type, amount and density of ice depends on both meteorological conditions and on the dimensions and type of structure (moving/static). Despite the relatively mild ambient winter temperature in southwest Nova Scotia, it can be expected that there will be 10-20 freezing rain events in an average year. The engineering of the WTGs will take this and other climatic factors into account in the design, installation specifications and operating procedures. Since wind farms are operating in countries in northern latitudes, e.g., Finland, Sweden, etc., and at high altitudes, there is a substantive track record of wind farms operating safely in comparable and worse climatic conditions to those experienced at Pubnico Point.

*Pathways:* the factors that could cause icing to occur and cause a safety hazard are specific climatic conditions, i.e., freezing rain or melting snow. The use of large equipment poses its own safety issues.

*Boundaries:* the spatial boundaries associated with icing are restricted to the Pubnico Point wind farm site. The temporal boundaries include both construction and decommissioning, but are primarily associated with Project operation.

*Project Construction:* the intent is to construct the turbines in three phases (see Figure 2.8). If this is accomplished, construction will occur outside the periods of severe winter weather. Nevertheless, those who will be responsible for the construction of the turbines will receive training on the hazards of ice forming on tall structures during construction.

Based on appropriate training and construction taking place in moderate weather conditions, icing is not anticipated to be an issue during construction.

*Project Operation:* ice has been known to accumulate on rotating blades under conditions of freezing rain, or melting snow. Safety issues can arise if anyone is in the vicinity of a turbine when ice slides, or is thrown off the blades. In a remote area, such as the Project site, the distances between the rows, the individual turbines

and to other land uses serve as effective mitigation. As a further safe-guard, AWPC should instigate a flag placement and post a falling ice warning protocol if, and when, ice is perceived to be an issue. This necessitates that operational staff are trained to be aware of the conditions likely to lead to ice accumulation on the turbine and of the risk of ice falling.

In summary, there are mitigative measures that need to be implemented, but icing is not anticipated to pose a significant environmental effect during Project operation.

*Decommissioning:* the decommissioning of the WTGs would pose comparable safety issues associated with icing as would occur during Project construction. Comparable mitigative strategies should be employed.

In summary, icing is not anticipated to pose a significant adverse environmental effect during decommissioning.

*Cumulative Assessment:* safety, and more specifically icing, is an issue related to the proposed Project. There is no interaction with other works taking place in a similar timeframe that would aggravate icing.

*Sustainable Use of Renewable Resources:* N/A.

*Residual Environmental Effects Assessment:* **icing that occurs during the construction, operation, or decommissioning of the Project is not anticipated to have a significant residual effect, i.e., low.**

#### ***5.1.13 Public Access to Pubnico Point***

A number of people, including representatives of the Acadian Band and the Native Council of Nova Scotia, asked whether access to Pubnico Point would be restricted during the development and operation of the wind farm. In response, it is important to differentiate between the Project site per se and Pubnico Point. Route 335 is a public road that provides access from Highway 103 to the lands and properties on the peninsula, including the Project site. Route 335 also provides public access to the lands and shores beyond the Project site. Route 335 will remain a public road, and access along this road will at all times be uninhibited.

*Pathways:* the pathways that could inhibit access to the Project site could include direct actions by AWPC during construction, operation or decommissioning.

*Boundaries:* the spatial boundaries associated with access are restricted to the Pubnico Point wind farm site. The temporal boundaries include both construction and decommissioning, but are primarily associated with Project operation.

*Project Construction:* the public will be restricted from the Project site during construction. This period will be of relatively short duration and will take place in several phases (see Section 2.4), but while there are heavy vehicles, excavation and related activities occurring on site, the public will be prohibited in the interests of safety.

In summary, access will be restricted to the site during Project construction. Public access will not be restricted on Route 335 and to the lands beyond the Project site.

*Project Operation:* there is no intent by AWPC to fence the entire Project site and thereby to limit access during Project operation. Consideration, however, is being given to gating the access roads from Route 335 to the turbine rows to discourage the traversing of the site by ATVs, but a final decision has not yet been made. During normal turbine operation, there are no safety concerns associated with the movement of people, or animals, in the vicinity of the towers. The exception relates to those weather conditions in winter that may result in a build up of ice on the blades and ice sheering. Warning signs will be posted on each access row advising the public of the potential danger of falling ice during winter-like conditions. Those personnel responsible for the site will also be particularly diligent of potential concerns during such weather conditions.

In summary, the operation of the Project will not result in a significant adverse impact on public access.

*Decommissioning:* the decommissioning of the WTGs would pose safety issues with respect to access to the site comparable to those associated with Project construction.

In summary, the decommissioning of the Project will not result in a significant adverse impact on public access.

*Cumulative Assessment:* access is an issue unique to the proposed Project. There is no interaction with other works taking place in a similar timeframe that would impact access to the Project site or Pubnico Point.

*Sustainable Use of Renewable Resources:* N/A.

*Residual Environmental Effects Assessment:* **the Project is not anticipated to have a significant adverse residual effect on access to the Project site or to Pubnico Point, i.e., minimal.**

#### **5.1.14 Aboriginal Interests**

As indicated in Section 3.5.3, the three concerns raised by the Acadian First Nation were as follows:

- concerns about the potential effects to the LFA 34 lobster fishery as a result of the proposed sub-sea transmission line;
- potential concerns relating to the traditional use of the turbine site and surrounding areas; and
- the socio-economic benefits to Acadia.

*Pathways:* the pathways of most relevance are those that could adversely impact marine water quality, i.e., those discussed in Section 5.4.1 above, those that might disrupt pre-contact archaeological artifacts on site and those activities that might bring benefits to the community at large and the aboriginal population in particular, e.g., project expenditures and the creation of employment.

*Boundaries:* the spatial boundaries include the marine waters around Pubnico Point and the land area where the wind farm will be constructed. The temporal boundaries are those associated with both Project construction and Project operation.

*Project Construction:* as discussed in Sections 2.2.2, the proposed cables will be buried to a depth of 1.2 metres. Although navigation in Pubnico Harbour will be disrupted for short periods of time during the cable lay, at no time will it be totally halted. Two other factors are important to the perceived effects to the LFA 34 lobster fishery; these are:

- i) that the harbour bottom will return to its previous state very soon after the laying of the cables, i.e., there will be minimum, if any, disturbance to in situ habitat; and
- ii) that it is the proponent's intent to lay the cables across Pubnico Harbour in the fall, i.e., outside the lobster season.

As detailed in Sections 5.1.1 and 5.1.5, no adverse impacts are anticipated with respect to either marine water quality or to intertidal habitat.

The Acadian Band and the Native Council of Nova Scotia (NCNS) both indicated that there had been some past use of Pubnico Point by one or more aboriginal families for traditional purposes. Neither the Band nor the NCNS offered specific information, but both expressed concern that there may be archaeological relics of interest. Both also expressed an interest in receiving information on Dr. Steve Davis' work. As indicated in Section 3.4.4, Dr. Davis did not find any cultural resources that would be adversely impacted by the Project. He was also of the opinion that pre-contacts finds would be unlikely on such an exposed point of land when there were many more favourable areas in southwest Nova Scotia. Dr. Davis had the opportunity to explain and discuss his findings with representatives of the Acadian Band and copies of his report have been forwarded to the Chief of the Acadian Band. The same information will be forwarded to NCNS if requested.

While both the Acadian Band and the NCNS support the use of renewable resources for the generation of electricity, both are also interested in being kept informed about the Project and of the economic benefits that may accrue to them and to the region. Obviously the greatest economic opportunity associated with the Project in terms of direct employment will be generated during construction. During Project operation the economic benefits will be more indirect.

AWPC has committed to keep both the Acadian Band and the Native Council of Nova Scotia informed of the Project as it proceeds, and to engage in open and fair practices in awarding contracts.

In summary, the construction of the Project will not have a significant adverse environmental effect on the interests of the aboriginal population.

*Project Operation:* as indicated above, both the Acadian Band and the NCNS have expressed an interest in the generation of energy from a renewable resource, namely wind. The actual operation of the wind farm will in no way inhibit any of their interests, or their use of the lands and waters at Pubnico Point.

In summary, the construction of the Project will not have a significant adverse environmental effect on the interests of the aboriginal population.

*Project Decommissioning:* decommissioning would involve the removal of WTGs and associated above ground infrastructure to ensure that the Project site was safe. Such activities might generate contract and employment opportunities.

In summary, the decommissioning of the Project will not have a significant adverse environment effect on the interests of the aboriginal population.

*Malfunctions and Accidents:* malfunctions and accidents are unlikely to pose any concern for the aboriginal population. In summary, malfunctions and accidents are not predicted to have a significant adverse effect on the aboriginal population.

*Cumulative Assessment:* N/A.

*Sustainable Use of Renewable Resources:* N/A.

*Residual Environmental Effects Assessment:* **the Project is not anticipated to have a significant adverse residual effect on the interests of either the Acadian Band or the NCNS, i.e., minimal.**

### **5.1.15 Landscape**

Despite a significant literature search, the value of one landscape in comparison to another, or what detracts or adds to landscape interest, is largely subjective. Wind Farms in Britain and parts of Europe have been opposed as spoiling valued rural and coastal landscapes. Many, on the other hand, find them attractive. The 17 wind WTGs rising 120 metres above the landscape and situated at the end of Pubnico Point will be highly visible.

*Pathways:* the pathways are those activities during construction that change the visual features of the Project site, particularly the transportation and assembly of the large WTGs. The WTGs themselves become the pathway during Project operation.

*Boundaries:* the spatial boundaries relate to the viewshed of the site during both construction and operation. The former will be shorter than the latter. The temporal boundaries are associated with Project construction and operation, but the latter is usually perceived as the most important.

*Project Construction:* the construction of the wind farm, particularly the construction of the WTGs, may be viewed by local residents as a temporary visual nuisance; on the other hand, the handling of the large structural members may be considered an attraction. As indicated in Section 3.5.2, the closest properties to the Project site are approximately 300 m distant from the northern boundary of the site; the local communities are further away. Construction of the wind turbines will take place in three phases and, because it would be the first park of its type in Nova Scotia, is likely to attract curious onlookers from both the local neighbourhood and beyond. Because of the interest that may be generated, AWPC will designate someone during the period of construction to provide information to visitors and to direct them to where they may safely observe what is taking place. As indicated in Section 5.1.13 above, the general public will be banned from casual intrusion into construction areas in the interests of safety. The more normal visual effects of a construction site can to some extent be offset by the maintenance of a tidy site, the restoration of the disturbed areas in a timely manner and the expedient removal of excess construction material and equipment.

In summary, the construction of the wind farm may generate some interest and attract visitors to the site; it will not result in a significant adverse environmental effect on the landscape.

*Project Operation:* once constructed and in operation concerns pertaining to the visual affect of the proposed wind farm on the landscape are largely subjective. Some people may dislike the visual appearance of WTGs in a rural landscape, but this site, it must be stressed, is remote from the highest trafficked tourist areas and is



not in proximity to a park or other comparable destination. Equally clearly, many people are curious about and like the visual appearance of modern wind towers.

The key viewsheds include views across the harbour from Lower East Pubnico, from Route 335 on approach to the site and from offshore. Given their height, the WTGs will be easily visible from Lower East Pubnico, from various locations on the east side of the harbour and from offshore. In the absence of a detailed vegetation survey and appropriate modelling, it is more difficult to determine at what point on Route 335, the WTGs will become visible.

In one study, (Cape Wind Associates LLC)<sup>43</sup> on the aesthetics of wind farms, it was reported that a single monopole of less than 60 metres was visible from 10 kilometres off shore. The Atlantic Wind Test Site, located at North Cape, PEI, at which WTGs are approximately 50 metres in height, is barely visible on a clear day from 15 kilometres away at Skinners Pond. In a visual analysis undertaken for a flare stack at the gas plant at Goldboro for the Sable Offshore Energy Project (SOEP, 1996)<sup>44</sup>, it was determined that the 140 m flare stack, could just be seen from approximately 6 kilometres offshore. The apparent inconsistencies reflect differences in topography, vegetation and climatic conditions. It can be assumed that the wind farm will be visible from a distance of 5-8 km depending on local vegetation, topography and climatic conditions.

As reported in the environmental assessment of three wind turbines proposed for the Toronto Waterfront (Dillon, 2000) with respect to a study to evaluate the experience of people who live near 24 wind turbines at the Cemmaes Farm in Wales, the following was stated: “Being able to see wind turbines did not bother the majority of people and led in some cases to respondents expressing increased interest and even pride in the machines”. The most common word (62%) chosen to describe the look of the turbines was “interesting”. Based on the interest that has been expressed locally, it is anticipated that most residents will accept and be interested in the changed landscape.

In summary, the operation of the wind farm will not result in a significant adverse environmental effect on the landscape.

*Project Decommissioning:* the decommissioning of the turbines would involve activities comparable to Project construction, and may generate some interest. In summary, the decommissioning of the Project site will not result in a significant adverse environmental effect.

*Malfunctions and Accidents:* N/A.

*Cumulative Assessment:* N/A.

*Sustainable Use of Renewable Resources:* N/A.

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<sup>43</sup> US Army Corps of Engineers. No date. Environmental Assessment and Statement of Findings. Internet Publication: <http://www.nae.usace.army.mil/>

<sup>44</sup> The Sable Offshore Energy Project (SOEP), 1996. Addendum 2 – Gas Plant and Nearshore Marine Pipeline Assessment.

*Residual Environmental Effects Assessment:* **the construction, operation and decommissioning of the proposed Project is not predicted to have a significant adverse residual effect on the landscape at Pubnico Point, i.e., low.**

#### **5.1.16 Property Values**

Whenever a new use, particularly an industrial or commercial use, is introduced into an area, there is often concern that such a use will cause a decrease in local property values.

*Boundaries:* the spatial boundaries are difficult to define, but may be assumed to include all the Pubnico communities. The temporal boundaries are primarily associated with Project operation.

*Project Construction:* given the short duration of the construction and the fact that it involves activities comparable to those employed on any commercial or industrial development site, construction activities are unlikely to cause any change in property values. In summary, the construction of the Project will not result in a significant adverse effect on property values.

*Project Operation:* a literature search indicated that there has been little research into the consequences of wind farm development on property values. In any consideration of changing property values, many factors must be taken into account; these include, but are not limited to, the following: local demographic change, the economy including industrial and commercial investment in the area, the age and type of house, etc. Seldom is one factor by itself the reason for changes in property values.

One recent study undertaken in the US did attempt to determine the effect of wind development on local property values (REPP, 2003). This study reported that of 25,000 records of property sales in both the US and Europe within 8 km of wind turbine viewsheds, the majority of property values rose more quickly than the values of equivalent property in comparable communities outside the viewshed. It was also found that values increased faster in the viewshed after the wind projects came online than they did before. Such findings do not imply that property values in the Pubnico communities will increase, but it is a reference that such developments do not necessarily negatively impact property values.

In summary, the operation of the Project is unlikely to result in a significant adverse effect on property values.

*Project Decommissioning:* given the timeline to decommissioning, it is impossible to predict what effects Project decommissioning may have on property values.

*Malfunctions and Accidents:* N/A.

*Cumulative Assessment:* the development and operation of the proposed wind farm will take place in the same timeline as the development of new wharf space at Dennis Point. This investment perhaps reflects confidence in the local economy, which may in turn attract further investment to the area. Such a trend could have a positive effect on property values.

In summary, such investments in the local economy may act cumulatively to the benefit of the local economy. The proposed Project is unlikely to act cumulatively with others to cause an adverse impact on local property values.

*Sustainable Use of Renewable Resources: N/A.*

*Residual Environmental Effects Assessment: the Project is not anticipated to have a significant adverse residual effect on property values, i.e., minimal.*

## **5.2 Effects of the Environment on the Project**

### ***5.2.1 Climatic Fluctuations***

The Project will be designed and installed with reference to the most recent meteorological and climatological information available to the engineers and the manufacturers of the equipment. The design will allow for natural occurrences that can reasonably be expected in the vicinity of the proposed site including high winds, lightning, occasional freezing rain and snow. AWPC has, for example, been conducting wind monitoring at the site to facilitate both the micro siting of the WTGs and the selection of the best technology for the WTGs.

### ***5.2.2 Extreme Events***

Increasing concentrations of greenhouse gases in the atmosphere are believed to be causing global warming (IPCC 1990; IPCC 1995), which in turn is anticipated to cause one or more of the following: rise in global sea level, increased storm intensity including increased winds and storm surges. The design of the WTGs incorporates a factor of safety to address anticipated changes in weather severity during the lifetime of the Project, including storm events. The equipment, for example, will stop functioning when winds reach approximately 90 km per hour. Project personnel, including the equipment manufacturers, are also aware of the work being done with respect to climatic change and are implementing improvements to production equipment, monitoring procedures and operational practices on a regular basis. Personnel on the ground will be trained in the protocols that have to be instituted in the event of an extreme climatic event; these protocols will also form part of the Contingency and Safety Plan, a document that will also be updated on a regular basis as is necessary or required to address changing regulations.

## **5.3 Summary of Potential Environmental Impacts and Cumulative Effects**

Table 5.5 summarizes the potential environmental impacts of the construction, operation and decommissioning of the proposed Project on the 16 identified VECs and socio-economic issues.

Given the location of the proposed site at the south of Pubnico Point at some significant distance from the more inhabited parts of the peninsula, the Project is not anticipated to act cumulatively with other new works or existing activities to adversely impact any of the identified VECs or socio-economic activities. Indeed the development of the wind farm may act cumulatively with other trends in southwest Nova Scotia to increase visitations to Pubnico Point. Lighting on the WTGs may be seen by some as an aid to navigation, particularly in poor weather conditions.

**Table 5.5: Summary of Impacts**

<i>VEC/ Socio-economic Issue</i>	<i>Pathway(s)</i>	<i>Impacts</i>	<i>Mitigation Measures</i>	<i>Residual Environmental Effects</i>	<i>Level of Residual Impact</i>
<b>A) CONSTRUCTION ACTIVITIES</b>					
Marine water quality	<ul style="list-style-type: none"> <li>• Disturbance of marine sediments during cable lay</li> <li>• Sediment run-off</li> <li>• Release of hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary sedimentation of water column</li> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Visual monitoring of water turbidity</li> <li>• Land buffers</li> <li>• Procedures for storage and handling of excavated materials</li> <li>• Revegetation</li> <li>• Temporary erosion control measures</li> <li>• Safe storage of hazardous materials</li> <li>• Frequent inspection of vehicles</li> <li>• Spatial restrictions re. fuelling and maintenance</li> <li>• Safe disposal of used oil and/or other lubricants, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Low
Surface and groundwater quality	<ul style="list-style-type: none"> <li>• Disturbance of sediments</li> <li>• Acidic run-off</li> <li>• Release of hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>• Sedimentation of surface waters</li> <li>• Acidic run-off</li> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• See above re. mitigation for sedimentation and hazardous materials</li> <li>• Geotechnical testing</li> <li>• Application of Sulphide Bearing Material Disposal Regulations, if necessary</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Low
Wetland	<ul style="list-style-type: none"> <li>• Grubbing &amp; clearing</li> </ul>	<ul style="list-style-type: none"> <li>• Fragmentation of wetland</li> </ul>	<ul style="list-style-type: none"> <li>• Careful design of access</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Low

<i>VEC/ Socio-economic Issue</i>	<i>Pathway(s)</i>	<i>Impacts</i>	<i>Mitigation Measures</i>	<i>Residual Environmental Effects</i>	<i>Level of Residual Impact</i>
	<ul style="list-style-type: none"> <li>• Disturbance of sediments</li> <li>• Release of hazardous materials</li> <li>• Acidic run-off</li> <li>• Continued public access to area</li> <li>• Access road construction</li> </ul>	<ul style="list-style-type: none"> <li>• Sedimentation</li> <li>• Physical disturbance of plant communities</li> <li>• Potential contamination</li> </ul>	<p>Rows A and B</p> <ul style="list-style-type: none"> <li>• Construction timing</li> <li>• See above re. mitigation for sedimentation and hazardous material</li> <li>• Revegetation program</li> </ul>		
Birds	<ul style="list-style-type: none"> <li>• Marine water quality</li> <li>• Road &amp; tower construction</li> </ul>	<ul style="list-style-type: none"> <li>• Small loss of habitat</li> <li>• Physical disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• Good engineering and design</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Low
Intertidal Habitat	<ul style="list-style-type: none"> <li>• Marine water quality</li> <li>• Laying of cables</li> <li>• Blasting</li> </ul>	<ul style="list-style-type: none"> <li>• Small loss of habitat</li> <li>• Physical disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• Small detonations</li> <li>• Use of blasting mats</li> <li>• Establishment of boulder ridge, if warranted</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Low
Marine Mammals	<ul style="list-style-type: none"> <li>• Marine water quality</li> <li>• Blasting</li> </ul>	<ul style="list-style-type: none"> <li>• Sedimentation of water column</li> <li>• Physical disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• See above re. mitigation for sedimentation</li> <li>• Use of AHDs or ADDs</li> <li>• Controlled blasting</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Minimal
Air Quality	<ul style="list-style-type: none"> <li>• Dust generation</li> </ul>	<ul style="list-style-type: none"> <li>• Poorer air quality</li> <li>• Smothering of vegetation</li> </ul>	<ul style="list-style-type: none"> <li>• Watering as needed</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
Tourism	<ul style="list-style-type: none"> <li>• Construction &amp; transportation of WTGs</li> </ul>	<ul style="list-style-type: none"> <li>• Innovative structures attract visitors</li> </ul>	<ul style="list-style-type: none"> <li>• Information</li> <li>• Parking</li> </ul>	<ul style="list-style-type: none"> <li>• Increased expenditures in area</li> </ul>	Beneficial impact
Navigation	<ul style="list-style-type: none"> <li>• Placement of submarine cables</li> </ul>	<ul style="list-style-type: none"> <li>• Interference with shipping</li> </ul>	<ul style="list-style-type: none"> <li>• Coordination with Harbour Master</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Minimal
Fishery	<ul style="list-style-type: none"> <li>• Marine water quality</li> <li>• Laying of cables</li> </ul>	<ul style="list-style-type: none"> <li>• Physical disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• See above regarding mitigation for sedimentation</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Minimal
Quiet Enjoyment of Area	<ul style="list-style-type: none"> <li>• Noise from construction</li> </ul>	<ul style="list-style-type: none"> <li>• Disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• Distance mitigates</li> </ul>	<ul style="list-style-type: none"> <li>• Distance dependant</li> </ul>	Minimal
Safety	<ul style="list-style-type: none"> <li>• Construction activities</li> <li>• Icing</li> </ul>	<ul style="list-style-type: none"> <li>• Danger to both workers and visitors to site</li> </ul>	<ul style="list-style-type: none"> <li>• No public on site</li> <li>• Adherence to safety plans</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Low

<i>VEC/ Socio-economic Issue</i>	<i>Pathway(s)</i>	<i>Impacts</i>	<i>Mitigation Measures</i>	<i>Residual Environmental Effects</i>	<i>Level of Residual Impact</i>
			<ul style="list-style-type: none"> <li>• Design rigour</li> <li>• Flagging and posting of warning notices</li> </ul>		
Public Access	<ul style="list-style-type: none"> <li>• Restrictions to site access</li> </ul>	<ul style="list-style-type: none"> <li>• No visitors on site</li> </ul>	<ul style="list-style-type: none"> <li>• Warning notices</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
Aboriginal Interests	<ul style="list-style-type: none"> <li>• See Note 1</li> </ul>				
Landscape	<ul style="list-style-type: none"> <li>• Construction of WTGs</li> </ul>	<ul style="list-style-type: none"> <li>• Visual intrusion</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
Property Values	<ul style="list-style-type: none"> <li>• Construction of WTGs</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
<b>B) OPERATION ACTIVITIES</b>					
Marine water quality	<ul style="list-style-type: none"> <li>• Accidental release of hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Safe storage of hazardous materials</li> <li>• Safe disposal of used oil and/or other lubricants, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
Surface and groundwater quality	<ul style="list-style-type: none"> <li>• Release of hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Safe storage of hazardous materials</li> <li>• Safe disposal of used oil and/or other lubricants, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
Wetland	<ul style="list-style-type: none"> <li>• Disturbance of sediments</li> <li>• Release of hazardous materials</li> <li>• Continued access</li> </ul>	<ul style="list-style-type: none"> <li>• Sedimentation</li> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Safe storage of hazardous materials</li> <li>• Safe disposal of used and/or other lubricants</li> </ul>	<ul style="list-style-type: none"> <li>• Establishment of new equilibrium</li> </ul>	Low
Birds	<ul style="list-style-type: none"> <li>• Rotation of blades</li> <li>• Lights on WTGs</li> </ul>	<ul style="list-style-type: none"> <li>• Potential of bird kill</li> </ul>	<ul style="list-style-type: none"> <li>• Good engineering and design</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Low
Intertidal Habitat	<ul style="list-style-type: none"> <li>• Marine water quality</li> </ul>	<ul style="list-style-type: none"> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Safe storage of hazardous materials</li> <li>• Safe disposal of used oil and/or other lubricants, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal

<i>VEC/ Socio-economic Issue</i>	<i>Pathway(s)</i>	<i>Impacts</i>	<i>Mitigation Measures</i>	<i>Residual Environmental Effects</i>	<i>Level of Residual Impact</i>
Marine Mammals	<ul style="list-style-type: none"> <li>• Marine water quality</li> </ul>	<ul style="list-style-type: none"> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Safe storage of hazardous materials</li> <li>• Safe disposal of used and/or other lubricants</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	Minimal
Air Quality	<ul style="list-style-type: none"> <li>• Dust generation</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	No impact
Tourism	<ul style="list-style-type: none"> <li>• Presence of wind farm</li> </ul>	<ul style="list-style-type: none"> <li>• Innovative structures that attracts visitors</li> </ul>	<ul style="list-style-type: none"> <li>• Information</li> <li>• Parking</li> </ul>	<ul style="list-style-type: none"> <li>• Increased expenditures in area</li> </ul>	Beneficial impact
Navigation	<ul style="list-style-type: none"> <li>• WTG lighting</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate navigation to harbour</li> </ul>	<ul style="list-style-type: none"> <li>• Notice of cable location</li> </ul>	<ul style="list-style-type: none"> <li>• Enhance safety</li> </ul>	Beneficial impact
Fishery	<ul style="list-style-type: none"> <li>• Marine water quality</li> </ul>	<ul style="list-style-type: none"> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Safe storage of hazardous materials</li> <li>• Safe disposal of used and/or other lubricants</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
Quiet Enjoyment of Area	<ul style="list-style-type: none"> <li>• Noise from turbines</li> </ul>	<ul style="list-style-type: none"> <li>• Physical disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Distance dependent</li> </ul>	Minimal
Safety	<ul style="list-style-type: none"> <li>• Icing</li> </ul>	<ul style="list-style-type: none"> <li>• Danger to people</li> </ul>	<ul style="list-style-type: none"> <li>• Adherence to safety plans</li> <li>• Design rigour</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Low
Public Access	<ul style="list-style-type: none"> <li>• Few restrictions</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	No impacts
Aboriginal Interests	<ul style="list-style-type: none"> <li>• See Note 1</li> </ul>				
Landscape	<ul style="list-style-type: none"> <li>• Wind farm</li> </ul>	<ul style="list-style-type: none"> <li>• Visual intrusion</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
Property Values	<ul style="list-style-type: none"> <li>• Wind farm</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
<b>C) DECOMMISSIONING &amp; ABANDONMENT</b>					
Marine water quality	<ul style="list-style-type: none"> <li>• Disturbance of sediments</li> <li>• Sediment run-off</li> <li>• Release of hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary sedimentation of water column</li> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Visual monitoring of water turbidity</li> <li>• Land buffers</li> <li>• Procedures for storage and handling of excavated</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Low

<i>VEC/ Socio-economic Issue</i>	<i>Pathway(s)</i>	<i>Impacts</i>	<i>Mitigation Measures</i>	<i>Residual Environmental Effects</i>	<i>Level of Residual Impact</i>
			materials <ul style="list-style-type: none"> <li>• Revegetation</li> <li>• Installation of temporary erosion control measures</li> <li>• Safe storage of hazardous materials</li> <li>• Frequent inspection of vehicles</li> <li>• Spatial restrictions re. fuelling and maintenance</li> <li>• Safe disposal of used oil and/or other lubricants, etc.</li> </ul>		
Surface and groundwater quality	<ul style="list-style-type: none"> <li>• Disturbance of sediments</li> <li>• Release of hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary sedimentation of surface waters</li> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• See above regarding mitigation for sedimentation</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Low
Wetland	<ul style="list-style-type: none"> <li>• Disturbance of sediments</li> <li>• Release of hazardous materials</li> <li>• Continued access</li> </ul>	<ul style="list-style-type: none"> <li>• Sedimentation</li> <li>• Potential contamination</li> </ul>	<ul style="list-style-type: none"> <li>• See above regarding mitigation for sedimentation</li> <li>• Revegetation program</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Low
Birds	<ul style="list-style-type: none"> <li>• Marine water quality</li> <li>• Tower dismantling</li> </ul>	<ul style="list-style-type: none"> <li>• Sedimentation</li> <li>• Physical contamination</li> </ul>	<ul style="list-style-type: none"> <li>• See above regarding mitigation for sedimentation</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Low
Intertidal Habitat	<ul style="list-style-type: none"> <li>• Marine water quality</li> <li>• Removal of cables</li> </ul>	<ul style="list-style-type: none"> <li>• Sedimentation</li> <li>• Physical disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• See above regarding mitigation for sedimentation</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Low
Marine Mammals	<ul style="list-style-type: none"> <li>• Marine water quality</li> <li>• Removal of cables</li> </ul>	<ul style="list-style-type: none"> <li>• Sedimentation</li> <li>• Physical disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• Safe storage of hazardous</li> <li>See above regarding mitigation for sedimentation</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
Air Quality	<ul style="list-style-type: none"> <li>• Dust generation</li> </ul>	<ul style="list-style-type: none"> <li>• Poorer air quality</li> <li>• Smothering of vegetation</li> </ul>	<ul style="list-style-type: none"> <li>• Watering as needed</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal



<i>VEC/ Socio-economic Issue</i>	<i>Pathway(s)</i>	<i>Impacts</i>	<i>Mitigation Measures</i>	<i>Residual Environmental Effects</i>	<i>Level of Residual Impact</i>
Tourism	<ul style="list-style-type: none"> <li>• Dismantling of WTGs</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	No impact
Navigation	<ul style="list-style-type: none"> <li>• Removal of cables</li> </ul>	<ul style="list-style-type: none"> <li>• Interference with shipping</li> </ul>	<ul style="list-style-type: none"> <li>• Coordination with Harbour Master</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Minimal
Fishery	<ul style="list-style-type: none"> <li>• Marine water quality</li> <li>• Removal of cables</li> </ul>	<ul style="list-style-type: none"> <li>• Sedimentation</li> <li>• Physical disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• See above for mitigation for sedimentation</li> <li>• Safe storage of hazardous materials</li> <li>• Safe disposal of used and/or other lubricants</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of short duration</li> </ul>	Minimal
Quiet Enjoyment of Area	<ul style="list-style-type: none"> <li>• Noise from construction</li> </ul>	<ul style="list-style-type: none"> <li>• Physical disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• Distance mitigates</li> </ul>	<ul style="list-style-type: none"> <li>• Distance dependent</li> </ul>	Minimal
Safety	<ul style="list-style-type: none"> <li>• Construction activities</li> <li>• Icing</li> </ul>	<ul style="list-style-type: none"> <li>• Danger to on site workers</li> </ul>	<ul style="list-style-type: none"> <li>• Adherence to safety plans</li> <li>• Design rigour</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Low
Public Access	<ul style="list-style-type: none"> <li>• Restrictions to site access</li> </ul>	<ul style="list-style-type: none"> <li>• No visitors to the site</li> </ul>	<ul style="list-style-type: none"> <li>• Warning notices</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
Aboriginal Interests	<ul style="list-style-type: none"> <li>• See Note 1</li> </ul>				
Landscape	<ul style="list-style-type: none"> <li>• Wind farm</li> </ul>	<ul style="list-style-type: none"> <li>• Visual intrusion</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal impact</li> </ul>	Minimal
Property Values	<ul style="list-style-type: none"> <li>• Wind farm</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	No impact

Note 1: Concerns raised by the aboriginal peoples have been addressed, under other headings

**6.1 Commitments**

AWPC will honour all commitments made in the EA of the proposed wind farm Project at Pubnico Point and will comply with all applicable laws and regulations. As stated in Section 4.5, many, if not all potential adverse effects, can be avoided through the application of good engineering and construction practices, the careful timing of activities and the adherence to appropriate environmental management techniques. To facilitate the implementation of effective environmental management techniques AWPC will develop an EPP and a Contingency and Safety Plan in association with the pertinent regulatory authorities. These documents will serve as key reference documents for the contractors and site personnel through the development, operation and decommissioning of the proposed Project.

Table 6.1 summarizes the environmental commitments made by AWPC in the EA to ensure that there will be no significant adverse residual environmental effects as a result of the proposed wind farm at Pubnico Point. Many of these commitments will be further detailed and detailed in the EPP and the Contingency and Safety Plan.

**Table 6.1: List of Environmental Commitments**

Visual monitoring of water turbidity during the laying and decommissioning of the submarine cables.
Adherence to the municipal zoning by-law to maintain land buffers between the shore and the WTGs and the establishment of comparable buffers between the wetland and parking and laydown areas.
Establishment of procedures for the storage and handling of excavated materials.
Establishment of revegetation program.
Determination and installation of temporary erosion control measures.
Establishment of protocols for the safe storage of hazardous materials.
Establishment of protocols to ensure the frequent inspection of construction vehicles.
Identification of areas where fuelling and maintenance of vehicles can be undertaken.
Establishment of protocols to ensure the safe disposal of used oils and/or other lubricants.
Additional geotechnical testing for sulphide bearing materials.
Small, controlled detonations on western intertidal zone, if required.
Use of blasting mats.
Establishment of boulder ridge on western intertidal zone, if warranted.
Use of AHDs or ADDs.
Watering to control dust, if necessary.
Making project information available to the public through information sheets or information boards.
Coordination with Harbour Master regarding laying of submarine cable.
Flagging and posting of warning notices regarding adverse and extreme weather conditions.
Public excluded from construction areas.
Posting of notice regarding location of submarine cables.
Commitment to keep the Municipality of Argyle, the NCNS and the Acadian Band informed of Project progress and to respond promptly to any questions these parties may raise.

## **6.2 Environmental Monitoring**

Based on the data that has been compiled and the analysis that has been undertaken, three monitoring programs are proposed:

- i) with respect to birds at the site of the WTGs;
- ii) with respect to the wetland; and
- iii) with respect to visitors to the site.

Each is discussed briefly in the following sections.

### ***6.2.1 Bird Monitoring Protocol***

As indicated in Section 5.1.4, AWPC recognizes the importance of birds, particularly those that are rare, endangered or migrate through Pubnico Point, and seeks an opportunity to meet with the pertinent regulatory authorities to discuss a practical and realistic monitoring protocol. A draft of such a protocol is provided in Appendix I.

### ***6.2.2 Wetland Monitoring***

Although having little intrinsic value (see Appendix E), the wetland does provide a distinct habitat. To augment the existing database the following actions will be undertaken:

- spring and fall monitoring of the botanic species during construction and for one year thereafter to identify the invasion, if any, of minerotrophic species, the presence of disturbance species, and the decline of endemic species, all indicators of changing ecohydrology; and
- the measurement of hydrological and hydrochemical changes in the wetland quarterly for one year. This will involve the installation of four piezometers to obtain data on the water table, the dissolved organic carbon, pH, DO, temperature, nitrate and carbonate species.

### ***6.2.3 Visitation to the Site***

AWPC will communicate on a regular basis with the Municipality of Argyle the numbers of visitors who seek information on the Project and will inform them of any issues, such as circulation or parking, as may arise.

## Chapter 7 **Conclusions**

This environmental assessment was conducted to determine the potential environmental effects of the construction, operation and decommissioning of a proposed wind farm at Pubnico Point to satisfy the regulatory requirements of the *CEAA* and the *NS Environment Act*. Potential environmental effects from Project related malfunctions and accidents were also considered in the assessment. The proponent, AWPC, conducted an Open House in the Project area and consulted extensively both with and through the auspices of the local municipality and with local individuals. The Acadian Band and the Native Council of Nova Scotia have been provided with project information, have posed questions with respect to the Project and the issues raised have been addressed in the assessment. AWPC has committed to keep all interested parties informed of Project progress and to respond to all reasonable questions posed.

The proposed Project is located in the southern portion of the Pubnico Point Peninsula in southwest Nova Scotia. The marine and fresh waters of this region are home to a rich commercial and recreational fishery. The islands, sheltered inlets, salt marshes and coastal wetlands provide diverse and rich habitat for a wide range of birds. Several breeding sites are of international significance, and The Brothers Islands, some 4 km distant from West Pubnico, is home to the largest colony of Roseate Terns in Canada. In contrast to this ecological richness and species diversity, the Project site exhibits few of the characteristics of the valued coastal sites in the region. Because of the high energy shoreline, the nature of the vegetation cover, poor drainage and prevalence of bedrock, the site has not been conducive to human settlement and use. Field work has demonstrated a paucity of bird species, no rare plants, no archaeological finds and a low grade wetland that has been severely damaged by ATVs. The site's attributes include its location on the coast and the prevalence of wind. From the technical and environmental evaluations that have been undertaken, it is an ideal location for a wind farm.

The assessment considered biophysical and socio-economic issues. In addition to an extensive search of the literature and pertinent databases, the study team consulted widely with regulatory agencies and acknowledged experts in pertinent disciplines. A number of specific field programs were also executed; these included field work with respect to birds and herptiles, vegetation, archaeology, wetlands and the intertidal zone. The assessment is focused on environmental issues of greatest concern referred to as Valued Ecosystem Components (VECs) or socio-economic issues. Sixteen VECs or socio-economic issues were subject to analysis. The significance of the residual environmental effects, i.e., after mitigation has been applied, is predictive for each of the identified VECs or socio-economic issues and the potential for the Project to interact cumulatively with other projects has been factored into the evaluation.

Subject to adherence to all pertinent regulations and the application of appropriate mitigative measures, the conclusion of this assessment is that no significant adverse residual environmental effects are likely as a result of the Project. The development of the Project, potentially the first wind farm of this scale in Nova Scotia, will generate approximately 100,000,000 kW/hr of electricity annually which will be sold to NSPI. The generation of electricity from renewable energy sources in this fashion is in accordance with both Federal and Provincial government articulated strategies and would contribute to a reduction of greenhouse gas emissions as required by Canada's ratification of the Kyoto Protocol.

Appendix A  
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- Francis, P.J. Coordinator, Land Administration, Nova Scotia Department of Natural Resources. Western  
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- Hinton, R. Aquaculture GIS & Licensing Officer, Nova Scotia Department of Agriculture and Fisheries.  
Halifax, NS. 2003
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Kearney, J. Anthropologist/Birder, Coady Institute, St. Francis of Xavier University, Antigonish, NS. 2003.

Langille, L. NWP Officer, Navigable Waters Protection Program. Dartmouth NS.2003.

Lauff, R. Department of Biology, St. Francis Xavier University, Antigonish, NS. 2003.

LeBlanc, J. Fisheries Officer Nova Scotia Department of Fisheries, Pictou, NS. 2003.

Leadbetter, J. Physical Habitat Assessor. Habitat Management Division Department of Fisheries and Oceans Canada, Halifax, NS.

Lowe, J.S. Fisheries Representative, Fisheries and Aqua Services, Nova Scotia Department of Agriculture and Fisheries. Yarmouth, NS. 2003.

MacDonald, P. Regional Biologist, Nova Scotia Department of Natural Resources. Yarmouth, NS. 2003

MacDonald, W. President, Marengo Consulting and Testing. Charlottetown, PEI. 2003.

McDonald D. Senior Program Officer Atlantic, Canadian Environmental Assessment Agency. Halifax NS. 2003.

McLaren, I. Professor Emeritus, Biology Department, Dalhousie University, Halifax, NS. 2003.

Muise, A. Yarmouth Regional Fisheries Representative (Retired), Nova Scotia Department of Agriculture and Fisheries. West Pubnico. NS. 2003.

Munro, M. Curator of Botany at Nova Scotia Museum. Halifax, NS. 2003

Murray, K. Inspector Specialist, Yarmouth Region, Nova Scotia Department of Environment and Labour, Yarmouth, NS. 2003.

Ogilvie, B. Curator, Special Places, Heritage Stewardship Section, Nova Scotia Museum , Halifax, NS. 2003.

Robinson, D. Acadia First Nation's Chief, Southwest NS. 2003

Sabean, B. Director of Wildlife, Nova Scotia Department of Natural Resources, Wildlife Division. 2003.

Saunders, G. Planner. Municipality of Argyle, Department of Property Inspection and Public Works. Tusket, NS. 2003.

Schaefer, H. Habitat Management Division, Department of Fisheries and Oceans, Halifax, NS. 2003.

Scheibling, R. Specialist Intertidal Ecology of the Nova Scotian coast. Biology Department Dalhousie University, Halifax, NS.

Smith, M.B. NWP Officer, Navigable Waters Protection Program. Dartmouth NS.2003.

Stevens G. Biologist. Department of Fisheries and Oceans, Dartmouth, NS

Surette, D. Rockweed Harvester, Pubnico, NS. 2003.

Sweeny, R. Biologist, Habitat Management, Department of Fisheries and Oceans Canada.

Tay, K.L. Environmental Protection, Environment Canada. Dartmouth, NS. 2003

Watts, S.F. Retired diving officer, Dalhousie University, Halifax, NS and resident of Wedgeport.2003.

Wharton, WG. Environmental Lawyer, and Diving Technician Pubnico project .2003.

Whitehead, H. Killam Professor of Biology, Co-Chair Marine Mammals SSG, COSEWIC, Graduate Coordinator, Department of Biology, Dalhousie University, Halifax, NS. 2003.

Wimmer, T. President, Marine Animal Response Society; Master's Student, Dalhousie University, Halifax, NS.

Appendix B

**Heritage Research Permit, Archaeological Field Notes  
and Museum Authorization**



Nova Scotia Museum  
Special Places Protection Act,  
R.S.N.S. 1989

Application for  
**Heritage  
Research Permit**  
(Archaeology)

Permit No. **A2003NS30**

(Original becomes Permit when approved  
by the Executive Director of the Nova  
Scotia Museum)

The undersigned Stephen Davis  
of 6519 Oak Street, Halifax, Nova Scotia B3L 1H6  
representing (institution) Davis Archaeological Consultants Ltd.

hereby applies for a permit under Section 8 of the Special Places Protection Act to carry out archaeological investigations during the period:

from 16 April 2003 to 16 June 2003

at Pubnico Point Wind Farm

general location Lower West Pubnico, Yarmouth County

specific location(s) (cite Borden numbers and UTM designations where appropriate)

n/a

and as described separately in accordance with the attached Project Description. Please refer to the appropriate Archaeological Heritage Research Permit Guidelines for the appropriate Project Description format.

I certify that I am familiar with the provisions of the Special Places Protection Act of Nova Scotia, and that I will abide by the terms and conditions listed in the Heritage Research Permit Guidelines for the category (check one).

- Category A - Archaeological Reconnaissance
- Category B - Archaeological Research
- Category C - Archaeological Resource Impact Assessment

Signature of applicant Stephen Davis Date 9 April 2003

Approved: Executive Director David Newland Date April 11, 2003

*(Faint text at bottom left)*

Left Halifax at 9:00a.m., arrived Red Cap Motel 12:10p.m. had lunch. Called Allister D'Entremont arranged to meet him at end of pavement. Travelled to cut lines marked each with Environment flagging tape. Each line represented southern boundary of development zone. Allister provided a map which showed four lines of turbines one of which has not been surveyed i.e. no cut line. Began survey on east side of road where transmission line will be buried and crosses over to East Pubnico. A heavily overgrown rock boundary wall exists .20 metres south of cut line. Wall rocks have extensive lichen growth along with thick moss. The cut line itself runs across a second less well defined linear rock feature. Given two rubber tires and other discarded objects I suspect that this feature is a product of the top soil extraction. Oral tradition places this area as the earliest settled in Pubnico (1653). Other than the first wall there is no evidence for significant heritage resources. The most ideal habitation area (high/dry) is where the soil has been removed. The wall does not continue on the west side of the road.

The survey continued on the west side of the road beginning with line 2 in an easterly direction. The cut line was on the south boundary of the development zone. It was crossed by numerous ATV paths which very common on Pubnico Point. The terrain was not conducive for historic habitation being characterized by stunted poplar with patches of spruce on higher dry areas. The top soil is very thin, typically no more than a few centimetres covering bedrock or glacial tills. The western end of this line was highlighted by a black spruce swamp (standing water). This bounded the shoreline which was characterized by a steep sloping storm beach leading down to bedrock covered in seaweed. The shoreline had an eroded bank which was checked with negative results.

The first cut line was checked in an easterly direction. This line was essentially the same as the second minus the black spruce swamp. On the way back to the car we checked the area of where the former mine was located. It appears that the mine was used as a rock quarry and gravel operation. In any event it falls outside of the development area.

I returned to the stone wall with the former owner of the property (Milford D'Entremont born 1925). We walked the property and he showed me where a rock filled well was once located. It was in the area where topsoil has been removed which supports our original conclusion. He stated that his father and grandfather both felt that this was the site of the original Pubnico inhabitants. I will recheck tomorrow as Allister D'Entremont showed me exactly where the cable trench will be dug. It is considerably further south than originally assumed (80-100 metres south of wall).

Talked to Ted d'Eon, local historian who reports that there is no documentary evidence for historic habitation on the point. Further, d'Eon did not know of any finds of precontact artifacts on the point or along either shore.

**18 April 2003**

Left motel 7:15 a.m. travelled to Lower East Pubnico to check cable landfall south of Lighthouse Road. The beach is moderately sloping covered in rock, backshore low lying and wet not conducive to habitation. The general area where power poles will be sighted is spruce and scrub covered. A newly excavated ditch along the road was investigated with negative results.

Began the survey of the northern most cut line at 9:00a.m. Noticed a stone boundary wall on the east side of the road which is not in the development area will check at end of day. The northern line has somewhat more mature and denser spruce forest cover. Approximately ten minutes into line a black spruce swamp with standing water is encountered. After the swamp the land rises in elevation and is dryer. Although it has moderate potential for historic habitation, we did not see any evidence of use. A number of classic tree falls were encountered in this area on the cut line. As with the other lines they clearly showed the thinness of the top soil and the presence of rock near the surface. These conditions would make it exceedingly difficult to pursue any agricultural activities. The most westerly end of the line ends at the ocean. The shoreline here is moderately sloping, covered in storm strewn rock.

The final field inspection was a revisit of the cable line, east of cut line number two, to walk the line from the road to the beach. This area as noted is approximately 80 metres south of the rock wall. It is a mixed topography characterized by wetlands covered in alders and spruce to uplifted areas which are mainly moss covered bedrock. The local term for the bedrock is the "ledge". This area has been heavily travelled by ATV's which have exposed subsurfaces. The area proved negative for heritage resources.

We finished off the survey by taking a number of photographs of the cut lines from the road. We also had a quick look along the second rock boundary wall east of the road. This area was *not* extensively investigated as it lies outside of the development area. As a general observation the east side of the road appears to have a higher potential for heritage resources. It lies on the Harbour side of the point and is thus somewhat more protected. It should be noted that the Wind Farm, with the exception of the buried cable, will *not* be developing this side of the road.

# NOVA SCOTIA MUSEUM

1747 Summer Street  
Halifax, Nova Scotia  
Canada B3H 3A6

Tel 902 424-  
Fax 902 424-0560

<http://museum.ednet.ns.ca>

May 8, 2003

Ann Wilkie  
CBCL Limited  
1489 Hollis Street  
Halifax, NS B3J 2R7

Dear Ms. Wilkie:

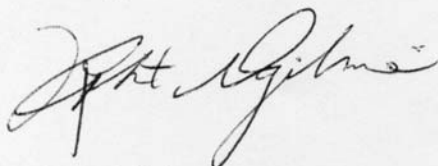
**RE:** Archaeological Assessment  
Pubnico Point Wind farm

This is to inform you that the Heritage Division, Tourism & Culture, has received and reviewed Dr. Stephen Davis' report on the Pubnico Point Wind Farm, conducted under Heritage Research Permit A2003NS30.

Based on the results of his investigation, Davis concludes that no significant resources will be impacted by the proposed wind farm and recommends that the project, as designed, be allowed to proceed. He also states that, if any design changes are made that will impact areas east of the access road (Pubnico Harbour side) then, further archaeological investigation will be necessary. We concur with his recommendations as stated.

If you have any questions, please let me know.

Sincerely,



Robert Ogilvie  
Curator, Special Places

c. Dr. S. Davis, Davis Archaeological Consultants

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A FAMILY of 25 MUSEUMS

  
NOVASCOTIA  
Tourism and Culture



Appendix C  
**Intertidal Zone Survey**

## Intertidal Zone Survey

This field survey took place at and around low tide (19:19) on August 30, 2003.

**Participants:** Drs. Annamarie and Bruce Hatcher, Mr. Stan Watts (local diver from Wedgeport and former Dalhousie diving officer), and Ms. Rochelle Watts (longtime resident of Wedgeport and local naturalist)

**Purpose:** To characterize the rocky intertidal areas of the outer Pubnico Harbour at the entry points of the cable installation proposed by AWPC.

Waypoint number	Lat (43°N) & Long (15°W)	Notes
<b>WEST PUBNICO</b>		
410	35.938' 47.572'	First, rough survey marker; elevation of 9 m.; time: 18:00 (low tide of 0.3 m at 19:19); GPS accuracy of 6 m (this mark is comparable to WP 413).
411	37.984' 47.541'	Stated entry point of cable - West Pubnico
412	35.757' 46.788'	Stated entry point of cable - East Pubnico (compares with WP 425 exactly)
413	36.042' 47.515'	Survey marker 323; designated start point; transition from forest to upper edge of cobble ridge; elevation 4 m.; alignment through woods from 323 towards road is 286° T.; bearing to WP 425 (other side of channel) is 188° T; Figure 1 shows the cable corridor through the woods; Figure 2 shows the view across the harbour from survey marker 323
414	9.8 m from WP 413	On transect from 413 to water's edge on a bearing of 118°T; transition from storm cobble to bedrock outcrop (Precambrian quartzite and slate); elevation 3 m.
415	14.7 m from WP 413	Top of intertidal macroalgal zone, bottom of crustose blue-greens; here algal cover is about 60% and bare rock 40% (Figure 3); algal species predominantly <i>Ascophyllum nodosum</i> , <i>Fucus vesiculosus</i> and <i>Fucus spiralis</i> ; animals include <i>Littorina littorea</i> , <i>Thyas lapillus</i> and <i>Balanus balanoides</i> (Figure 4); elevation 2 m
416	23.4 m from WP 413	Elevation 0 m., 95% cover of <i>Ascophyllum nodosum</i> on coarse cobble/boulders and a few specimens of <i>Fucus serratus</i> (Figure 5)
417	38.7 m from WP 413	Elevation -1 m.; base of intertidal rockweed zone; 80% cover of <i>Ascophyllum nodosum</i> and 10% cover of <i>Fucus</i> (3 spp.); Figure 6 shows the transition from coarse cobble to mud
418	45.7 m from WP 413	Middle of cobble/ muddy sand zone; filamentous algae

<i>Waypoint number</i>	<i>Lat (43°N) &amp; Long (15°W)</i>	<i>Notes</i>
		( <i>Enteromorpha</i> ) and <i>Fucus</i> (20%), <i>Chondrus crispus</i> , barnacles, Spirorbid worms on hard substratum (80%), in soft sediments <i>Arenicola</i> , <i>Nereis</i> and bloodworms (abundant polychaete burrows) (Fig. 7), hermit crabs, <i>Crepidula fornicata</i> , <i>Zostera marina</i> (20% cover); overall 40% coarse cobble and 60% sand/mud; elevation – 3 m, Figure 8 shows (kelp) drift <i>Laminaria longicruris</i> with intact stipe of 1.8 m. and frond of 2.8 m; large amount of accumulated drift <i>Laminaria longicruris</i> and <i>Laminaria digitata</i> (Figure 9)
419	50.7 m from WP 413	Permanent tidepool, with <i>Zostera marina</i> , and attached sporophytes of <i>Laminaria longicruris</i> and <i>Chordaria</i> spp.; 70% of substrate is bedrock outcrop, 20% is coarse cobble and 10% is sand/mud (Figure 10); other species include <i>Mytilus edulis</i> , the <i>Fucus</i> is colonized by spirorbid worms. On the bedrock 30% cover of crustose corallines and some juvenile sporophytes of <i>Laminaria digitata</i>
420	55.4 m from WP 413	Elevation -3 m; rock outcrop 30 cm above the level of the tidepool; 70% cover of <i>Ascophyllum nodosum</i> . 30% cover bedrock with barnacles and littorinids (Figure 11)
421	60.2 m from WP 413	Elevation -3 m; centre of tide pool; 70% coarse cobble and 30% sand ; depth 50 cm, 30% cobble covered by macroalgae (all species as above); on sand is <i>Zostera marina</i> ; water visibility very poor (< 1 m.), no crabs or carapaces evident anywhere!
422	65.1 m from WP 413; 36.022° 47.478'	Distance to WP 413 is 1.0 km; edge of channel, depth 0.7 m, elevation -3 m; bottom is 100% bedrock outcrop running along an alignment of 160° T.; rock has 20% cover of macrophytes ( <i>Laminaria longicruris</i> , <i>Chondrus crispis</i> , <i>Chordaria</i> spp., <i>Corallina</i> spp., <i>Balanoides</i> spp., hermit crabs and lots of <i>Littorina littorea</i> ); no sea urchins or <i>Agarum</i> . About 5-10 m offshore, subtidally, <i>Laminaria digitata</i> is growing and exposed periodically (Figure 12); end transect 17:30
<b>EAST PUBNICO</b>		
425	35.757° 46.789'	At survey stake at the transition from grass to the line of large boulder armouring; accuracy of GPS is 6 m, 1.11 km to WP 413 on a bearing of 298° T
426	6.1 m from WP 425	cobble, beginning of 'rubble' sized 3 to 30 cm diameter (mean 15) (Figure 13); elevation -1 m
427	12.4 m from WP 425	Top of intertidal strand line

<i>Waypoint number</i>	<i>Lat (43°N) &amp; Long (15°W)</i>	<i>Notes</i>
428	28.1 m from WP 425	Elevation -3 m; cobble with no barnacles, no algae; top of microalgal zone; occasional boulders with <i>Enteromorpha</i> and barnacles (Figure 14)
429	45.1 m from WP 425	Top of macroalgal zone with 70% cover by cobble, 25% cover by large boulders and 5% coarse sand; algae on larger boulders was 60% <i>Enteromorpha</i> and a similar brown (took a sample)
430	55.2 m from WP 425	Elevation – 4 m.; transition from cobble to sand; 95% cover coarse sand and 5% boulders up to 1 m diameter; on boulders <i>Fucus</i> and <i>Laminaria</i> ; drift <i>Laminaria</i> , <i>Zostera</i> and <i>Fucus</i>
431	65.5 m from WP 425; 35.77° 46.833'	Elevation -5 m, low tide mark; 100% sand; 5 m offshore <i>Laminaria</i> and <i>Ascophyllum</i> plants attached to boulders. End transect 20:15



**Figure 1**



**Figure 2**



**Figure 3**





**Figure 4**



**Figure 5**



**Figure 6**



**Figure 7**



**Figure 8**



**Figure 9**





Figure 10



Figure 11



Figure 12





**Figure 13**



**Figure 14**

Appendix D

## **Document Concordance with Observations Received from Reviewers**

## Table of Contents

<i>Regulatory Agency</i>	<i>Date of Comments</i>	<i>Page</i>
<b>FEDERAL</b>		
CEAA (Derek MacDonald)	July 30, 2003	1
DFO – Habitat Management Div. (Thomas Wheaton)	July 28, 2003	3
DFO – Habitat Management Div. (Heidi Schaefer)	August 13, 2003	3
Environment Canada – Environmental Protection Branch (Kevin Blair)	August 11, 2003	6
<b>PROVINCIAL</b>		
NS Department of Environment & Labour (Cheryl Benjamin)	July 30, 2003	12
NS Department of Environment & Labour (Solveig Madsen)	July 24, 2003	12
NS Department of Environment & Labour (John Drage)	July 25, 2003	12
NS Department of Environment & Labour (Darrell Taylor)	July 25, 2003	13
NS Department of Environment & Labour (Peter MacDonald)	July 22, 2003	13
NS Department of Natural Resources (Sherman Boates)	July 25, 2003	13
NS Department of Natural Resources (Kristen Murray)	July 23, 2003	14
NS Department of Natural Resources (Jo-Anne Himmelman)	July 28, 2003	14
NS Department of Energy (Brian Hayes)	July 23, 2003	14
NS Department of Municipal Affairs (Andrew Paton)	July 24, 2003	14
NS Department of Natural Resources (Yanick Matteau)	July 30, 2003	14

**Document Concordance with Observations Received from Reviewers**

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
<b>i) FEDERAL</b>		
CEAA Derek MacDonald July 30, 2003	<p><b>1.4 – Canadian Environmental Assessment Act</b> The first paragraph of this section, including the four bullets, is more-or-less correct, but could be more concise and more consistent with wording of the Act.</p>	See Section 1.4 - paragraph has been restructured.
	<p><b>1.5 Other Regulatory Approvals &amp; Section 1.5.2</b> This section refers to the normal 25-day registration decision deadline. The “Joint Assessment” provisions (Section 47) of the <i>Environment Act</i> enable that deadline to be modified, as will be the case for PPWF once the federal-provincial agreement is in place. The current draft agreement proposes a 60-day deadline.</p>	See Section 1.5.3 - Environmental Assessment Harmonization.
	Section 1.5 mentions re-opening of an abandoned quarry. The environmental effects of the quarry operation should be assessed as part of this review.	No decision has yet been made with respect to the opening of the quarry. See Sections 1.5.2 and 2.2.4.
	<p><b>2.3.1 Construction Activities</b> Ancillary physical works or activities that may be required should be listed and briefly described.</p>	See Section 2.2.4 - Ancillary Components.
	<p><b>2.3.3 Decommissioning and Abandonment</b> “Underground cabling .....would remain in situ....” It is implied that this includes the sub-sea portion, but this should be clarified.</p>	See Section 2.3.3 – sub-sea portion will be removed at decommissioning.
	<p><b>2.6 Environmental Management</b> The EPP and Contingency and Safety Plan should be developed in consultation with relevant federal and provincial agencies such as EC, DFO Habitat, CCG and NSDEL.</p>	See Section 2.6: amendments have been incorporated
	<p><b>Table 3.2 Vascular Plants Identified at Pubnico Point</b> The table lists the <i>Eleocharis tuberculosa</i> (long-tubercled spikerush), giving the impression that it was found on the point, but text on page 29 indicates that the plant was misidentified.</p>	See Section 1.6.1, 3.2.3 and Table 3.2
	<p><b>Page 32 last paragraph</b> “The species of greatest local concern would appear to be the roseate tern.” Is there some uncertainty around this? Why not “The species of greatest local concern <u>is</u> the roseate tern.”?</p>	See Section 3.4.5: amendments have been incorporated
	<p><b>3.4.5 Planned Land and Water Uses</b> It should be made absolutely clear that the harbour development discussed here is not part of the Wind Farm project. Also suggest rewording the last sentence of the first paragraph to read “Based on discussions.....the only planned development is the proposed construction.....”</p> <p>As well, vessel traffic and fishing activity should be considered when analyzing cumulative effects in the marine environment.</p>	See Sections 3.5.5, 3.5.3 and 5.1.9.

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	<p><b>3.6 Issues and VECs Identified:</b> Of the items listed, marine water quality, lobster habitat and wetlands are the only true VECs. Some of the items relate more to socio-economic aspects and would probably be better considered in the context of valued socio-economic components (VSECs, or socio-economic VECs), such as aesthetics, public access and property values.</p> <ul style="list-style-type: none"> <li>• Pyritic slate is not a valued ecosystem (or environmental) component, but its presence could result in adverse effects on certain VECs, particularly wetlands (as discussed in 4.2.3). Section 4.4.3 discusses the potential for adverse effects on water wells, suggesting that consideration should be given to including it (or groundwater quality in general), as a VEC.</li> <li>• Noise is not a VEC per se - the primary concern about noise is likely its effect on the peace and tranquility of the area, or the ability to engage in quiet enjoyment of the area, either of which could be characterized as a VSEC.</li> <li>• Based on the description in 4.2.7, icing appears to be related to safety, also a socio-economic concern and potential VSEC. However, it also merits attention under the rubric of “effects of the environment on the project”, a topic which does not appear to be addressed in the current draft, but which is included in the Act’s definition of “environmental effect” and therefore must be considered.</li> <li>• The “aboriginal matters” item on the list is presumably intended to provide a context for analysis of the project’s effects on current use of lands and resources for traditional purposes by aboriginal persons. This could also be characterized as a VSEC.</li> <li>• Although not critical to validity of the report’s conclusions, re-structuring this section (and the accompanying analyses in Section 4) so that the issues are dealt with in the context of identified VECs or VSECs would improve the document.</li> <li>• The term “VEC” is introduced without a brief explanation of what it means.</li> </ul>	<ul style="list-style-type: none"> <li>• See Section 4.5, 5.1.1, 5.1.2 and 5.1.3.</li> <li>• See Section 4.6 and 5.1.11.</li> <li>• See Sections 4.6, 5.1.12 and 5.2.</li> <li>• See Section 4.6 and 5.1.14.</li> <li>• See Sections 4.0 and 5.0</li> <li>• See Section 1.3.</li> </ul>
	<p><b>4.2.4 Wetland</b>  “Further, this wetland has been severely degraded by.....ATVs.....” This fact is not relevant and should not be presented as a rationale for allowing further degradation. It and other uses should, however, be considered in an analysis of cumulative effects on the wetland.</p>	<p>See Section 5.1.3.</p>
	<p><b>4.4.3 Pyritic Slate</b>  Bedrock trenching is described as an activity which could expose sulphide bearing materials, but excavation for turbine footings is not. Is the latter not a concern?</p>	<p>See Sections 5.1.1, 5.1.2 and 5.1.3.</p>
	<p><b>4.4.5 Birds</b></p> <ul style="list-style-type: none"> <li>• Attraction to lights should be listed as a pathway for possible adverse effects.</li> <li>• Under <i>Project Construction</i>: “During field work undertaken.....only 37 species of birds were identified...”. The word “only” is a subjective assessment and could be perceived as an attempt to downplay the significance of the area.</li> <li>• Under <i>Project Operation</i>: the second sentence (beginning with “Clearly.....”) appears to be unnecessary.</li> </ul>	<ul style="list-style-type: none"> <li>• See Sections 4.6.4 and 5.1.4.</li> <li>• See Section 5.1.4.</li> <li>• See Section 5.1.4.</li> </ul>
	<p><b>Table 4.3 Noise Levels of Various Wind Turbines</b>  Noise levels are presented based on a particular wind speed. Is there a rationale for selection of that particular speed? Does sound level vary much with speed?</p>	<p>See Section 5.1.11.</p>
	<p><b>4.4.8 Public Access</b>  Under <i>Project Operation</i>: would gates be effective deterrents, given the off-road capability of ATVs? It seems riders could simply go around a gate.</p>	<p>See Section 5.1.13.</p>
	<p><b>Page 66</b>  Consideration should be given to creating a summary table for the effects analysis, including (for each VEC and VSEC) a listing of project elements which could cause an adverse effect, a description of the effect, any mitigation identified and the predicted residual significance. Thought should also be given to including the need for and requirements of a follow-up program in the analysis and summary table. Follow-up is valuable for verifying the accuracy of impact predictions and the effectiveness of any mitigation.</p>	<p>See Table 5.5 and Section 6.0.</p>

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
Andrew D. Cameron July 7, 2003	Other fisheries do not receive the same level of detail as the lobster fishery and the aquaculture industry.	See Section 3.5.3.
	The seaweed industry could be handled better. There is no mention of Irish Moss. Irish Moss is the source of carrageenan. Knotted wrack ( <i>Ascophyllum nodosum</i> ) is the most common rockweed in the area. It is the source of alginate not caragreen (sic). Acadian Seaplants Limited of Dartmouth Nova Scotia has the provincial rockweed lease for all of Pubnico Harbour. The boundary line is from Pubnico Point to the Yarmouth -Shelburne County line on the eastern side of the Harbour. Acadian should be consulted as to impact of the submerge cable on their operation.	See Sections 3.5.3 and 3.6.1.
Fisheries and Oceans – Habitat Management Division Thomas Wheaton July 28, 2003	<ul style="list-style-type: none"> <li>Contaminant analysis of substate omitted from data provided.</li> <li>Section 35(2) and 32 of <i>Fisheries Act</i> may apply.</li> </ul>	Necessary applications have been made.
Habitat Management Division, Fisheries and Oceans Canada Heidi Schaefer Aug 13, 2003	Section 1.4 Canadian Environmental Assessment Act (page 2). Please add that Fisheries and Oceans Canada (DFO) has also been triggered under the <i>Fisheries Act</i> , Section 32 Destruction of fish by means other than fishing.	See Section 1.4: an amendment has been incorporated
	Similar to Section 1.5, Other Regulatory Approvals (page 3), there should be a section to describe any federal regulatory approvals required ( <i>Fisheries Act</i> Section 32 and 35 Authorizations and <i>Navigable Waters Protection Act</i> Permit).	See Section 1.5.1.
	Section 2.2.1. If any blasting will occur related to this project, detailed plans for blasting must be provided.	See Sections 2.2.1 and 2.2.2.
	Section 2.2.2.i It is stated that the seabed is composed primarily of fine gravel with silt, and that a gradation of a sample of the channel material showed it to contain 50% gravel, 35% sand and 15% fines. Are these the results from one sample only or an average of all of the samples taken? Were there any sections of sediment along the proposed crossing with a high percentage of fines? More detailed results of the borehole and diver survey should be presented in the EA.	See Section 2.2.2.
	Section 2.2.2.ii Submarine Cable (page 13-14)	See Sections 2.2.2 and 5.1.5.
	a) This section states that if obstacles cannot be avoided, then in that particular area, divers will install split-articulated pipe across the ledge to the point on each side where the cable is buried to a depth of 1 m. Please describe any impacts the use of above ground piping might have on navigation. If impacts on navigation are expected, describe how they will be mitigated. Describe any effect above ground piping might have on the benthic habitat it passes over; and, if impacts are expected, describe how they will be mitigated.	See Sections 2.2.2 and 5.1.5.
	b) This section states that to the extent possible, the cable will be laid through natural channels within the intertidal. Where natural channels do not exist, however, some excavating of a drilled or blasted trench may be required. Plans for blasting work in the intertidal must be specified in the EA. Could a rock breaker be used for this work rather than blasting?	See Sections 2.2.2 and 5.1.5.
	c) This section of the EA states that one option for the trenching in the intertidal is that excavated material will be backfilled into the trenches on top of a layer of concrete. It appears in Figure 2.7 that the trenches will be backfilled (or capped) with concrete. Please provide clarification on how the trenches will be filled. Also, please provide the maximum total area that will receive the concrete fill.	See Sections 2.2.2 and 5.1.5.
Section 2.2.3 Connection to the Grid (page 14). More information is required about the proposed substation in Lower East Pubnico. When and how will it be constructed, and what types of material will be stored there (transformers, oil, PCBs, etc.)?	See Section 2.2.3.	
Section 2.2.4 Ancillary Components (page 15). Please provide more information about the re-opening of the existing quarry. Specifically, please address how run-off from the quarry will be controlled.	See Section 2.2.2.	

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	Section 2.3.1 Construction Activities (page 16) states that the transportation of equipment for the construction of the turbines may be by sea to either Shelburne or Pubnico Point. The EA should address the potential impacts to transportation, particularly navigation, during the transportation and unloading of these large components.	See Sections 2.3.1 and 5.1.9.
	Section 2.3.3 Decommissioning and Abandonment (page 17) states that the underground cabling will remain in situ to minimize disturbance to the site. a) Note that if the cable is decommissioned, the NWP Approval Document will stipulate that the cable be removed at the Owner's expense. b) This section of the EA does not address what will happen to the section of above ground split-articulated pipe that may have to be used to get around outcrops and ledges in the cable corridor. Please describe how any above ground piping will be decommissioned.	See Section 2.3.3. See Section 5.1.5.
	Section 3.3.2 Marine Species (page 35) a) This section states that Pubnico Harbour provides habitat for <i>Chionoecetes opilio</i> (snow crab). This is typically a more deep water species, and DFO Science feels the above statement is likely inaccurate. b) This section does not list the presence of Harbour Porpoises ( <i>Phocoena phocoena</i> ). According to the <i>Yarmouth County Coastal Resources Mapping Project</i> (1997) this species is known to occur in the Pubnico Point area. Other cetaceans including common and Atlantic dolphins, pilot, minke and fin whales may be found in the area during some part of the year (J. Conway pers. comm. 2003). c) This section lists five fish species known to migrate into Pubnico Harbour, but only lists the migration times for two of these species: eels and smelts. The times when each of these five species is known to migrate in and out of the harbour should be listed. d) (page 36) This section states that the bottom substrate in the vicinity of the cable crossing is likely comparable to that taken at the location of a proposed wharf at Dennis Point. I would like to see bottom video of the cable crossing corridor to verify this assumption (survey guidelines attached). If there was video taken during the March 2003 borehole and diver survey, it might be suitable for the review. e) This section states that the most common macrofloral species included knotted wrack, kelp and brown algae in varying abundance from 0% - 100%. This does not provide much useful information on abundance. Please add more detailed information about the algal abundance.	See Section 3.3.3. See Section 3.3.5. See Section 3.3.4. See Section 3.3.1. There was no bottom video taken. See Section 3.3.2.
	Section 3.4.3 Commercial and Recreational Fishery (page 37) states that the local fishermen have indicated that there should be no interference with the fishery due to the existence of the submarine cables. Reference is then made to Section 3.5.1 where the public consultation with fishermen is described. Section 3.5.1 makes reference to a letter in Appendix 3 from the lobster fishermen who traditionally fish in the corridor area. This letter states that:  <i>“We do not believe that the burying of the proposed cable will either damage or interfere with the existing lobster habitat within, or in proximity to, the proposed submarine cable corridor”.</i>  Were the fishermen that signed this letter aware of the plans to use split articulated piping to circumvent obstacles in the corridor?	See Sections 3.5.3 and 3.6.1: additional information has been provided.
	Section 3.4.3 Commercial and Recreational Fishery (page 37). This section of the EA should specifically state that there will at no time be an exclusion zone for fishing imposed around the cable corridor area.	See Sections 3.5.3, 3.6.1 and 5.1.10.

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	<p>Section 3.4.3 Commercial and Recreational Fishery (page 37)</p> <p>a) This section states that commercial lobster, groundfish, scallop and herring fisheries occur in the area. This section also states that consultations with local fishermen, particularly those that set lobster traps in the vicinity of the cable crossing, have indicated that there should be no interference with the fishery due to the existence of the submarine cable. It is not clear in this statement whether all fishermen (groundfish, herring, scallop, etc.) agreed that there would be no interference to their fishery, or if it was only the lobster fishermen who expressed this opinion. Please provide comment.</p> <p>b) Although the smelt fishery in Pubnico Harbour is mentioned in Section 3.3.2 Marine Species as one of the three most important commercial areas for smelt in Nova Scotia, it is not mentioned in this section on commercial fisheries. Please provide an explanation.</p>	<p>See Section 3.6.1.</p> <p>See Section 3.5.3 and 5.1.10.</p>
	<p>Section 3.6 Issues and VECs Identified (page 44) The following additional VECs must be analyzed in this EA:</p> <p>a) Navigation. Fisheries and Oceans Canada (DFO)'s <i>CEAA Guide: Applying the Canadian Environmental Assessment Act (CEAA) for the Fish Habitat Management Program</i> (April 2001) states that impacts on navigation should be considered environmental effects in a CEAA Environmental Assessment (EA). Impacts on navigation should be addressed specifically and should include impacts to all types of navigational uses mentioned in the EA (the 110 fishing vessels, the vessels that will potentially be used to transport equipment to the site, the marine pleasure craft, the boat yard vessels, etc.).</p> <p>b) Fish species and their habitat (as defined under the <i>Fisheries Act</i>) that are fished commercially in the project area (lobster, groundfish, scallops, and herring, smelt), and that migrate through the project area (eels, gaspereau, smelt, seabass and trout), and marine mammals found in the area (Harbour porpoise, Harbour seals, etc.). Effects of the project on these VECs, particularly the effects of blasting on marine mammals, should be analysed in the EA.</p> <p>c) All commercial fisheries in the area. Effects of the project on the lobster, groundfish, scallop, herring, and smelt fisheries should be considered.</p> <p>d) Species at Risk. Specifically, please consider the Harbour porpoise which is currently listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as a Species of Special Concern (COSEWIC 2003).</p>	<p>See Section 5.1.9.</p> <p>See Sections 5.1.5, 5.1.6 and 5.1.10.</p> <p>See Section 5.1.10.</p> <p>See Sections 3.3.3 and 5.1.6.</p>
	<p>Section 4.4.1 Marine Water Quality (page 48). Why is the spatial boundary associated with sediment run-off from Project works on land and the accidental release of hazardous materials limited to the southern portion of Pubnico Harbour and the waters around Pubnico Point? The wind rose in Figure 2.3 indicates that winds often blow from the southwest. Would these wind conditions, along with tidal currents, allow sediment and/or hazardous materials to influence the northern portion of Pubnico Harbour as well? Please provide comment.</p>	<p>See Section 5.1.1.</p>
	<p>Section 4.4.2 Lobster Habitat (page 51) states that if the cables are layed outside the commercial lobster fishing season, and within the timeframe indicated, the disruption to lobster habitat in the defined corridor will be small in extent and of a very temporary nature.</p> <p>a) It is not clear why laying the cable outside the lobster fishing season and within the timeframe indicated in any way mitigates impacts on lobster habitat. The project timing would mitigate effects on the ability to fish lobster, but not on the condition of the habitat itself. Please change the above statement to reflect this comment.</p> <p>b) If concrete is being layed in the intertidal, the disruption to lobster habitat will not be small in extent or of a temporary nature.</p> <p>c) Please change the above statement to reflect this comment. How will the laying of concrete on lobster habitat be mitigated? Please provide more information.</p>	<p>See Section 5.1.5.</p> <p>See Section 2.2.2, 3.3.1, 3.3.2 and Appendix C.</p> <p>See Section 2.2.2.</p>



<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	<p>Section 4.4.2 Lobster Habitat (page 51) states under “Project Operation” that once the cables are buried, there will be no requirement to interfere further with the bottom of Pubnico Harbour. Under “Malfunctions and Accidents”, it states that any break or malfunction in the cables will have to be repaired and that this would involve replacing the cable/s. Replacement would involve a similar process to installation. “Project Operation” should therefore include a qualifying statement such as “...as long as there are no malfunctions or breaks during the operation phase”. The EA should provide a contingency plan in the event of malfunctions and repairs to the cable. This plan should state whether existing cables will be repaired or replaced, and should state that any repairs or replacements will occur during the same optimal time period as the installation (outside the lobster fishing season).</p> <ul style="list-style-type: none"> <li>• Section 4.4 Analysis (page 45 – 66) must include a summary of the analysis presented as a Valued Ecosystem Component (VEC) table. The VEC table should include the following headings: VEC, Project Activity, Potential Effects, Significance, Mitigation Measures, and Significance of Residual Effects.</li> <li>• The impacts of Electro-Magnetic Field (EMF) effects have been a concern in other EAs of submarine cable projects. Are EMF effects on human and marine species health a concern for this project?</li> <li>• The need for follow-up to verify the accuracy of impact predictions and the effectiveness of mitigation should be considered. Specifically, a video survey of the channel after the cable is installed would verify that the bottom has indeed returned to pre-existing conditions.</li> </ul>	<p>See Sections 2.2.2 and 5.1.5.</p> <ul style="list-style-type: none"> <li>• See Table 5.5 which has been formatted as per NRCan Guidelines.</li> <li>• See Section 2.5.</li> <li>• To be determined in conjunction with HADD application.</li> </ul>
<p>Environment Canada – Environmental Protection Branch Kevin Blair August 11, 2003</p>	<p><b>Contaminants</b></p> <ul style="list-style-type: none"> <li>• <i>Acid Generating Rock</i>: It is unclear what volume of potential acid generating material may be disturbed in connection with trenching activity and construction of each wind turbine. However, this could be a case where any disturbance would be considered cumulative in terms of the Nova Scotia regulatory level of 500 m<sup>3</sup> indicated on p. 22 of the draft EA.</li> <li>• In section 4.4.3, the main concern related to acid generating rock is identified as contamination of down-gradient wells. From EC's perspective, the main concern is the discharge of deleterious substances into waters frequented by fish (although no surface streams appear large enough to be indicated on the maps provided). Attention should be given to this issue in the EA, especially given that such a discharge is prohibited under Section 36 of the <i>Fisheries Act</i>.</li> <li>• EC considers the key pathway for interaction with the environment to be release of leachate from the sulphide-bearing materials to nearby surface or ground water, not to the atmosphere as indicated in the draft EA. "Spatial boundaries" should also include any affected discharge areas. "Temporal boundaries" may be decades, and mitigation costs may be considerable, if problems are encountered.</li> <li>• If blasting is proposed and considered necessary, there are measures commonly used to minimize disturbance of residual in-situ material. This is particularly important in linear activities such as trenching. The measures to be implemented should be described in the EA.</li> <li>• From EC's perspective, avoidance through siting and design is the best solution to reducing potential effects related to disturbing acid generating rock. As it stands, the information provided is insufficient to establish that siting, design and mitigation measures are appropriate or sufficient for the task at hand. For example, is trenching described on p. 52 of the draft EA necessary? To what depth?</li> <li>• Results of the commissioned geotechnical exploration identified on p. 52 of the draft EA, and some general design information, should address many of these issues and should be included in the EA for review.</li> <li>• Erosion and Sedimentation: The description of provisions for erosion and sedimentation control in the draft EA are quite vague. It is indicated on p. 49 that "proven methods to control run-off and erosion" will be used, and it is understood that an EPP will be prepared, but little additional information is provided. As a stand alone document, the EA should describe how potential adverse effects will be avoided or mitigated. At a minimum, such a description should include a summary of the "proven methods" and how they will be adapted to accommodate site-specific conditions and sensitivities.</li> <li>• <i>Hazardous Materials</i>: In addition to reporting spills to provincial authorities, all spills and releases should be reported to the 24-hour emergency reporting system (1-800-565-1633).</li> <li>• The draft EA indicates that a Contingency and Safety Plan will be developed for the project. As a stand alone document, the EA should convey how site-specific conditions and sensitivities have been taken into account in</li> </ul>	<ul style="list-style-type: none"> <li>• See Sections 3.2.1, 5.1.1, 5.1.2 and 5.1.3.</li> <li>• See Sections 5.1.1, 5.1.2 and 5.1.3.</li> <li>• See Sections 5.1.1, 5.1.2 and 5.1.3.</li> <li>• See Section 2.2.1.</li> <li>• See Section 2.2.1.</li> <li>• See Sections 2.2.1, 5.1.1, 5.1.2 and 5.1.3.</li> <li>• See Sections 5.1.1, 5.1.2, and 5.1.3.</li> <li>• See Section 5.1.1.</li> <li>• See Section 2.6.</li> </ul>

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	the mandatory assessment of accidents and malfunctions and how a contingency plan will be built on assessment results.	
	<p>Impact of the Environment on the Project: As it stands, the impacts of the environment on the project do not appear to be addressed in the draft EA.</p> <ul style="list-style-type: none"> <li>• Under Section 2.1.1, it is stated that after data analysis and modeling, "it is believed that the wind resource at the site is farmable". Although both site specific and long term data are used in the analysis, more detailed presentation and discussion of wind statistics vis à vis power generation and design at the Pubnico Point site would be desirable. It should not only be demonstrated that conditions are adequate for power generation, but also that the design will accommodate extreme winds and ice loads, and a combination of the two.</li> <li>• Figure 2.3 should have units of wind speed indicated.</li> <li>• In Sections 4.2.7 and 4.4.7, the term "sleet" is used. This is not a term sanctioned by the meteorological community in Canada, and in fact, means different things in different parts of the world. The weather condition described by this term should be made clear.</li> <li>• Although southwestern Nova Scotia has the least incidence of freezing precipitation on the mainland because of the "relatively mild ambient winter temperatures", it does not follow that the mild winters "should not lead to significant icing conditions that might hamper the performance of the turbines or pose a safety concern." For example, Yarmouth Airport averages 8 days per year with freezing precipitation (<i>Canadian Climate Normals 1961-90</i>, Environment Canada, 1993). Occasionally, an event may be problematic.</li> <li>• A project lifetime of 20-25 years or more is expected, so any climate change sensitivities should be identified. Historical climate data may not be adequate for design purposes. For example, more intense mid-latitude storms (stronger winds) are possible. More intense precipitation events are likely, which may affect ground-bearing properties of supporting soils if the site is not underlain by solid bedrock.</li> </ul>	<ul style="list-style-type: none"> <li>• See Sections 2.1.1, 5.1.12 and 5.2.</li> <li>• See Section 5.1.12.</li> <li>• See Section 5.1.12.</li> <li>• See Section 5.2.</li> </ul>
	<i>Wildlife:</i> In EC's opinion, it is not possible to come to a conclusion that significant adverse effects on wildlife at risk or migratory birds are unlikely based on the information provided. And based on the information provided, EC cannot agree that the project would not have a residual effect on wetlands in the project area. It is EC's view that bats should be a Valued Ecosystem Component (VEC) for this EA.	See Sections 3.2.4 and 3.2.7.
	<i>Wildlife at Risk: Species at Risk Act (SARA)</i> - The Responsible Authority is reminded that the <i>Species at Risk Act</i> amends the definition of "environmental effect" in subsection 2(1) of the Canadian Environmental Assessment Act (CEAA) to clarify, for greater certainty, that EAs must always consider impacts on a listed wildlife species, its critical habitat or the residences of individuals of that species. SARA also requires that the person responsible for a federal EA must, without delay, notify the competent minister(s) in writing if the project being assessed is likely to affect a listed wildlife species or its critical habitat. The person must also identify adverse effects of the project on listed species and their critical habitat. And if the project is implemented, the person must ensure that measures are taken to avoid or lessen adverse effects and that effects are monitored. Mitigation measures must be consistent with recovery strategies and action plans for the species.	See Section 1.5.1.
	<p><i>Roseate Tern:</i> As indicated in the Pubnico Point Wind Farm Environmental Assessment Draft Report, the nearby The Brothers are home to a mixed colony of terns which includes Arctic Terns (provincial rank: Yellow; AC CDC: S3B), Common Terns (provincial rank: Yellow; AC CDC: S3B) and the federally and provincially Endangered Roseate Tern. And while we agree that the proposed project would not likely influence the presence of the colony at The Brothers, the possibility of terns, especially Roseate Terns, colliding with turbines or associated infrastructure remains a concern. Given that:</p> <ul style="list-style-type: none"> <li>- several of the turbines appear to be located at the edge of the water (and no width is provided for the buffer zones between the project site and the shorelines mentioned on page 49);</li> <li>- the Common Tern was listed in the project area during avian field work;</li> <li>- little is known about the terns' foraging or migration routes; and</li> <li>- the proposed site is in an area where fog occurs on a third of the days of the year and measurable precipitation is usually seen approximately 161 days of the year (both conditions likely increasing the risk of bird collisions with turbines).</li> </ul>	See Sections 2.1, 3.2.5 and 5.1.4.
	The Canadian Wildlife Service (CWS) of EC does not agree that the likelihood of tern collisions with wind turbines	See Section 5.1.4.

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	can be discounted. CWS therefore recommends that a precautionary approach be taken with regard to these wildlife at risk, and that appropriate field work be undertaken to determine the use of the project area by terns. It should be determined whether terns fly over the site, or in proximity to coastal turbines, on their way to or from foraging grounds or in migration. Field work should be undertaken in different meteorological conditions.	
	<i>Harlequin Duck:</i> CWS has records of Harlequin Ducks occurring in West Pubnico and St. John Island. This species is considered Special Concern by the federal government and is provincially Endangered. Therefore, potential impacts of the project on this species, including proposed placement of the underwater transmission line, should be considered.	See Sections 3.1 and 3.2.5.
	<i>Tuberclad Spike-rush:</i> In section 3.1.2 (i) of the May 2003 Pubnico Point Wind Farm - Project Description report, it was indicated that Tuberclad Spike-rush, a federally Threatened plant, was found to be quite abundant in various parts of Pubnico Point. It is indicated on page 6 of the current draft report that based on the immature achenes provided to the NS Museum, it is believed that the plants were not Tuberclad Spike-rush after all, but one of 2 other species of Spike-rush. Have the identity of the plants on site since been identified (narrowed down to the correct species) at the appropriate time of year? Were all the plants on site of the same species? Which species was/were determined to be on site?	See Sections 1.6.1, 3.2.3.1 and Table 3.2.
	<i>Other rare plants:</i> The methodology used in rare plant surveys should be provided. It is also not clear whether the Nova Scotia Museum was the only source of rare plant information consulted, or if the AC CDC and the Nova Scotia Department of Natural Resources were also contacted.	See Section 1.6.1 and 3.2.3.
	<p><i>Bats:</i> Although different bat species found in Nova Scotia are briefly described in the text, the possibility of deleterious effects on bats is discounted in the report on that basis that "there is little evidence to suggest that the study site is of special value to bats." However, as indicated in our June 27<sup>th</sup> comments, bat mortality at wind power structures is widespread in the US, and often exceeds avian mortality. Most bat mortality involves solitary, tree-roosting bats, with Hoary Bat being the most prevalent, followed by Red Bat and Silver-haired Bat. Bat mortality occurs primarily during the fall migration or dispersal period. Meanwhile, at a wind plant in PEI, 3 Little Brown Myotis were found dead during bird monitoring in 2002.</p> <p>The AC CDC lists Hoary Bats and Red Bats as S2 in NS, and Silver-haired Bats as S1 in NS. Furthermore, these species are given Yellow ranking by the province, as is the Little Brown Bat. The bats should be considered a VEC for the EA.</p>	See Section 3.2.7.
	<i>Migratory Birds: Migratory Birds Convention Act (MBCA)</i> - It is not clear from the information provided that the proponent is aware that migratory birds, their eggs, nests, and young are protected under the <i>Migratory Birds Convention Act</i> and associated regulations. Furthermore, under the <i>Migratory Birds Regulations</i> , "no person shall deposit or permit to be deposited oil, oil wastes or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds." Documentation should include a commitment to compliance with the Migratory Birds Convention Act, as well as provincial wildlife legislation during all project phases, and should show details on how compliance would be achieved. Migratory birds include those species listed in the CWS Occasional Paper <i>Birds protected in Canada under the Migratory Birds Convention Act</i> .	See Sections 3.2.5 and 5.1.4.
	<p><i>Analysis of Effects:</i> EC does not agree that it is possible to adequately evaluate potential effects of the proposed project on migratory birds based on the information provided. It is critical that the impacts of wind power facilities on local and migrant bird populations be assessed with as much accuracy as possible. Some birds are likely to be more sensitive than others to wind power facilities. Therefore, in order to properly evaluate potential impacts of wind power sites on avian species, it is important to achieve an understanding of:</p> <ul style="list-style-type: none"> <li>• the distribution and abundance of birds, and their use of the project area during all seasons (i.e. breeding season, migration, winter);</li> <li>• site-specific attributes that may affect bird vulnerability (e.g. topography, weather conditions, prevailing wind direction, proximity to coast);</li> <li>• how birds may be vulnerable or sensitive to the various aspects of a proposed wind power facility; and</li> <li>• what mitigation measures are available to minimize impacts.</li> </ul>	See Section 5.1.4.

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	<p>Although some avian field work at the project site has been undertaken during the breeding season, the methodology for this field work has not been provided, nor have detailed survey results been provided. Only a table indicating the presence of birds at the project site is included in the draft report; no details regarding the abundance of these birds at the site is given. Furthermore, no field data on the use of birds during other seasons is provided, although in previous correspondence EC has already expressed concerns regarding the potential use of the area as a stopover site by migrants.</p> <p>For the time periods that are missing, fieldwork should be done at the appropriate times of year for the species of interest and should be conducted by qualified biologists, experienced in conducting the appropriate surveys and in identifying birds by sight and sound. Detailed survey methodology and results for each season should be provided with EA documentation submitted to regulatory agencies for review. When this data is available, it will then be possible to better evaluate the potential effects that turbines and associated infrastructure may have on birds in the area (including mortality and avoidance of the area).</p>	See Section 1.6.2.
	<p><i>Breeding Birds:</i> The impacts that wind power facilities may have on breeding birds include: habitat loss, destruction of active nests, obstruction of regular flight paths, disturbance caused by the turbines or human activity around breeding sites, mortality or injury due to collision with structures, and obstruction of important feeding areas (especially in offshore or tidal areas).</p> <p>In order to evaluate the potential effects of a proposed wind power facility on the breeding birds of the area, information regarding the relative abundance of birds that breed at the site should be provided. Information regarding the species of birds that breed in the surrounding area (within 5 km of the site) should also be provided.</p>	See Sections 3.2.5 and 5.1.4.
	<p><i>Migrating Birds:</i> The proponent has argued that the peninsula is not expected to be used by large numbers of fall migrants; however, EC does not agree that it is possible to come to this conclusion without supporting field data. The greatest concern for migrants in the area of a proposed wind power facility would normally be the risk of collision. If the structures includes lighting, the problem could be further exacerbated for species that are attracted to light. In addition to collisions with lit structures, birds attracted to lights may collide with power lines, other birds, or the ground, or they may circle around the light until they drop to the ground of exhaustion. The birds surviving on the ground are then at risk of depredation. Moreover, disturbance can also be a factor for migrants if wind turbines are located near important staging areas where large numbers of birds concentrate to rest or feed.</p> <p>Collisions by migrants are most likely to occur during the first hours after nightfall, at the initiation of the migration flight when birds are at a low climbing altitude, or in the hours between midnight and dawn, when many birds begin a gradual descent as they terminate their night flight. However, inclement weather can increase the risk of collision. For instance, clouds have an influence on the altitude of migrants by forcing higher flying migrants to lower altitudes, which increases the density of migrants near the ground and increases the probability of collisions with tall obstacles. The large numbers of days with fog or measurable precipitation at the site are a concern. Drizzle, fog, and haze impair visibility and also cause birds to fly at lower altitudes and to follow topographical clues. If a wind power facility is proposed in a migration corridor, the altitude that birds are passing over the site during different meteorological conditions should be determined. If the average height of migration is at blade height, the risk of collision is likely higher. Similarly, if there is a high proportion of fog days at the proposed site during the migration period, there is likely an increased risk of collision.</p> <p>In order to adequately evaluate the risk of collisions and disturbance effects on migrants, the following information should be provided:</p> <ul style="list-style-type: none"> <li>• What is the species composition of birds that migrate through the area?</li> <li>• Are any of these birds considered wildlife at risk (species listed by COSEWIC, species listed as S1, S2, and S3 by the AC CDC, species listed provincially, or species of high conservation priority for the Bird Conservation Region (BCR))?</li> </ul>	See Sections 3.2.5 and 5.1.4.

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	<ul style="list-style-type: none"> <li>• What is the approximate number of migrants that use the area? How does this number compare to other nearby sites? (i.e., does the proposed area host more migrants than other sites?)</li> <li>• What is the flight altitude of migrants through the area during different meteorological conditions (if large numbers of birds are found to migrate through the area)?</li> <li>• What is the frequency of inclement weather?</li> <li>• What is the number of fog days per year and per season, and when during the day does the fog most often occur?</li> <li>• Are there significant staging areas on-site or near the site (e.g., within 5 km)?</li> <li>• If significant numbers of birds stage in the area of the proposed wind power facilities, are there any activities taking place nearby that could potentially alarm birds resulting in collisions with turbines, transmission lines, etc.?</li> </ul>	
	<p><i>Wintering Birds:</i> During the winter, bird numbers and movement are generally reduced. Simply by having fewer birds using an area, the number of collisions should be minimal at land-based sites. However, offshore and nearshore wind facilities may have a greater potential for problems. For example, in ice-free areas, large concentrations of wintering ducks and seabirds may use offshore or nearshore areas. To properly evaluate the potential effects of wind power facilities on wintering birds, the following questions should be answered:</p> <ul style="list-style-type: none"> <li>• What is the species composition of wintering birds in the area?</li> <li>• Are any of these birds considered wildlife at risk (species listed by COSEWIC, species listed as S1, S2, and S3 by the AC CDC, species listed provincially, or species of high conservation priority for the Bird Conservation Region (BCR))?</li> <li>• What is the approximate number of birds that use the area in winter? How does this number compare to other nearby sites? (i.e. does the proposed area host more wintering birds than other sites?)</li> <li>• What is the importance of the site for wintering birds?</li> <li>• Are there alternative wintering sites in the area?</li> <li>• Do wintering waterfowl and seabirds fly over headlands and other land bodies in the area?</li> </ul>	See Section 3.2.5.
	<p><i>Mitigation and monitoring:</i> In addition to life-cycle specific questions in the preceding sections, the following general questions regarding mitigation and monitoring should be answered in EA documentation submitted for review:</p> <ul style="list-style-type: none"> <li>• Would blades be marked to make them more visible to birds?</li> <li>• A description of lights should be provided. What colour lights would be used? Would solid, flashing, or strobe lights be used?</li> <li>• If it were not possible to place power lines underground, what mitigation measures are proposed to avoid impacts such as avian collisions with power lines?</li> <li>• How would bird collision injuries and mortalities at the site be monitored? (The proponent only indicates on page 57 of the draft report that it would be "willing to discuss a reasonable bird monitoring protocol, perhaps similar to that executed at the North Cape." (see "Additional comments" below))</li> <li>• How would the success of mitigation measures be monitored? What mechanisms would ensure that corrective measures are taken if mitigation is not successful?</li> </ul>	See Section 2.2.1.  See Appendix I.
	<p><i>Additional comments:</i> On page 56, the proponent compares its site with North Cape, PEI, and deduces that bird collisions at Pubnico Point may be low based on results of bird monitoring at the North Cape wind farm. CWS has serious concerns regarding the quality of the field work that has been undertaken at North Cape to date. Through the recent assessment review of a proposed expansion to the North Cape facility, EC has alerted the operator to these concerns and the improvements that are necessary to assure the reliability and usefulness of the data in understanding the effects of the project on birds. At this time, therefore, we recommend that the results from that wind farm's avian monitoring program not be used to draw conclusions on the Pubnico project.</p> <p>On page 56 of the draft report, Erickson et al. (2001) is also mentioned. This report from the United States also appears to have had a considerable influence on the proponent's conclusions regarding expected bird mortality.</p>	Based on the literature reviewed, these remain legitimate references.

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	<p>However, the 2.19 avian fatalities/wind turbine/year identified in this report does not reflect the variability in numbers of bird deaths at different sites (some sites showing high fatality numbers while others have very few). It is extremely important that specific conditions that could influence the numbers of collisions at different sites be considered in an EA. It cannot simply be inferred that 2.19 avian fatalities/turbine/yr can be anticipated at each site in Canada.</p> <p>In addition, the fact that Erickson et al. (2001) have found that other impact sources result in greater bird mortality cannot be used as a rationale for tolerating mortalities at wind farms. It is important to recognize that (a) several organizations including CWS are working at reducing other sources of human-(or pet-) caused bird deaths, (b) the additional bird deaths from wind turbines could result in cumulative effects, and (c) for some species with low population numbers, only a few deaths caused by human activities would be significant as this could result in a high impact for the population or the species.</p>	
	<p><i>Wetlands:</i> It is not clear how the proponent has come to the conclusion that the proposed project would not result in residual deleterious effects on wetlands, when turbines would be placed in the wetland and the wetland would be cut into 3 portions by access roads to the rows of turbines. The proponent argues that the wetland is already impacted by human activities such as ATV use which has also contributed to the incursion of invasive plants. The fact that the wetland has been impacted by human activities should not be used to justify further degradation of the wetland.</p> <p>In addition, several turbines appear to be proposed for the edge of the water, and it is also not clear whether the proposed project would result in impacts to, or loss of, sensitive coastal habitats. Buffer zones between the site and the shoreline are briefly mentioned on page 49, but the size of these buffer zones is not mentioned. Salt marshes are very productive habitats. Plant material produced in these wetlands is eaten by invertebrates, birds and other salt marsh inhabitants; is decomposed in the marsh, thus adding nutrients to the food chain; or is exported to other coastal and marine systems. Salt marshes are also important nesting habitat for Willets and Sharp-tailed Sparrows, and migration habitat for shorebirds. Eelgrass beds also contribute large amounts of nutrients to coastal and marine habitats. Eelgrass is also a very important food for migrating geese. Coastal wetlands also provide other important functions such as natural shoreline protection from wave action and erosion, as well as natural flood reduction and control.</p> <p>It also not clear whether the proposed cable route crossing construction would impact sensitive beach habitat. Vehicles and other equipment should not be allowed on beaches or dunes. Beach vegetation is known to be very sensitive to trampling. Vehicle and pedestrian traffic on beaches loosens the sand and damages the plant cover of dunes. Repeated travel over dunes by pedestrians or vehicles may therefore result in damage to dunes. It is essential to conserve the plant cover of dunes, since it provides the dunes with natural protection against the natural forces of wind and tides. Vehicle traffic on beaches can also degrade shorebird habitat by crushing seaweeds into the sand, thus making them unavailable as cover or foraging habitat. If the project is approved, measures should be taken to ensure that project staff and vehicles do not trample sensitive beach habitats. Furthermore, beaches and dunes should not be used as staging areas for the project.</p> <p>As part of its commitment to wetlands conservation, the Federal Government has adopted <i>The Federal Policy on Wetland Conservation</i> with its objective to “promote the conservation of Canada’s wetlands to sustain their ecological and socio-economic functions, now and in the future.” In support of this objective, the Federal Government strives for the goal of No Net Loss of wetland function on federal lands or when federal funding is provided. Furthermore, according to <i>The Federal Policy on Wetland Conservation - Implementation Guide for Federal Land Managers</i>, “Due to local circumstances where wetland losses have been severe, in some areas no further loss of any remaining wetland area may be deemed essential.” EC recommends that the goals of the policy be respected.</p>	<p>See Sections 5.1.3.</p> <p>See Sections 2.1 and 2.2.2.</p> <p>See Sections 2.2.2 and 2.2.4.</p> <p>See Section 5.1.3.</p>
	<p><i>Additional comments</i></p> <ul style="list-style-type: none"> <li>• What species are proposed for revegetation efforts at disturbed areas of the site?</li> </ul>	<ul style="list-style-type: none"> <li>• See Section 5.1.3.</li> </ul>

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	<ul style="list-style-type: none"> <li>According to Figure 2.8 of the draft report, certain construction activities are scheduled to begin in August 2003. No project related construction activities should take place for a project for which the CEAA screening is ongoing.</li> <li>In Appendix 1, Ramsey Hart of the Canadian Wildlife Service is listed as a contact person. Although his office is located in the CWS Sackville office, Ramsey Hart does not work for CWS. Ramsey works for Bird Studies Canada, a not-for-profit conservation organization dedicated to advancing the understanding, appreciation and conservation of wild birds and their habitats.</li> </ul>	<ul style="list-style-type: none"> <li>No project related construction activities will take place until all pertinent authorizations have been attained.</li> <li>Appendix A: correction made</li> </ul>
<b>ii) PROVINCIAL</b>		
Nova Scotia Department of Environment and Labour Cheryl Benjamin July 30, 2003	Section 1.2. Project Overview. The EA should be based on the maximum number of wind turbines anticipated.	See Section 1.2.
	Section 2.2.2 Underwater Cable. Clarify "split articulated pipe".	See Section 2.2.2.
	Page 15. Present size of the quarry and proposed expansion should be provided.	See Section 2.2.4.
	How will roadway construction affect the wetland? Assumed the area will be in-filled, but will culverts be used to maintain drainage? Can the wetland be avoided?	See Section 5.1.3.
	Pg. 27. It is not clear what is meant by "artificial habitat"? Does this preclude species at risk being present?	See Section 3.2.3.
	Pg. 49. Spill should be reported to the Environmental Emergency # (1-800-563-1633), not NSDEL.	See Section 5.1.1.
	Pg. 54. ATV use should be considered in the cumulative effects section for wetlands.	See Section 5.1.3.
	Pg. 59. Noise is provided for a single turbine. Is there a cumulative effect of numerous turbines? What would be the maximum expected noise level in an area between four turbines 250 m apart?	See Section 5.1.11.
	Chapter 4 Analysis. Was any consideration given to discussing transportation as a socio-economic VEC? The document should provide a description of transportation routes, amount and timing of traffic expected to be generated, identify any required permits/approvals, predicted impacts on the transportation network and its use, and any avoidance/mitigation measures.	See Section 2.2.4.
	Section 4.4.2 Lobster Habitat. Should the first sentence of page 51 read "no significant impact on marine water quality"?	See Section 5.1.5.
Section 4.4.5 Birds. This section needs to be strengthened if the prediction that the Project is not anticipated to have a significant residual effect on birds is to be supported.	See Section 5.1.4.	
Section 4.4.10. Landscape. Based on the likely size of the turbines and the nature of the local terrain, is there a prediction on the distance from which the turbines will be visible? Will the turbines be visible from Route 3 across the harbour?	See Section 5.1.15.	
Nova Scotia Department of Environment and Labour Solveig Madsen July 24, 2003	It is recommended that the Company utilize pollution prevention approaches during the construction of the wind farm and the associated infrastructure and also during the operation and maintenance of the facility.	See Section 2.6.
Nova Scotia Department of Environment and Labour John Drage July 25, 2003	1. Due to the nature and location of this project, the potential for impacts to groundwater are minimal and impacts to local wells are not expected.	No response necessary.
	2. The main potential issue with respect to groundwater is sulphide-bearing material. If this is present on the site and is disturbed during the construction phase there is potential for negative impacts to groundwater. This issue has been addressed in the registration document, which indicates that further studies are planned prior to construction to identify whether or not sulphide bearing materials are present. I would suggest that the proposed Environmental Protection Plan and the Contingency and Safety Plan include sections on how sulphide bearing materials will be monitored for during construction and how they will be addressed if they are identified.	See Section 5.1.1 and 5.1.2.
Nova Scotia Department of Environment and Labour Darrell Taylor July 25, 2003	Wetland should be protected to maintain habitat for wetland species.	See Section 5.1.3.

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	Pyritic slates have been identified and should be fully addressed to protect the wetland and any limited surface water resources in the area.	See Sections 5.1.1, 5.1.2 and 5.1.3.
	Monitoring of water quality related to the wetland and marine shoreline areas might be advisable to assess impacts related to siltation, slate disturbance, or release of lubricants or similar substances, during construction and possibly during operation.	See Section 5.2.2.
Nova Scotia Department of Environment and Labour Peter MacDonald July 22, 2003	Long Savannah and Spinneys Heath are large bogs and are not significant habitat for waterfowl.	See Section 3.1: amendment has been incorporated
	The Roseate Tern is listed as Endangered under the Nova Scotia Endangered Species Act.	See Section 3.2.5.
	The large polygon shown in Figure 3.1 is labelled as a bald eagle wintering area. There are a number of other significant features associated with this polygon including: salt marsh, wintering waterfowl, and shorebirds.	See Figure 3.1: amendments have been incorporated
	No information given regarding the methodology used in the botanical survey.	See Sections 1.6.1 and 3.2.3.1: additional information has been provided.
	The Significant Habitats Database reflects the current level of knowledge, and areas known to be significant have been flagged. However, not all areas of the province have been surveyed, and new information is added as it is acquired. It should not be interpreted that an area in our database without a significant habitat flag does not have significant habitat. NSDE&L are currently not aware of any significant habitat in the area.	Noted.
	Do not agree with the conclusion that since the wetland area has already been degraded by ATV activity and no species at risk was found to occur here, "there would be no substantial adverse effect" (page 54).	See Section 5.1.3.
	NSDE&L is not comfortable with the level of information provided on the importance of the area to migratory birds, particularly fall migrants which funnel toward the southernmost points of Nova Scotia. There is no information on the extent of travel through this area by migratory birds. Pubnico Point is very close to areas where migrating birds tend to concentrate prior to their cross-ocean flights. The argument that this is a peninsula adjacent to the mainland and therefore is less likely to be a major travel route may well be valid, but this is still just an opinion without supporting data. Moreover, the distance from Pubnico Point across the water to the mainland is not great, and could be easily traversed by birds moving down the peninsula, as we already know they do when moving to offshore islands. A monitoring system should be an essential component of the project.	See Sections 3.2.5 and 5.1.4.
Nova Scotia Department of Natural Resources Dr. J. Sherman Boates July 25, 2003	The consideration of potential impacts on wildlife including plants and habitats is very coarse and in some cases, of insufficient to make reasonable assessment of potential impacts of the project.	See Sections 1.6.1 and 3.2.3.1: additional information has been provided.
	Botanical inventories are inadequate to provide ability to assign confidence that no species at risk occur within the proposed development area. Attention in future inventories should focus on identification of unique habitats and with potential for species at risk to occur with timing of inventories gauged to visiting during a period of peak delectability.	See Sections 1.6.1 and 3.2.3.1: additional information has been provided.
	Address to the issue of potential impacts of the wind farm on migratory passerines and other birds is extremely weak. This issue is a significant cause of concern.	See Sections 3.2.5 and 5.1.4.
	The inventories for herpetiles was unnecessary given the reasonable inference that no species of concern would occur on the site.	Text remains unchanged.
Nova Scotia Department of Natural Resources Kristen Murray July 23, 2003	If old pit is to be used as a source of gravel for access road construction, an approval is required prior to the aggregate being removed.	See Section 2.2.4.
	Construction of access roads, cement platforms within or across a wetland or watercourse need to be permitted.	See Section 2.2.4.
	If dredging material is to be disposed on land, a permit is required.	Noted.
Nova Scotia Department of Natural Resources - Land Administration Division Jo-Anne Himmelman July 28, 2003	To apply for the issuance of an easement/authority to utilize Crown Land {submerged land (submarine cable, wharf), railway bed (overhead transmission crossing)} the Department of Natural Resources (DNR) requires a written application.	See Section 1.5.2.



<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
Nova Scotia Department of Energy Brian Hayes July 23, 2003	No changes to the document are required.	
Nova Scotia Department of Municipal Affairs Andrew Paton July 24, 2003	Site may become a tourist attraction; this is a matter that should be addressed.	See Section 5.1.8.
Nova Scotia Department of Natural Resources Yanick Matteau July 30, 2003	Table summarizing impacts, mitigation measures and residual impacts.	See Table 5.5.
	Follow-up on monitoring section.	See Section 6.0
	Effects of the environment on the project	See Section 5.2.
	How will mitigation measures be addressed if construction cannot proceed in the fall?	See Section 5.1.5.
	Better detailing of methodology	See Section 4.0
	Flora: While no flora is considered rare or endangered, the actual cover will be impacted and should be discussed.	See Section 5.1.3.
	Visual Impact: Impact from different points of view should be discussed - from the sea, from East Pubnico, from the Camp at Melford and from the houses.	See Section 5.1.15.
	Socio-Economic Impact: What would be the effect on the area of increased tourist visits?	See Section 5.1.8.
	Wildlife: what will be the impact?	See Section 3.2.4.
	Air and Climate: Does the project have an impact on the air quality, especially during construction?	See Section 5.1.7.
	1.5.1: AWPC is considering the reopening of an abandoned quarry. If this is the case, need to describe the operation of the quarry including blasting, if needed.	See Section 2.2.4.
	2.1: Turbines shown in Figure 2.1 seem to be high compared to the scale of the map.	Figure 2.1 has been amended.
	2.2: The project includes the construction of a substation; further detail required.	See Section 2.2.3.
	2.2.4: What is the proposed siting for the permanent administrative building?	See Section 2.2.4.
	2.2.4: What is the expected quantity of crushed rocks that will be used to construct the access road(s) and the ancillary works?	See Section 2.2.4.
	2.3.1: Transportation of the turbines should be described in more detail, including the possible access, the number of trucks, the special conditions for transport.	See Section 2.3.1.
	3.2: Identify on figure 3.2 the bog outflow.	Figure amended.
	3.2.2: Two towers and some part of the access roads will cross the wetland.	Noted.
	3.2.3: <i>Eleocharis tuberculosa</i> should be removed from the list since it was identified as another species.	Noted.
	3.2.3: A map detailing the location of the different vegetation types would be useful.	Details not available.
	3.2.4: What research was undertaken about fauna?	See Section 3.2.4.
	3.2.5: No nesting raptors were found in the region, however, there is a Bald Eagle Wintering Area less than 10 km from the project site. How do the Bald Eagles use the area around Pubnico Point? Will they be impacted?	See Section 3.2.5 and 5.1.4.
	3.3: Is there fish habitat that might be impacted by the cable layout? Describe the habitats and the impacts.	See Section 5.1.5.
4.: For the cumulative impacts section, there are other activities apart from the fisheries and the wharf: the recreational use (ATV), the tourism (including one that could be due to the turbine) and navigation. These activities should be described.	See Section 5.1 and 5.3.	
4.2.5: Tree cutting and land clearing should be considered as pathways because they may disrupt birds nest and habitats.	See Section 5.1.4.	
4.4.1 Marine Water Quality : Malfunctions and Accidents: Should show that if a cable is broken, its redundancy should not require new layout.	See Section 5.1.1.	
4.4.3: Results of geotechnical survey to come. What are the mitigation measures if pyritic rocks are found.	See Section 5.1.1, 5.1.2 and 5.1.3.	
4.4.4: The dimensions are incorrect : 6.09 m by 87.4 m (200' by 287') It should be 60.9 m instead of 6.09 m.	Correction has been made.	
4.4.4: The project may increase the traffic in the wetland (principally from onlooker). What are the impacts and how can the proponent reduce the effects of this traffic on the wetland?	See Section 5.1.3.	

<i>Regulatory Agency</i>	<i>Issues Raised</i>	<i>Applicable Reference and Notes</i>
	4.4.4: On page 54, the report states “through the use of standard and accepted industry procedures and mitigation measures, adherence to applicable regulations and guidelines, and waste management planning, the construction stage of the project will not result in a significant adverse effect on the degrade wetland”. It is our understanding that the project will cut the wetland in three by the construction of access roads with no measure to ensure that the water flow will be kept between the parts. The report should state that the wetland will be impacted adversely and identify which measures will be taken to reduce this impact..	See Section 5.1.3.
	4.4.5: The report states that Black-billed Cuckoo might find appropriate habitat on the site. Was the cuckoo surveyed for? How can we be sure that there is no cuckoo ? When is tree cutting planned? Can it disturb the nesting period?	See Section 3.2.5.
	4.4.5: Discuss the impact of the project on the Bald Eagle considering the Wintering Area and the meteorological conditions during winter.	See Section 3.2.5.
	4.4.5: The impact on the Roseate tern must be better studied and described.	See Section 3.2.5.
	4.4.5: A follow-up program on bird mortality shall be described in a separate section. This program should be developed with the support of the Canadian Wildlife Service.	See Appendix I.
	4.4.6: As stated in the document, there is a “camp” at Melford’s Field. What is the status of the camp (permanence, use, legal)? What will be the noise level around this place which will be located less than 100 m from a turbine. Will the occupants be disturbed by the noise?	See Sections 3.5.2 and 5.1.11.
	4.4.6: Cumulative impact of noise from all turbines is not shown. A modeling of noise level for the turbines should be done.	See Section 5.1.11.
	4.4.10: The visual impact of the project should be better described and should include sketches or images.	See Section 5.1.15.

Appendix E  
**Wetland Evaluation**

Name of Wetland \_\_\_\_\_

Name

Area/Town/Province/Territory

**Complete this evaluation in a sequential manner. Potential sources of information are listed in Appendix C.** Evaluation Form From: North American Wetlands Conservation Council (Canada), March, 1992. Wetlands Evaluation Guide. Issues Paper No. 1992-1. Published by Environment Canada.

#### 7.4 Stage One "General Analysis"

The "General Analysis" is designed to provide land use planners, administrators, developers, and the public with an opportunity to examine the relative value of wetlands, and any proposed projects which may directly or indirectly impact those wetland values (Figure 7.1). This "General Analysis" sets out a process of easily identifying - from readily available public data - biological, hydrological and biogeochemical, social/cultural, and production wetland functions and the expected new production functions generated by the proposed project. All considerations are at an international, national, or provincial level of significance. A few are also at a regional scale of consideration.

Comparing the importance of the wetland and the project, provides the evaluator with knowledge about the desirability of: (1) protecting the wetland because it has outstanding value; (2) approving the project because it has outstanding value and the wetland has little or no value; and (3) deferring to Stage Two because no conclusion is obvious. The ratings provide guidance only to the recommendations.

**Note:** When listing sources, indicate relevant documents, authorities, and agencies.

Stage One Evaluation undertaken by:

Name Clinton Pinks, CSLA, CBCL Limited

Address 1489 Hollis Street, Halifax, NS B3J 2R7 Canada

*Stage One values are based upon obvious, easily verified findings. Lack of sufficient information or inconclusive results will trigger the Stage Two application. Values allocated are:*

H = High Value (3); M = Moderate Value (2); L = Low Value (1); NA = Not Available (X)

**Where information is not available or unknown, check additional sources. If still unavailable or unknown, then automatically proceed to Stage Two (Section 7.5).**

41

#### 7.4.1 Biological Component: Importance to Wildlife/Plant Communities

- Potential Source of Data:
- Territorial/Provincial Wildlife or Natural Resources Agency
  - University/Community College, Botany and Biology Departments
  - Canadian Wildlife Service/Wildlife Habitat Canada office
  - Local Ducks Unlimited Canada office
  - Canada Land Inventory (Agriculture Canada)

**i. Significance for Waterfowl/Wildlife Species**

This relates to the importance, at a national or provincial scale of significance, of the wetland as a habitat for the production, migration or other life history events for waterfowl and other animal species at a national or provincial scale of significance. (Select most current classification, and circle numbers in either the Canada Land Inventory box OR the Provincial/Territorial Classification box. Enter circled numbers on the lines beside each column and their sum on the subtotal line).

CANADA LAND INVENTORY

	HIGH (Class 1-2)	MODERATE (Class 3-4)	LOW (Class 5-7)	NOT AVAILABLE *	
Waterfowl	3	2	1	x	1
Wildlife	3	2	1	x	1

Subtotal (maximum is 6) 2  
(where "x" occurs, go to "7.5")

or

PROVINCIAL/TERRITORIAL CLASSIFICATION

	HIGH	MODERATE	LOW	NOT AVAILABLE	
Waterfowl	3	2	1	x	
Wildlife	3	2	1	x	

Subtotal (maximum is 6) \_\_\_\_\_  
(where "x" occurs, go to "7.5")

Source CLI - Land capability for waterfowl wildlife - 020P

<http://geogratis.cgdi.gc.ca/cgi-bin/geogratis/cli/waterfowl.pl>

\*Class #7 = "lands with such severe limitations that almost no waterfowl are produced."

**ii. Rarity/Scarcity or Uniqueness**

This relates to the degree to which the wildlife and vegetation species and populations inhabiting the wetland are rare, endangered or vulnerable within the region. (circle numbers and total them)

NATIONAL, OR PROVINCIAL/TERRITORIAL CLASSIFICATION

	HIGH	MODERATE	LOW	NOT AVAILABLE	
Waterfowl/Wildlife	3	2	1	x	1
Vegetation	3	2	1	x	1

Subtotal (maximum is 6) 2  
(where "x" occurs, go to "7.5")

Source The Pubnico Wind Farm Report, CBCL Limited, 2003, with specific references to on-site field investigations pertaining to birds and herptiles, the vegetation inventory and wetlands assessment.

Total Biological Component Rating: 4 (maximum is 12)

(add "i." + "ii." subtotals, transfer total to equation in "7.4.6")

### 7.4.2 Hydrological Component: Water Quality/Groundwater/Erosion Control/Flood Control

This relates to the importance of the wetland for valued hydrological functions. It may be a general rating based on interviews with water analysts.

Source of Data: ■ Territorial/Provincial/Federal Water Resources Agencies

(circle numbers and total them)

	HIGH	MODERATE	LOW	NOT AVAILABLE	
Significance of Contribution to Provincial Regional Water Quality/Groundwater	3	2	①	x	1
Significance of Contribution to Provincial/Regional Erosion Control/Flood Control	3	2	①	x	1*

**Total Hydrological Rating** (maximum is 6) 2  
 (transfer total to "7.4.6"; where "x" occurs, go to Stage Two ("7.5"))

Source See source, page 43.

\* Lower Pubnico Point is less than 2,000 m wider and would contribute minimally to water quality, groundwater erosion control or flood control.

### 7.4.3. Social/Cultural Component: Contribution to Quality of Life

This relates to the existing public commitment to the wetland as exemplified by way of current legislated actions that protect significant wetland resources.

- Sources of Data: ■ Territorial/Provincial Lands Branch  
 ■ Territorial/Provincial Planning Branch  
 ■ Territorial/Provincial Environment Branch

(circle numbers and total them)

	HIGH	MODERATE	LOW	
Existing, Proposed or Potential International/National/Provincial/Regional Heritage Designation or Protected Status (within or adjacent to the protected area)	3	2	①	1

**Total Social/Cultural Rating** (maximum is 3) 1  
 (transfer total to "7.4.6")

Source DNR, 2002, Nova Scotia Wetland and Coastal Habitats Inventory Database makes no reference to this wetland having any designation or protected status.



## 7.4.4 Production Component: Expected New Project Production Benefits

This relates to the potential new added value production benefits which may result from implementation of the project, both geographically and within the economic sectors.

- Sources of Data:
- The proponent
  - Territorial/Provincial Economic Development Agency
  - Municipal/Regional Economic Development Office

(circle numbers and total them)

	HIGH	MODERATE	LOW	
Significance to the Economic Sector (e.g. agriculture, forestry or tourism)	3	②	1	2
Economic Significance to National, Provincial, Regional Development and Employment	3	②	1	2
<b>Total Production Component Rating</b> (maximum is 6)				<b>4</b>
<i>(transfer total to "7.4.6")</i>				

Source AWFC have the potential, due to their relatively new presence in Nova Scotia, to promote tourism as an example of the management of sustainable resources.

## 7.4.5 Copy of All Relevant Findings and Sources Attached

- Yes  
 No

If no, then list See sources page 43 and materials compiled in section 3.0 of the environmental assessment.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Describe other major issues relevant to a decision The onsite wetlands' assessment identified <sup>45</sup>  
ATVs as a significant concern to the hydrology of the wetlands. Access to  
the wetlands is presently unrestricted and has the potential to become a  
serious, adverse impact to the health of the wetlands system. By securing  
the wetlands, through the development of a wind farm, accessibility to the  
wetlands may be better controlled.

\_\_\_\_\_

\_\_\_\_\_

## 7.4.6 Overall Project Impact Rating

An overall project rating occurs when the preceding Sections (7.4.1 - 7.4.4) are examined to compare the overall significance of the wetland to that of the proposed project. This significance is identified in the rating calculation which follows.

### a. Rating Calculation

(insert totals from previous Sections (7.4.1 - 7.4.4) in boxes provided, subtract total in Section 7.4.4 from total of 7.4.1 to 7.4.3, and calculate overall rating)

#### CURRENT WETLAND STATUS

7.4.1 Biological Rating	4	(a)
7.4.2 Hydrological Rating	2	(b)
7.4.3 Social/Cultural Rating	1	(c)

#### PROJECT STATUS

7.4.4 Projected Production Change Rating	4	(d)
------------------------------------------	---	-----

Overall Rating = 3 (e)  
a+b+c minus d = e

NOTE: When a value of "U" (unknown) or "NA" (not available) occurs, then proceed to either gather that information or move directly to Stage Two "7.5" to address that requirement.

### b. Overall Rating

The equation totals the three wetland function component values (a + b + c) and subtracts the new project production benefits value (d). The result is an overall rating (e) which represents the value of the wetland in relation to the benefits of the proposed project.

- Maximum possible value: 19
- Minimum possible value: 1
- Where overall rating is equal to or greater than 13, project rejection (or relocation) should be recommended.
- Where overall rating is equal to or less than 3, project approval should be recommended.
- Where overall rating is between 4 and 12 inclusive, project should be referred to Section 7.5, Stage Two.



## Instructions to Evaluators

This overall rating provides guidance only to the recommendation, but other factors such as critical thresholds on particular wetland functions or the role of a single wetland within a broader wetland complex (e.g. prairie potholes) should be considered and noted in the recommendation. Despite the overall rating, the evaluator would also have the option of concluding that the significance of *one* wetland or project component is so overwhelming, e.g. habitat to endangered species, key source of groundwater, Canada Land Inventory or provincial class I rating, designation as a national or provincial park, etc.) that the recommendation of rejecting the project is warranted on this basis alone. A strong justification is required.

### 7.4.7 Recommendation

- (a) reject project
- (b) refer to Stage Two "7.5"
- (c) approve without conditions
- (d) approve with conditions

*(list necessary mitigative measures and measures to retain/enhance wetland functions of value to society in (e))*

- (e) mitigative measures The proponent provide DNR with field data collected for this wetland during the wetlands assessment, to be included in the DNR's Wetlands Inventory Database.

- (f) reasons for recommendation *(note: outline by project benefits and important wetland functions/values lost or reduced do not simply report the number calculated)* This project promotes sustainable energy resource development, which reduces our our reliability on fossil fuels. The Project has a low detrimental impact to the function of the wetlands, while having a potentially high possibility for the future preservation of the wetlands.

  
Evaluator's Signature

July 6, 2003

Date

47

If referred to "7.5", outline particular project impacts or wetland functions/values that may be worthy of special attention \_\_\_\_\_

Appendix F  
**ACCDC Categorizations**

## ACCDC Ranks

- S1 Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.
- S2 Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
- S3 Uncommon throughout its range in the province, or found only in a restricted range, even if abundant in at some locations. (21 to 100 occurrences).
- S4 Usually widespread, fairly common throughout its range in the province, and apparently secure with many occurrences, but the Element is of long-term concern (e.g. watch list). (100+ occurrences).
- S5 Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions.
- S#S# Numeric range rank: A range between two consecutive numeric ranks. Denotes uncertainty about the exact rarity of the Element (e.g., S1S2).
- SH Historical: Element occurred historically throughout its range in the province (with expectation that it may be rediscovered), perhaps having not been verified in the past 20 - 70 years (depending on the species), and suspected to be still extant.
- SU Unrankable: Possibly in peril throughout its range in the province, but status uncertain; need more information.
- SX Extinct/Extirpated: Element is believed to be extirpated within the province.
- S? Unranked: Element is not yet ranked.
- SA Accidental: Accidental or casual in the province (i.e., infrequent and far outside usual range). Includes species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range.
- SE Exotic: An exotic established in the province (e.g., Purple Loosestrife or Coltsfoot); may be native in nearby regions.
- SE# Exotic numeric: An exotic established in the province that has been assigned a numeric rank.
- SP Potential: Potential that Element occurs in the province, but no occurrences reported.
- SR Reported: Element reported in the province but without persuasive documentation which would provide a basis for either accepting or rejecting the report (e.g., misidentified specimen).
- SRF Reported falsely: Element erroneously reported in the province and the error has persisted in the literature.
- SZ Zero occurrences: Not of practical conservation concern in the province, because there are no definable occurrences, although the species is native and appears regularly. An NZ rank will generally be used for long distance migrants whose occurrences during their migrations are too irregular (in terms of repeated visitation to the same locations) or transitory. In other words, the migrant regularly passes through the province, but enduring, mappable Element Occurrences cannot be defined.

## Qualifiers

### Breeding Status

- B Breeding: Basic rank refers to the breeding population of the element in the province.
- M Non-breeding, Migratory: Basic rank refers to the non-breeding migratory population of the element in the province.
- N Non-breeding: Basic rank refers to the non-breeding population of the element in the province.

### Other

- ? Inexact or uncertain: for numeric ranks, denotes inexactness, e.g., SE? denotes uncertainty of exotic status. (The ? qualifies the character immediately preceding it in the SRANK)
- C Captive or cultivated: Element is presently extant in the country or province only in captivity or cultivation.

### Global Rank Definitions: G-ranks

- G1 Critically imperilled Globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- G2 Imperilled Globally because of rarity (6 to 20 occurrences or less than 3000 individual) or because of vulnerability to extinction due to some natural or man-made factor.
- G3 Either very rare and local throughout its range (21 to 100 occurrences or less than 10,000 individuals) or locally in a restricted range or vulnerable to extinction from other factors.
- G4 Apparently secure Globally (may be rare in parts of its range).
- G5 Demonstrably secure Globally.
- GH Of historical occurrence throughout its range, may be rediscovered.
- GX Believed to be extinct throughout its range.
- GXC Extirpated in the wild but still known from captivity or cultivation.
- G#? Tentative rank (eg.G2?)
- G#G# Range of rank; insufficient data to assign specific Global rank (eg.G2G3).
- G#T# Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definitions as above (eg.G3T1).
- G#Q Rank of a questionable species - ranked as species but questionable whether it is a species or subspecies; numbers have same definitions as above (e.g. G2Q).
- G#T#Q Same as above, but validity as subspecies or variety is questioned.
- GU Due to lack of information, no rank or range can be assigned.
- G? Not yet ranked (temporary).

Appendix G

**Letters from Local Lobster Fishermen and  
Ornithologist**

June 25, 2003

Atlantic Wind Power Corporation Ltd.  
P.O. Box 812, Yarmouth,  
Nova Scotia  
B5A 4K4

Dear Atlantic Wind Power Corporation:

*RE: Construction of a submarine cable corridor across Pubnico Harbour as a component of the proposed Pubnico Point Wind Farm*

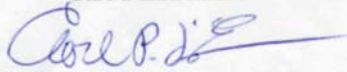
We the undersigned are aware that the Atlantic Wind Power Corporation (AWPC) is seeking permission for the construction of the Pubnico Point Wind Farm. As part of the regulatory requirements, a *Canadian Environmental Assessment Act (CEAA)*, environmental screening triggered by the *Fisheries Act, section 35 (2) Harmful Alteration Disruption and Destruction (HADD)* of fish habitat and *NWPA, section 5 (1) (a): Construction of Work in Navigable Water* is underway.

As a component of the proposed Pubnico Point Wind Farm, the construction of a submarine cable corridor across Pubnico Harbour is required to transfer generated electricity to the Nova Scotia Power Inc. 69kv grid in Lower East Pubnico. We understand that the submarine cable will consist of six cables to be laid across the Harbour with in a 60 metre corridor at the location identified on the attached map at coordinates: N43-35.984 and W65-35.341 (West Pubnico) and N43-35.757 and W 65-46.788 (East Pubnico).

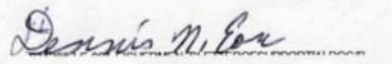
We the undersigned are local fishermen who set traps and fish for lobster in the immediate vicinity of the proposed submarine cable corridor. We are signing this letter in support of the proposed project. We do not believe that the burying of the proposed cable will either damage or interfere with the existing lobster habitat within, or in proximity to, the proposed submarine cable corridor. Furthermore, we believe the proposed construction activity will not pose a navigational hazard if the work is completed outside of the local lobster season.

Sincerely,

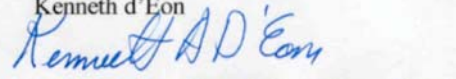
Carl d'Entremont

  
762-2917  
Box 10


Dennis d'Eon

  
Box 72 | 762 2891

Kenneth d'Eon

  
762-3066 Box 257

Blanchard Nickerson

  
762-2917  
Box 234

July, 8, 2003

**Annabelle Singleton**  
**Environmental Planner**  
**CBCL Limited**  
**1489 Hollis Street PO Box 606**  
**Halifax, NS Canada B3J 2R7**  
902 421 7241, local 2253 Fax 902 423 3938  
email: [annabelles@cbcl.ca](mailto:annabelles@cbcl.ca)

Dear Ms. Singleton:

Mr. Brad d'Entremont has asked me to send you a letter stating any concerns I had with the proximity of his and his partners' proposed wind turbine electric generating system at Pubnico Point to the Roseate Tern colony on The Brothers. The Brothers are located about 3 or 4 km north west of this proposed site.

As a local volunteer, I have been monitoring the terns at The Brothers for about 30 years and more specifically, the Roseate Terns on these islands for 20 years. The Roseate Tern has been designated an endangered species by the Committee On the Status of Endangered Species In Canada (COSEWIC). Common Terns as well as Arctic Terns nest on The Brothers along with the Roseate Terns. The majority of the terns at this colony consists of Common Terns; about 10% are Roseate Terns and about 5% are Arctic Terns. Over the last 3 years, the yearly average number of tern nests has been 821 with 82 being the average number of Roseate Tern nests over the same period.

The Brothers have had the largest Roseate Tern colony in Canada for many years.

**I wish to inform you I foresee no measurable negative effect or impact with the tern colony on The Brothers and with the construction or operation of such an electric generation system at Pubnico Point.**

If you wish to discuss this issue with me in more detail, I can be reached at 902-762-2097 (home), 902-762-2793 (work), 902-762-2885 (fax) or at [ted@ns.sympatico.ca](mailto:ted@ns.sympatico.ca) (email).

My web page with my work over the years on The Brothers can be found at [www.ted.ca](http://www.ted.ca) and follow the "Nature & Science" link.

Sincerely,



**Ted C. D'Eon**  
**P.O. Box 100**  
**West Pubnico**  
**Nova Scotia B0W 3S0**

cc: Brad d'Entremont

Appendix H  
**Open House Survey Form**





**Proposed Pubnico Point Wind Farm**  
**Open House**  
**May 22, 2002**

**Attendee Questionnaire**

Thank you for taking the time to visit us today. It is important that we learn about environmental factors of local importance that may have a bearing on the proposed project. Please use this questionnaire to provide feedback to us on what you have learnt during the course of the Open House. The completed form can be given to any of our representatives in attendance, or mailed or faxed to Ann Wilkie at our engineering consulting firm:

**CBCL Limited**  
**P.O. Box 606**  
**1489 Hollis Street**  
**Halifax, NS B3J 2R7**  
**Fax: (902) 423-3938**

**Questions:**

1. Did this Open House provide the information that you needed or expected? What additional information would you have liked?

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2. What do you think about the proposed windmill farm at Pubnico Point? Are you in favour, undecided or opposed? What leads you to this conclusion?

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**May 22, 2002 - Open House at Pubnico Point**  
Attendee Questionnaire  
Page 2

3. What are your principal concerns with respect to the windmill development?

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4. Are there features from a historical, cultural, archaeological, geological or biological nature associated with, or adjacent to, the wind farm site that we should be aware of? Please identify.

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5. In your opinion, what would this community stand to gain or lose from this project? Please identify.

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6. Please provide any additional comments or questions you may have about the project.

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Name of respondent: \_\_\_\_\_

Address: \_\_\_\_\_ Phone No.: \_\_\_\_\_

Appendix I  
**Draft Bird Monitoring Protocol**

## **Draft Bird Monitoring Protocol**

This draft protocol is based on the work done by Andrea Kingsley and Becky Whittam to monitor the impacts of birds at North Cape in Prince Edward Island. The proposed methodology will be discussed and refined in collaboration with the regulators and bird ornithologists before implementation.

It is generally our view that Pubnico Point is not a significant area or migratory path for birds. Nonetheless AWPC will work with others to develop and execute this protocol. The goal is to determine the effects of the proposed wind farm at Pubnico Point on birds breeding, staging or migrating in or through the area. It is recognized that this is the first wind farm to be developed in coastal Nova Scotia, and, as the first, effective monitoring at the site could generate information of relevance to the siting and layout of subsequent comparable projects.

Unless supplementary research funding can be attained, the execution of the monitoring program will be limited by the fact that it will be conducted by the staff of AWPC, none of whom will be trained in bird identification. Certainly at key periods of breeding and migration, it will be important to solicit the support of someone with substantial bird identification experience.

The number and species of birds visiting or passing over the site will vary by season and in response to weather and other environmental factors. To establish a sound data base, it would be preferable to monitor the site at all times of year for a minimum of two years. Most wind test sites are monitored every two weeks (Anderson *et al.* 1999), which is the period advocated for the Pubnico Point site for the months of May through October; once per month should be adequate for the balance of the year.

The objectives of the proposed monitoring program are to:

- determine *bird utilization rates*, i.e., # of birds observed per unit time and/or area, at half the turbines in each row and at paired control sites located at some distance from the turbines;
- determine *bird mortality rates*, i.e., # of carcasses found per unit area, at these same points;
- use these variables to calculate *bird risk*, i.e., mortality/utilization, at each point;
- compare bird risk at turbines and at controls;
- identify annual periods of high and low risk; and
- determine the influence of weather on passage and mortality risk.

## **Methods**

Each of the selected turbines should be considered a single point survey which should be matched with a control point located about 250 m distant, with the stipulation that the habitat between the two should be similar. Control points should be flagged and georeferenced with a GPS. This paired design should allow comparison of bird utilization and mortality rates immediately surrounding the turbines, and 250 m from the turbines.

Each of the points should be surveyed once a month from November through April, and every two weeks from May through October. Surveys should begin at first light, so that carcasses are more likely to be found before they are scavenged. The points should be visited randomly, although each turbine point and its associated control point should be visited successively. Additional counts should be conducted following significant fog events during the migrations season, i.e., 24 hours or more of fog.

At each point, the observer should record the location, along with the date, start time and weather (temperature, visibility, wind speed and direction, and precipitation). After this data has been recorded, a 5 minute point count should be conducted wherein all birds that are near, i.e., within 50 m of the control point should be recorded. The following variables should be recorded:

- species, if known. If not known, each bird should be recorded by number;
- behaviour, i.e., flying, perching, soaring, walking etc;
- If flying or soaring, the zone of passage. Four suggested zones (from Morrison, 1998) are:
  - a) within the blade sphere;
  - b) close to the blades including passes along the edge of the rotation zone;
  - c) not in the blade sphere, but below the bottom tip of the blade; or
  - d) out of and well above the top of the blade.

If at a control point, the bird's location should be recorded in reference to the heights associated with the above zones, e.g., zone d = greater than 75 m.

It is estimated that the above recordings should take 1.5 to 2 hours. After these recordings have been made, the points should be revisited and an area of 50 m radius around each turbine, and control point, should be searched for carcasses. It is important that these searches be conducted on the same day as the point counts. If the carcasses cannot be identified, they should be collected (requires a permit from the Canadian Wildlife Service) or photographed for identification. Each carcass should be removed from the search zone after photographing or identification to avoid refinding it on a later search.

For each carcass found, the recorder should identify its species, the condition of the carcass, the probable cause of death and justification why this cause was chosen. The distance and direction from the control point should be noted and, if possible, georeferenced.

## **Analysis**

The bird utilization rate and bird mortality rate can be calculated for each turbine and control point. The utilization rate can also be calculated separately for each passage zone. An index of risk could then be calculated as the ratio of mortality to utilization. This ratio could then be compared for turbine and control sites to determine whether the area immediately around the turbines is more dangerous than the area at some distance from the turbines. This ratio can also be compared across the seasons to determine if risk is higher during the migration, breeding, or wintering seasons, and across various weather conditions to determine if risk is higher during periods, for example, of low visibility.