

APPENDIX A
THE MUNICIPALITY OF THE COUNTY OF COLCHESTER
LAND USE BY LAW

Municipality of Colchester
Chapter 56
Wind Turbine Development Bylaw

1. Title & Scope:

- 1.1 This Bylaw is enacted pursuant to Section 172 of the Municipal Government Act, SNS 1998, c.18 and shall be known and may be cited as the “Wind Turbine Development Bylaw” of the Municipality of Colchester and shall apply to all lands within the Municipality of the County of Colchester.
- 1.2 This Bylaw does not exempt any person from complying with the requirements of other bylaws or regulations in force within the Municipality of the County of Colchester and from obtaining any licence, permission, permit, authority or approval as otherwise required by the Municipality, the Province of Nova Scotia, and/or the Government of Canada.
- 1.3 This by-law shall apply to all large and small scale wind turbines including those existing prior to the effective date of this by-law, except Section 4 which shall not apply so as to invalidate the location of any wind turbine pre-existing the effective date of this by-law. This Bylaw shall not apply to micro-scale wind turbines.

2. Definitions:

For the purposes of this Bylaw:

- 2.1 **“Decommissioning”** means the final closing down and dismantling of a wind turbine and associated infrastructure once the project has reached the end of its operation life;
- 2.2 **“Development Officer”** means the Development Officer appointed by the Council of the Municipality of the County of Colchester;
- 2.3 **“Dwelling”** means all structures intended for regular human occupation, such as a house or cottage but not a camp or an accessory structure such as a shed or storage area;
- 2.4 **“Camp”** means a recreational shelter typically used for weekend or short term activities such as hunting, fishing or snowmobiling. Camps are more rustic than cottages and usually lack some of the basic facilities such as running water, electricity, and separate kitchen;
- 2.5 **“Cottage”** means a seasonal home that is serviced with running water, onsite sewage disposal system and electricity and that is equipped to accommodate an

extended period of stay. Cottages are able to evolve into retirement or permanent homes;

- 2.6 **“Environmental Assessment”** means all documentation required under the *Canadian Environmental Assessment Act* and *Nova Scotia Environment Act* and regulations;
- 2.7 **“Licence”** means a Wind Turbine Development Licence issued pursuant to this Bylaw;
- 2.8 **“Nacelle”** means the frame and housing at the top of the tower that is part of a wind turbine enclosing components such as, the gearbox and generator, protecting them from the weather;
- 2.9 **“Nameplate Capacity”** means the manufacturer’s maximum rated output of the wind turbine expressed in kilowatts;
- 2.10 **“Municipality”** means the Municipality of the County of Colchester;
- 2.11 **“Owner”** and **“Operator”** mean respectively any Owner or Operator of a wind turbine licensed under this Bylaw;
- 2.12 **“Setback”** means the measured distance from the base of the wind turbine tower;
- 2.13 **“Wind Farm”** means two or more large scale wind turbines electrically connected to the transmission grid or local distribution network;
- 2.14 **“Wind Power Project”** means a Wind Farm or Wind Turbine and associated property, substations and other utility systems;
- 2.15 **“Wind Turbine”** means a wind energy conversion system erected to produce electrical power by capturing the kinetic energy in wind and converting it into electricity;
- 2.16 **“Wind Turbine Height”** means the distance measured from grade to the highest point of the blade’s arc;
- 2.17 **“Wind Turbine - Large Scale”** means any Wind Turbine, which has a Nameplate Capacity of greater than 100kW, which may be developed as a stand alone turbine or in combination with other turbines in a Wind Farm;
- 2.18 **“Wind Turbine - Small Scale”** means a Wind Turbine which has a Nameplate Capacity of equal to or less than 100kW, but not less than 1kW, which may be developed as a stand alone turbine or in combination with other turbines in a wind farm;
- 2.19 **“Wind Turbine - Micro Scale”** means a Wind Turbine which has a Nameplate Capacity of equal to or less than 1kW.

3. Administration:

- 3.1 No person shall install or operate a Wind Turbine in the Municipality of the County of Colchester without first having obtained a Licence from the Development Officer.
- 3.2 A Licence for a Wind Turbine shall be issued by the Development Officer subject to the following requirements:
- a) The Owner or Operator submits a completed application in such form as is approved from time to time by the Municipality;
 - b) The application shall be cosigned by the registered property owner if the land is not owned by the Owner and/or Operator of the Wind Turbine;
 - c) A completed application form is accompanied with an application fee in an amount that is to be determined by Municipal Council from time to time;
 - d) The requirements contained in Section 4 and Section 5 and 6 of this Bylaw have been met.

3.3 Duration of Licence:

- a) A Licence issued under this Bylaw will be in effect for 25 years unless otherwise cancelled or suspended.
- b) An Owner or Operator may apply to renew a Licence and a completed application must be submitted to the Development Officer no less than thirty days prior to the expiry date of the effective Licence. An application for renewal will be accompanied with an application fee that is set by Municipal Council from time to time. A License shall be renewed for a period of 20 years provided the application includes information, prepared by a qualified individual, that demonstrates the Wind Turbine(s) can safely operate for the additional time period.
- c) A Licence issued under this Bylaw shall automatically lapse and become null and void if, in the opinion of the Development Officer:
 - (i) construction of the Wind Power Project has not commenced within eighteen (18) months of the date the Licence was issued;
 - (ii) substantial completion of the Wind Power Project has not occurred within five (5) years of the date that the Licence was issued;
 - (iii) following the issuance of a Licence, new or corrected information that materially affects the application is brought to the attention of the Development Officer;
 - (iv) the applicant fails to meet the requirements of Section 7 of this Bylaw;or

(v) the entire Wind Power Project has ceased operation for a period of at least one year, unless the Owner or Operator thereof can reasonably establish that additional time is needed to repair or rebuild part or all of the Wind Power Project because of damage or loss caused by circumstances beyond the reasonable control of the Owner or Operator.

3.4 Notice of Decision:

- a) Within a reasonable amount of time, not to exceed 45 days, of receiving a completed application for a Licence or renewal thereof, the Development Officer shall either issue the Licence or notify the applicant of a decision to refuse the issuance:
- b) A decision to refuse an application for a Licence or Renewal thereof shall be served to the applicant in writing by ordinary mail and shall include the reasons for not issuing or renewing the License.

4. Location Conditions:

A Wind Power Project shall meet the following conditions:

- a) The minimum Setback for a Large Scale Wind Turbine from an external property line and public roads will be one (1) times the total height of the Wind Turbine. This Setback will not apply where the adjoining property is part of the Wind Power Project.
- b) The minimum Setback for the location of a Large Scale Wind Turbine from an existing dwelling, such as a house or cottage but not a camp, on a neighbouring property is 700 metres.
- c) The applicant may request a reduction of the 700m setback down to a minimum of 500m with written permission from the neighbouring property owner. Written permission will be obtained from the neighbouring property owner in a fashion approved by the Municipality.
- d) The minimum Setback from an external property line for a Small Scale Wind Turbine shall be two (2) times the total height of the Wind Turbine. This Setback will not apply where the adjoining property is part of the Wind Power Project.

5 Conditions of Operation

5.1 Finish

A Wind Turbine shall have a non-reflective matte finish in an unobtrusive colour.

5.2 Lettering and Signage

A Wind Turbine tower shall not contain any commercial advertising. However, the hub or Nacelle may display the manufacturer's, Operator's or Owner's name

or logo. Site signs will be limited to those which identify the Wind Power Project, locate access points and provide safety and educational information.

5.3 Tower Access and Safety

- a) A wind power project shall be protected from unauthorized access by a security fence, with a lockable gate and a minimum height of 1.8 metres, or by having any ladder or permanent tower access located no closer to the ground than 3.7metres or for monopole designs, with internal access only, a lockable door.
- b) The minimum rotor blade ground clearance will be 7.5 metres.

5.4 Lighting

A Wind Turbine shall not be provided with artificial lighting except for lighting that is required by Transportation Canada or other regulatory authorities.

5.5 Temporary Uses - test towers

Facilities for the assessment of wind energy resources (test towers) may be erected for the life of the wind power project if they continue to be used. If they are no longer required as part of the project, they shall be removed within one year of inactivity.

5.6 Outdoor Storage

Outdoor storage shall be considered an accessory use to a wind power project and any such storage occurring after the completion of construction activities of the wind power project shall be screened from view from adjacent residential Dwellings and public highways.

6. Information Required at Time of Application

Along with the application for a Licence, the applicant shall provide:

- a) A site plan, drawn to scale by an engineer or surveyor, showing the location of the Wind Turbines and accessory components of the Wind Power Project;
- b) A plan, drawn to scale, showing location of adjacent structures and identifying all Dwellings and public roads within 1 kilometres of any proposed Large Scale Wind Turbines;
- c) A copy of the Environmental Assessment, if applicable. The notice of federal and/or provincial approvals, along with any changes, comments or conditions will be forwarded to the Municipality upon issuance;
- e) The recognised design standard for the proposed turbines;
- f) A copy of a Decommissioning Plan as prepared by the applicant. The Decommissioning Plan will identify above ground components of the Wind Power Project to be removed from the site along with any site remediation, excluding roads, required to return the site to a natural state. Decommissioning will

commence within one (1) year after the owner or operator has surrendered the License or the License has been terminated by force of Section 3.3 of this Bylaw. Decommissioning shall be completed within twelve (12) months after its commencement;

- g) A copy of approvals from Transportation Canada and Navigation Canada and/or such other regulatory approval that may be required; and
- h) Evidence and results of public notification to Section 8 of this Bylaw.

7. Requirements of the Applicant During the Construction Phase

It shall be a condition of a Licence, issued under this Bylaw, that:

- a) once determined, the applicant shall submit the engineer drawings for the foundations supporting the Wind Turbines as prepared and stamped by a professional engineer, licensed to practice in Nova Scotia;
- b) within two (2) months of installation of a single Wind Turbine (or completion of a phase in a multi-phased wind turbine project), the applicant will submit a location certificate for each foundation, that confirms that the location of each such Wind Turbine is in compliance with the applicable Setbacks stipulated in this Bylaw;
- c) when an Environmental Assessment is required, under Section 6c, above, construction will not commence until the final approvals of the Environmental Assessment are issued and submitted to the Administrator of this Bylaw.

8. Community Information Meeting

- 8.1** As part of the application for Large Scale Wind Turbine Project Licence, the applicant shall arrange or have conducted a community meeting, in the community where the Wind Power Project is to be located, to present the proposal and answer any questions concerning the project.

8.2 Notice of Meeting

The applicant will provide sufficient notice to enable municipal councillors and staff to attend the meeting. Notice of meeting will be advertised in the local and daily newspaper a minimum of two times, first notice being two weeks prior to the meeting date. At the time of first notice, the applicant will advise the Municipality of the meeting date, time and location.

8.3 Citizen Monitoring Committee

The applicant shall offer opportunity to the community to establish a citizen monitoring committee for the duration of the construction phase of the project.

9. Enforcement

9.1 Right of Inspection

The Development Officer and any employee of the Municipality authorized by the Development Officer may, for the purpose of ensuring compliance with this By-law, including compliance with the Decommissioning Plan enter in or upon any land or premises at any reasonable time upon reasonable notice thereof but without a warrant. If a person refuses to allow the administrator to exercise, or attempts to interfere or interferes with the administrator in the exercise of a power pursuant to this Act, the administrator may apply to a judge of the Supreme Court of Nova Scotia for an order to allow the administrator entry to the property and an order restraining a person from further interference.

9.2 Offence

It shall be an offence to:

- a) contravene any provision of this Bylaw, including any licensing requirement, location condition or condition of operation and construction;
- b) contravene any condition in a Wind Turbine Development Licence, or renewal thereof under this bylaw; and
- c) fail to comply with any representations contained within an application in respect of which a Licence has been issued.

9.3 Punishment

Offences pursuant to subsection 9.2 are punishable on summary conviction by a fine of not less than \$1,000 and not more than \$5,000 and to imprisonment of not more than two months in default of payment thereof.

9.4 Additional Penalty

In addition to any penalty under subsection 9.3, in the event of an offence against this Bylaw, the Development Officer may suspend a Licence for a period of up to 3 months in respect of a first conviction and may revoke a Licence in respect of a second conviction within any 3 year period.

A suspension or revocation shall preclude any person from applying for or being granted Licence or renewal for the period of the suspension in the case of a suspension, and for 5 years in the case of a revocation, in respect of the same development in respect of which the offence was committed.

9.5 Enforcement of Decommissioning Plan

At the end of the operational life of the Wind Power Project, occurring either at the choice of the Owner and/or Operator or for any reason contemplated in this Bylaw, and upon a finding by the Development Officer that the Decommissioning

Plan has not been carried out in a way satisfactory to the Development Officer, the Development Officer may:

- (i) give notice to the Owner and/or Operator advising him of any steps necessary to comply with the Decommission Plan and asking that the Owner and/or Operator to take these steps to complete Decommissioning at his costs;
- (ii) after giving notice and providing the Owner and/or Operator with a reasonable time to complete Decommissioning, carry out any necessary steps for the Decommissioning of the Wind Power Project on behalf of the Owner and/or Operator. All costs incurred in the course of such Decommissioning of the Wind Power Project shall be the responsibility of the Owner and/or Operator and payable by the Owner and/or Operator to the Development Officer.

This Section shall operate in addition to the provisions contained on Section 9.3 of this Bylaw.

9.6 Appeals

Any person who, upon application, is refused a Wind Turbine Licence or renewal or whose Wind Turbine Licence is suspended may, by written notice to the Development Officer, within 30 days of receiving written notification of the refusal, suspension or revocation, file an appeal to Council and Council shall hear the appeal at a hearing within 60 days of the filing of the appeal and Council may allow the appeal, dismiss the appeal or vary the decision under appeal.

10. Severability

It is hereby declared that each and every of the foregoing Sections of this Bylaw is severable and that if any provision of this Bylaw should for any reason be declared invalid by any court, it is the intention and desire of the Council of the Municipality of the County of Colchester that each and every of the then remaining provisions hereof should remain in full force and effect.

APPENDIX B
ENVIRONMENTAL PROTECTION PLAN SUGGESTED
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APPENDIX C
HUMAN HEALTH AND WIND FARMS – A LITERATURE
REVIEW

In support of the Environmental Assessment (EA) for the Millbrook Community Wind Project, a review was completed of current available literature on the potential effects on human health related to wind energy. Several key health-related issues were identified, and Project-specific studies were completed to address shadow flicker, electromagnetic interference (EMI), visual impacts and sound. Details of these studies are provided in Section 12.0 of the “Environmental Assessment Registration Document”.

The following sections provide the reader with additional background information on the potential effects of electromagnetic fields (EMFs), air quality, ice throw/shedding and infrasound on human health.

Electromagnetic Fields

EMFs are a type of energy that occurs naturally and is also created through the use of electrical appliances and equipment (i.e. cell phone usage, radio towers, etc.) (City of Toronto 2011). A guidebook to Wind Energy Development was produced in 2011 and identified transmission lines, wind turbine generators, generator transformers and underground cables as the four potential sources of EMFs as a result of wind farm operations (Canadian Wind Energy Association [CanWEA] 2011). The guidebook goes on to suggest that EMF exposure is not significant due to low emission levels produced by wind farm operations and indicates that generator transformers likely generate the highest levels of EMFs. Similar conclusions have been made by Health Canada and the World Health Organization (Chief Medical Officer of Health of Ontario 2010).

In 2007, a study was completed to assess the possible effects of EMFs on human health. The study concluded that there is little evidence to support the theory that EMFs cause long term health issues (Scientific Committee on Emerging and Newly Identified Health Risks 2007). As well, a study led by the National Institute of Environmental Health Sciences assessed scientific evidence spanning over 6 years, to determine whether exposure to EMF could result in a potential risk to human health. Results indicated that there were no consistent patterns of biological effects with animals or with cells (Electric and Magnetic Fields Research and Public Information Dissemination Program 2002).

Health Canada states that “research has shown that EMFs from electrical devices and power lines can cause weak electric currents to flow through the human body. However, these currents are much smaller than those produced naturally by your brain, nerves and heart, and are not associated with any known health risks” (Health Canada 2010). Health Canada goes on to state that EMFs are strongest when close to the source so that at greater distances, the strength of the field fades rapidly and humans need not engage in specific actions to minimize risk including those who are located just outside the boundaries of power line corridors (Health Canada 2010).

Air Quality

The development and construction phases of a wind energy project may affect local air quality, by increasing air borne dust associated with on-site equipment, and vehicles. Emissions from vehicles and equipment can also contribute to a reduction in local air quality.

The American Wind Energy Association (AWEA) states that the generation of electricity from the wind does not result in any air emissions (AWEA 2010). Similarly, the US Environmental Protection

Agency (EPA) recognizes that the emissions associated with wind technology are negligible because no fuels are combusted. Therefore, wind energy production offsets more polluting forms of energy generation and can actually improve air quality and our health.

Ice Throw and Ice Shedding

Under appropriate temperature and humidity conditions, ice can build up on the rotor blades, nacelle and tower of a wind turbine, which can lead to two types of risk:

- ice fragments dislodge and are shed from the rotor of the operating turbine due to aerodynamic and centrifugal forces; and
- ice fragments dislodge from the structure and fall to the ground when it is shut down or idling without power production (CanWEA 2007).

As part of a project prepared by the Finnish Meteorological Institute entitled “Wind Energy in Cold Climates (WECO)”, a set of safety guidelines for wind developments in ice prone areas was developed. A risk assessment methodology demonstrated that the risk of being struck by ice thrown from a turbine is diminishingly small at distances greater than approximately 250 m from the turbine in a climate where moderate icing occurs (Morgan *et al.* 1998). With proper setbacks and on-sight safety awareness, hazards are minimized (Colby 2008; Massachusetts Department of Environmental Protection & Massachusetts Department of Public Health 2012).

The turbines selected for the Project will be equipped with turbine deactivation technology, which detects rotor imbalance caused by ice formation on blades, and triggers the turbine to automatically shut down in icy conditions. The use of this technology will significantly reduce the risk of ice throw.

Turbines for the proposed Project have been located greater than 1.5 km (turbine 1) from the nearest provincial road (Loch Haven Lane), 1.1 km (turbine 2) from the nearest residence, and 1.2 km (turbine 3) from the nearest seasonal woods camp. These setback distances exceed the recommended safe distances to effectively remove the risk of ice throw.

These mitigation strategies will decrease and/or eliminate the risk of injury from ice to nearby workers and drivers. In addition, the following additional mitigation strategies will be implemented:

- physical and visual warnings (i.e. signs and fences);
- turbine deactivation during periods of ice accumulation; and
- restriction of access to trained site personnel (Wahl and Giguere 2006).

Infrasound

General Background - Sound

Humans detect sound from changes in pressure that travel through the air and cause the eardrum and small bones of the middle ear to vibrate. The vibrations are transmitted to the inner ear where sensory hair cells then change the vibrations into nerve impulses, which travel to the brain where they are perceived and interpreted.

The magnitude (loudness) of sound is described as “pressure level”, “sound level” or “noise level” and is measured as decibels (dB). Typical sound levels, measured in decibels, are shown in Table A.

Table A: Typical Sound Levels

Source	Distance from Source		Sound Pressure Levels (dBA)
	feet	meters	
Freight train	100	30	70
Vacuum Cleaner	10	3	70
Freeway	100	30	70
Wind in trees	40	12	55
Light traffic	100	30	70
Average home			50
Soft whisper	5	2	30
Quiet bedroom			20

Source: AWEA 2011

The tonal quality or pitch of the sound is related to its frequency and is measure in hertz (Hz). The normal frequency range of sounds that humans can hear (known as audible sound) extends from about 20-50 Hz (a rumbling sound) up to high frequency of about 10,000-15,000 Hz (hissing sound) or even higher for some people. Humans generally hear best in the mid-frequency range of 500-4,000 Hz.

General Background - Infrasound

Infrasound is very low-frequency sound, that is typically defined as being between 1-20 Hz, which is below what human ears can normally hear.

Infrasound is everywhere in the environment. It is emitted from natural sources (e.g. wind, rivers) and from artificial sources including road traffic, aircraft, and ventilation systems. The most common source of infrasound that humans encounter is vehicles (CMOH 2010).

When evaluating potential effects of infrasound, it is important that these frequencies be discussed in the context of the sound pressure levels, or in other words, the loudness of the sound. For instance, very loud sounds at very low frequencies (i.e. 165 dB at 2 Hz, reducing to 145 dB at 20 Hz) may result in pain (Leventhall 2006) and infrasound has been shown to cause annoyance, when the sound level exceeds the threshold of hearing (i.e. the lowest sound levels that a listener can detect) (HGC 2010). Further, research shows that to be physically felt, infrasound must exceed 100–110 dB (Ellenbogen *et al.* 2012).

While there is some variation in the literature and between individual sensitivities, there is fairly good agreement on the level of the threshold of hearing among the various studies that have been completed (Figure 1).

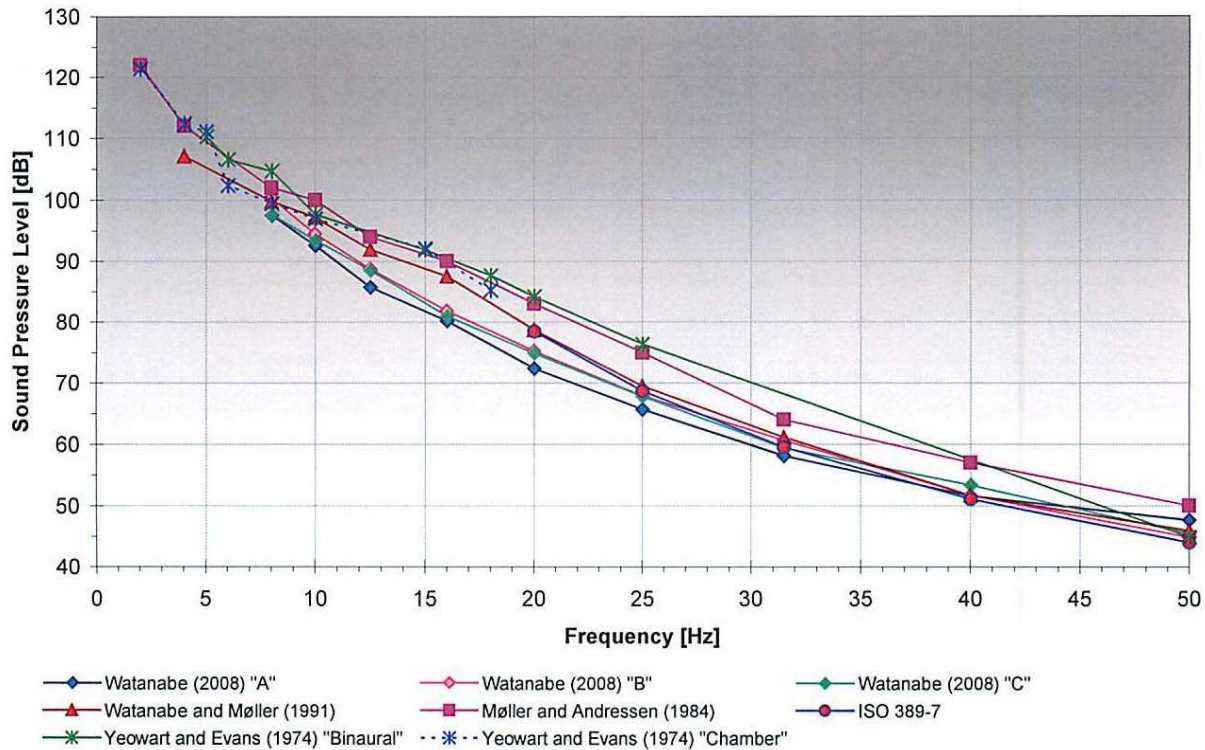


Figure 1: Threshold of Hearing Data from Various Papers (HGC 2010).

What these results show is that the lower the frequency of the sound, the louder the sound needs to be in order to be perceived.

Measured Infrasound Levels

In 2010, Sonus, an acoustic consulting firm based in South Australia, completed a study to measure infrasound produced by a range of natural and manmade sources using a methodology specifically designed to measure infrasound (Table B, Figure 2). The G-weighting network was applied to the measured infrasound pressure levels as it has been standardized to determine the human perception (i.e. threshold of hearing) and annoyance due to noise that lies within the infrasound frequency range. By comparison, when measuring audible sound levels, meters are usually equipped with weighting circuits to simulate the frequency response characteristics of the human ear. The A-weighting filter is normally used as it correlates well with the human perception of most sounds.

Sound levels measured using the G and A-weighting filters are expressed as dBG and dBA, respectively.

Table B: Measured Levels of Infrasound from Natural and Manmade Sources

Source	Infrasound Level (dBG)
Threshold of hearing	85 dBG
Wind Farm (360 m downwind) (CGWF)	61 dBG
100 m downwind from wind farm (CBWF)	66 dBG
200 m downwind from wind farm (CBWF)	63 dBG
Ambient infrasound (100 m from nearest turbine with negligible wind and no turbine operation) (CBWF)	62 dBG
Inside a residence (fridge operating) (1200m from nearest turbine)	51 dBG
Outside a residence (1200m from nearest turbine)	58 dBG
Adjacent to the beach (25 m from high water mark)	75 dBG
Cliff face (250 m from the coastline)	69 dBG
Inland forest (8 km from the coastline)	57 dBG
Gas fired power station (350 m)	74 dBG
Business District (70 m from two major road corridors)	76 dBG

Source: Sonus Pty Ltd 2010

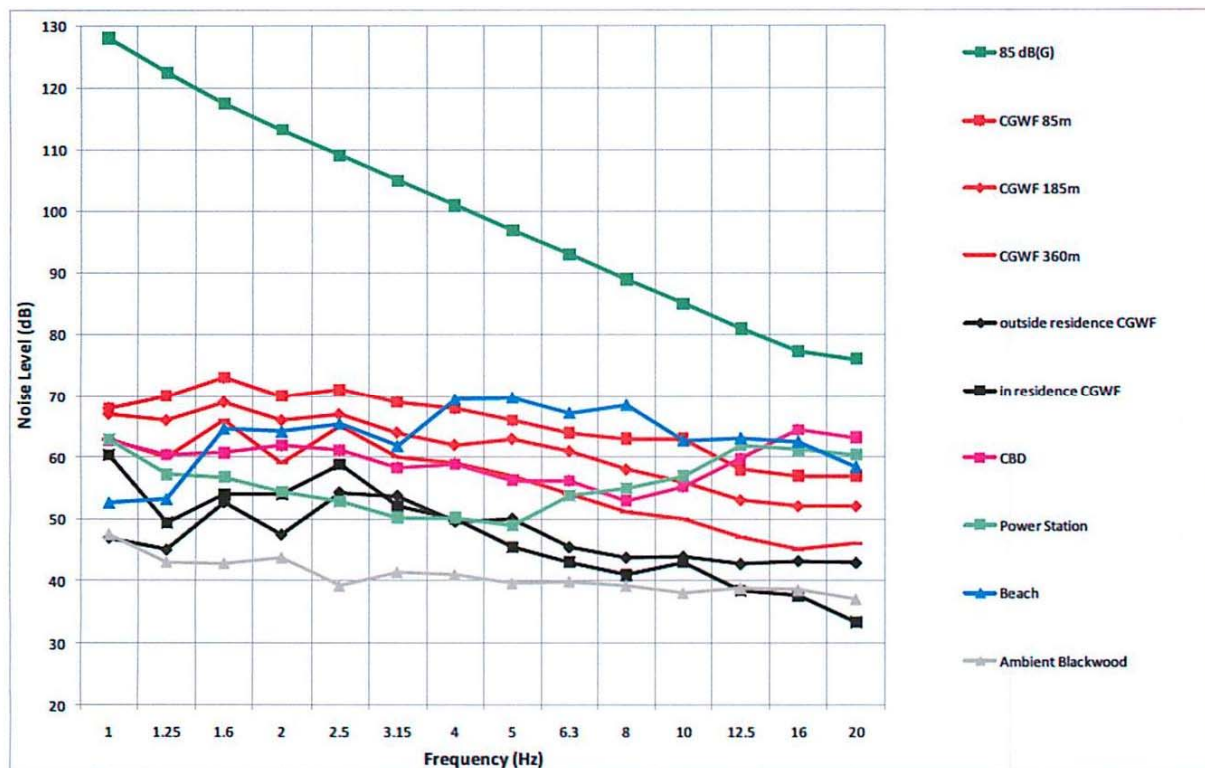


Figure 2: Summary of Measurement at the Clements Gap Wind Farm and Other Sources (Sonus Pty Ltd 2010)

The results of the study indicate that while turbines do produce infrasound, levels are well below established levels that can be perceived by humans and are comparable to natural and urban sources that are common in the environment.

Another recent Australian report also measured levels of infrasound within typical environments in South Australia, with a particular focus on comparing wind farm environments to urban and rural environments away from wind farms. The study concluded that measured infrasound levels at rural locations both near to and away from wind farms were no higher than infrasound levels measured at the urban locations (Figure 3). Human activity and traffic were the main sources of infrasound at urban locations, while localized wind conditions were found to be the main source of infrasound in rural locations. All measurements were below the levels that can be perceived by humans, with most by a significant margin (Evans *et al.* 2013).

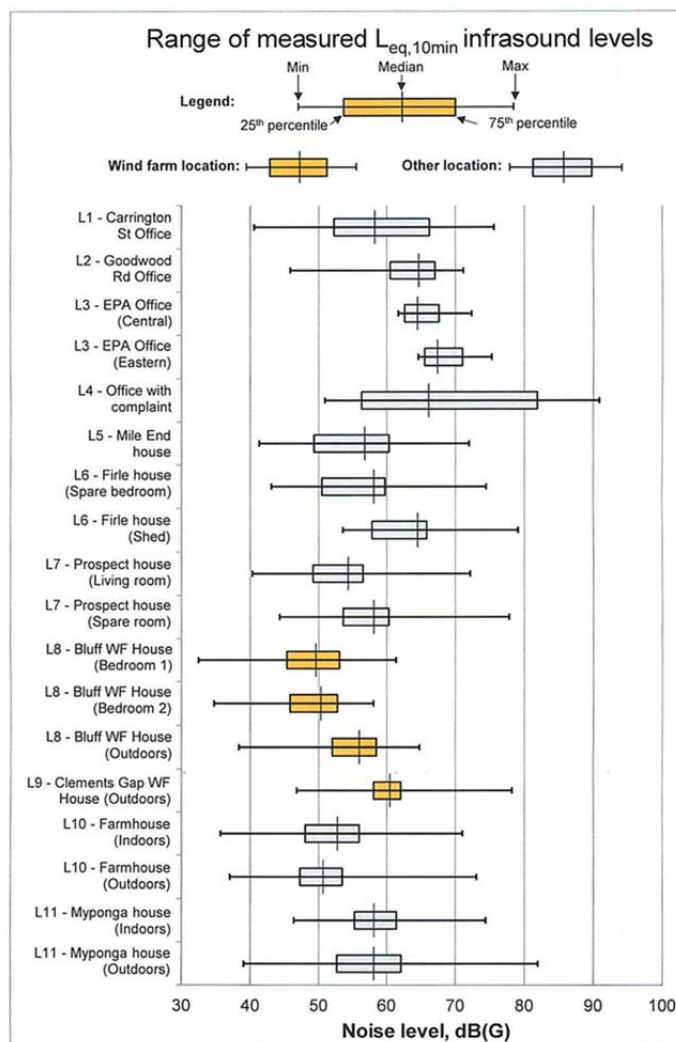


Figure 3: Range of Measured Infrasound Levels (Evans *et al.* 2013).

An investigation was also completed at a wind farm in Pubnico, Nova Scotia to, in part, evaluate infrasound levels at a residence within 330 m of the closest turbine (HGC 2006). Similar to other results from wind farms, infrasound levels were found to be well below the level of sound that can be perceived by humans, as shown in Figure 4.

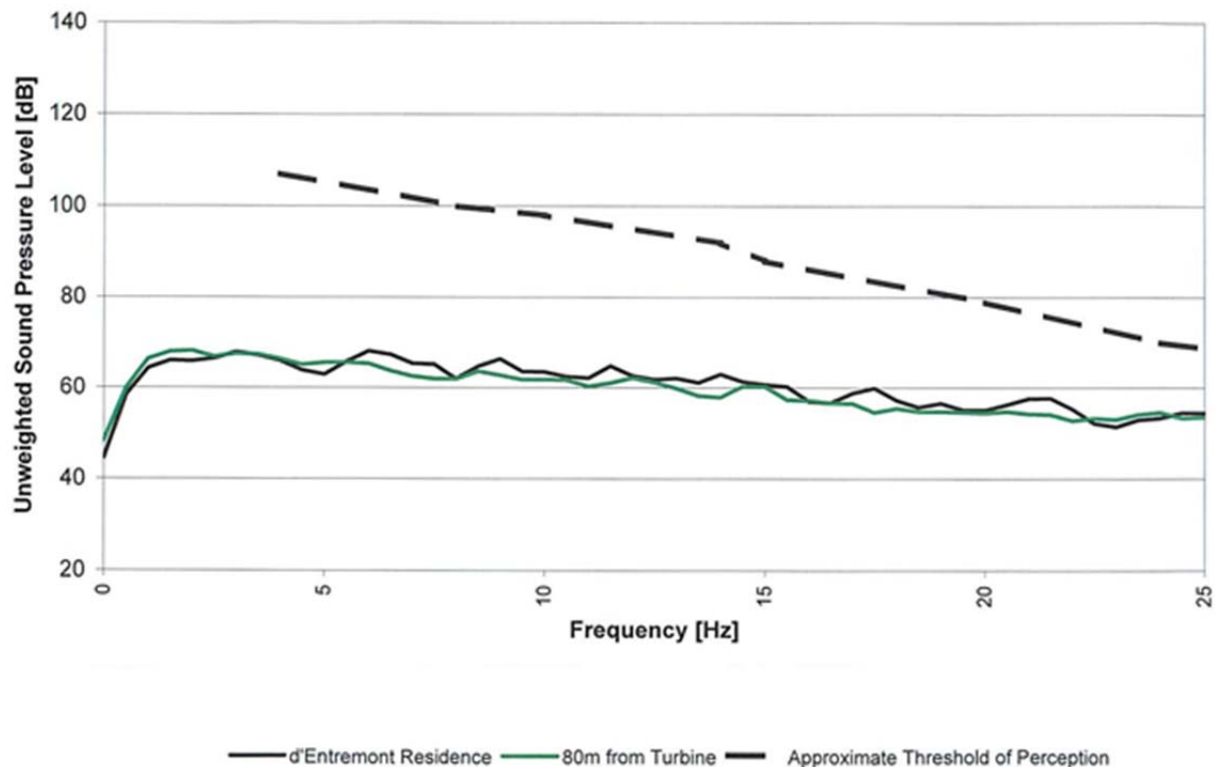


Figure 4: Infrasound Measurements at Pubnico Wind Farm (HGC 2006).

Infrasound and Health Concerns

Concern about infrasound from wind turbines may have originated from the experience of neighbours of early wind turbine designs with downwind rotors (rotors downwind of the tower). In contrast, all modern utility scale wind turbines have upwind rotors that produce significantly lower infrasound emissions (Bastasch *et al.* 2006).

Several studies and panels have been assembled to evaluate the perceived health effects associated with wind turbines.

A scientific advisory panel with expertise in audiology, acoustics, occupational/environmental medicine, and public health was assembled by the wind industry in early 2009 to conduct a review of current literature available on the issue of perceived health effects of wind turbines (Colby *et al.*

2009). Following their review and analysis of the information, the panel reached consensus on the following conclusions:

- There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects.
- The ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans.
- The sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequencies of the sounds and the panel's experience with sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences.

The Chief Medical Officer of Health in Ontario also conducted a review of papers and reports (from 1970 to date) on wind turbines and health from scientific bibliographic databases, grey literature, and from a structured Internet search. The report concluded that “low frequency sound and infrasound from current generation upwind model turbines are well below the pressure sound levels at which known health effects occur. Further, there is no scientific evidence to date that vibration from low frequency wind turbine noise causes adverse health effects” (CMOH 2010).

The Massachusetts Department of Environmental Protection in collaboration with the Massachusetts Department of Public Health recently convened a panel of independent experts to identify any documented or potential health impacts of risks that may be associated with exposure to wind turbines, and, specifically, to facilitate discussion of wind turbines and public health based on scientific findings. The panel concluded that “measured levels of infrasound produced by modern upwind wind turbines at distances as close as 68 m are well below that required for non-auditory perception”. Further, the panel concluded that “the weight of the evidence suggests no association between noise from wind turbines and measures of psychological distress or mental health problems” (Ellenbogen *et al.* 2012).

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APPENDIX D

WETLAND METHODOLOGY AND CHARACTERIZATIONS

Wetlands and Watercourses in Nova Scotia

Wetlands in Nova Scotia are regulated by NSE under Section 105 of the *Environment Act*. Under the Act, wetlands are:

Land referred to as a marsh, swamp, fen, or bog that either periodically or permanently has water table at, near, or above the land surface or that is saturated with water, and sustains aquatic processes as indicated by the presence of poorly drained soils, hydrophytic vegetation, and biological activities adapted to wet conditions.

Watercourses are defined in the *Environment Act* as:

Any creek, brook, stream, river, lake, pond, spring, lagoon, or any other natural body of water, and includes all the water in it, and also the bed and the shore (whether there is actually any water in it or not). It also includes all groundwater.

Watercourses are defined in Halifax Regional Municipality (HRM) land use by-laws as:

A lake, river, stream, ocean, or other natural body of water.

Delineation Methodology

In order for a wetland determination to be made, the following three criteria were assessed the field:

- Presence of hydrophytic (water loving) vegetation;
- Presence of hydrologic conditions that result in periods of flooding, ponding, or saturation during the growing season; and
- Presence of hydric soils (anaerobic conditions in upper part).

Although detailed data point analysis was not completed within the study areas, soil pits were completed frequently to confirm the presence/absence of wetland hydrology and hydric soils, as per the methodology below. A general vegetation survey was also completed within the wetlands to confirm hydrophytic vegetation.

Identification of Hydrophytic Vegetation

Hydrophytic vegetation is defined as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanent or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (Environmental Laboratory 1987). Hydrophytic vegetation should be the dominant plant type in wetland habitat (Environmental Laboratory 1987).

WETLAND DELINEATION IDENTIFICATION METHODOLOGY

Dominant plant species observed in each wetland were classified according to indicator status (probability of occurrence in wetlands), in accordance with the U.S. Fish and Wildlife Service (USFWS) National List of Vascular Plant Species that Occur in Wetlands: NE Region (Region 1) (Reed 1988). Please refer to Table 1 (below) for these classifications. These indicators are used as this region most closely resembles the flora of Nova Scotia and climate regime. Further relevant information was reviewed in Flora of Nova Scotia (Zinck, 1998).

Table 1: Classification of Wetland-Associated Plant Species¹

Plant Species Classification	Abbreviation ²	Probability of Occurring in Wetland
Obligate	OBL	>99%
Facultative Wetland	FACW	66-99%
Facultative	FAC	33-66%
Facultative Upland	FACU	1-33%
Upland	UPL	<1%
No indicator status	NI	Insufficient information to determine status
Plants That Are Not Listed (assumed upland species)	NL	Does not occur in wetlands in any region.

¹ Source: Reed 1988

² A '+' or '-' symbol can be added to the classification to indicate greater or lesser probability, respectively, of occurrence in a wetland.

If the majority (greater than 50%) of the dominant vegetation at a data point is classified as obligate (OBL), facultative wetland (FACW), or facultative (FAC), then the location of the data point is considered to be dominated by hydrophytic vegetation.

Identification of Hydric Soils

A hydric soil is a soil that has formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA-NRCS 2010). Indicators of the presence of a hydric soil include soil colour (gleyed soils and soils with bright mottles and/or low matrix chroma), aquic or preaquic moisture regime, reducing soil conditions, sulfidic material (odour), soils listed on the hydric soils list, iron and manganese concretions, organic soils (histosols), histic epipedon, high organic content in surface layer in sandy soils, and organic streaking in sandy soils.

Soil pits were excavated to a maximum depth of 40 cm or refusal. The soil in each was then examined for hydric soil indicators. The matrix colour and mottle colour (if present) of the soil were determined using the Munsell Soil Colour Charts.

Determination of Wetland Hydrology

Wetland habitat, by definition, either periodically or permanently, has a water table at, near, or above the land surface or that is saturated with water. To be classified as a wetland, a site should have at least one primary indicator or two secondary indicators of wetland hydrology, as shown in Table 2.

WETLAND DELINEATION IDENTIFICATION METHODOLOGY

Table 2: Indicators of Wetland Hydrology

Examples of Primary Indicators	Examples of Secondary Indicators
Water marks	Oxidized Root Channels in the Upper 30 cm
Drift Lines	Local Soil Survey Data
Sediment Deposition	Dry season Water Table
Drainage Patterns	Stunted or Stressed Plants
Water-stained leaves	
Visual Observation of Saturated Soils	
Visual Observation of Inundation	

Wetland habitat is assessed for signs of hydrology, via visual observations across the area and through assessment of soil pits.

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Table D1: Wetland Characteristics: Millbrook/Turo Heights Community Wind Projects

Project # 12-4328/12-4544

WETLAND ID	WETLAND TYPE	LANDSCAPE POSITION	LANDFORM	WATER FLOW	SOIL TYPE	SURFACE/HYDROLOGIC CONDITIONS	WETLAND BOUNDARY	DOMINANT VEGETATION			WATERCOURSE / WATER BODY PRESENT
								Herbs	Shrubs	Trees	
1	Treed swamp	Terrene	Basin	Outflow (drainage)	Organic (A1-Histosol)	1) Saturated at surface 2) Drainage patterns 3) Surface water (5 cm)	Gentle	New York fern (<i>Thelypteris noveboracensis</i>); cinnamon fern (<i>Osmundastrum cinnamomeum</i>); wooly bullrush (<i>Scirpus cyperinus</i>); American bullrush (<i>Scirpus americanus</i>); flat-topped white aster (<i>Doellingeria umbellata</i>)	yellow birch (<i>Betula alleghaniensis</i>); black spruce (<i>Picea mariana</i>); balsam fir (<i>Abies balsamea</i>)	black spruce red maple (<i>Acer rubrum</i>)	Drains to the north via an ephemeral drainage channel.
2	Treed swamp	Terrene	Basin	Isolated	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Saturated at surface 2) Drainage patterns	Gentle	bluejoint grass (<i>Calamagrostis canadensis</i>); cinnamon fern; wooly bullrush	balsam fir; red maple; yellow birch; black spruce	red maple; white birch (<i>Betula papyrifera</i>); black spruce	None observed.
3a (north)	Shrub swamp	Terrene	Basin	Outflow (inferred)	Organic (A1-Histosol)	1) Saturated at surface 2) Surface water (10 to 15 cm deep)	Gentle	cinnamon fern; sensitive fern (<i>Onoclea sensibilis</i>); bunchberry (<i>Cornus canadensis</i>); three seeded sedge (<i>Carex trispérma</i>)	yellow birch; white birch; red maple	None (outover)	None observed.
3b (south)	Treed swamp	Terrene	Basin	Outflow (inferred)	Organic (A1-Histosol)	1) Saturated at surface 2) Groundwater at 20 cm 3) Water stained leaves	Gentle	cinnamon fern; mountain holly (<i>Nemopanifthus mucronata</i>); black spruce	black spruce; red maple; mountain holly	black spruce; red maple; white birch	None observed.
4	Shrub swamp	Terrene	Basin	Isolated	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Standing water	Gentle	wooly bullrush	trembling aspen (<i>Populus tremuloides</i>); red maple; yellow birch	None	None observed.
5	Treed swamp	Terrene	Basin	Inflow (ephemeral)	Organic over bedrock (A1 - Histosol)	1) Saturated at surface 2) Standing water	Gentle	wooly bullrush; cinnamon fern	balsam fir; red maple	red maple; black spruce	Ephemeral drainage input in the south, no output observed.
6	Treed swamp	Terrene	Basin	Outflow (ephemeral)	Organic over bedrock (A1 - Histosol)	1) Standing water	Gentle	wooly bullrush; cinnamon fern	balsam fir; red maple	black spruce	Drains into road side ditch.
7	Treed swamp	Lotic stream (confined)	Basin	Outflow (ephemeral)	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Saturated at surface; 2) Water stained leaves; 3) Drainage patterns 4) Oxidized photospheres	Gentle	New York fern; flat-topped white aster; cinnamon fern; grass sp.	balsam fir; yellow birch; black spruce	yellow birch	Ephemeral drainage input observed from the north. Drains into roadside ditch which sources watercourse 1.
8	Shrub swamp	Lotic stream (confined)	Basin	Throughflow (intermittent)	Organic (A1-Histosol)	1) Saturated at surface 2) Groundwater at 20 cm 3) Water stained leaves	Gentle	fringed sedge (<i>Carex critica</i>)	white birch; red maple	None	Ephemeral drainage input observed from the west. Ephemeral drainage output observed to the east.
9	Treed swamp	Terrene	Slope	Outflow (ephemeral)	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Saturated at surface 2) Drainage patterns 3) Surface water (2 cm)	Gentle	cinnamon fern; rice cut grass (<i>Leersia oryzoides</i>); hay scented fern (<i>Dennstaedtia punctilobula</i>)	balsam fir; black spruce; white birch	black spruce; white birch; red maple	Drains ephemerally to the east.

Table D1: Wetland Characteristics (pg 2): Millbrook/Truro Heights Community Wind Project

Project # 12-4328/12-4544

WETLAND ID	WETLAND TYPE	LANDSCAPE POSITION	LANDFORM	WATER FLOW	SOIL TYPE	SURFACE/HYDROLOGIC CONDITIONS	WETLAND BOUNDARY	DOMINANT VEGETATION			WATERCOURSE / WATER BODY PRESENT
								Herbs	Shrubs	Trees	
10a (north)	Treed swamp	Terrene	Basin	Outflow (inferred)	Organic over depleted mineral soils (A2 - Histlic epipedon)	1) Saturated at surface 2) Groundwater within 20 cm 3) Drainage patterns 4) Water stained leaves	Gentle	New York fern; cinnamon fern	balsam fir; yellow birch	balsam fir; yellow birch	None observed.
10b (south)	Shrub swamp							New York fern; flat-topped white aster	balsam fir; yellow birch	None	
11	Treed swamp	Terrene	Basin	Isolated	Organic over depleted mineral soils (A2 - Histlic epipedon)	1) Saturated at surface 2) Hydrogen sulphide odor 3) Standing water	Gentle	cinnamon fern; New York fern	None	balsam fir; red maple	None observed.
12	Shrub swamp	Terrene	Basin	Inflow (ephemeral)	Organic over depleted mineral soils (A2 - Histlic epipedon)	1) Saturated at surface; 2) Oxidized rhizospheres	Gentle	fringed sedge; sensitive fern	white birch; red maple	None	Ephemeral drainage input observed from the west.
13	Shrub swamp	Terrene	Flat / sloped	Throughflow (ephemeral)	Organic over sandy redox (S5 - Sandy redox)	1) Saturated at surface; 2) Drainage patterns; 3) Groundwater at 25 cm	Gentle	fringed sedge; cinnamon fern	white birch; black spruce	None	Drains east into watercourse 2.
14a (north)	Treed swamp	Terrene	Basin	Outflow	Organic (A-1 Histosol)	1) Saturated at surface 2) Drainage patterns 3) Surface water (5 cm)	Gentle	New York fern; cinnamon fern; woolly bullrush; American bullrush	yellow birch; black spruce; red maple	black spruce; red maple	Drains southeast across road into watercourse 2.
14b (south)	Treed swamp	Lotic stream (confined)	Flat / sloped	Outflow	Organic over depleted mineral soils (A2 - Histlic epipedon)	1) Saturated at surface 2) Water stained leaves 3) Surface water (5 cm)	Gentle	cinnamon fern; rice cut grass; hay scented fern	balsam fir; black spruce; white birch	black spruce; white birch; red maple	Drained by watercourse 2 to the east.
15	Treed swamp	Lotic stream (confined)	Basin	Outflow (inferred)	Organic over sandy redox (S5 - Sandy redox)	1) Saturated at surface 2) Groundwater within 20 cm 3) Drainage patterns 4) Water stained leaves	Gentle	New York fern; flat-topped white aster	balsam fir; red maple; yellow birch	balsam fir; red maple; yellow birch	None observed.
16	Shrub swamp	Lotic stream (confined)	Basin	Throughflow (ephemeral)	Organic over depleted mineral soils (A2 - Histlic epipedon)	1) Saturated at surface 2) Drainage patterns 3) Surface water (2 cm deep)	Gentle	woolly bullrush	balsam fir; yellow birch	None	Drainage inflow observed from the east. Inferred outflow to the west.
17a	Treed swamp	Lotic stream (confined)	Basin	Outflow	Organic (A1-Histosol)	1) Saturated at surface 2) Drainage patterns 3) Water stained leaves 4) Groundwater at 10 cm	Gentle	cinnamon fern; bluejoint grass; sensitive fern	balsam fir	white birch; black spruce	Drained by watercourse 3 to the east.
17b	Treed swamp	Terrene	Basin	Outflow	Organic over depleted mineral soils (A2 - Histlic epipedon)	1) Saturated at surface 2) Drainage patterns	Gentle	cinnamon fern; sensitive fern	balsam fir	black spruce	Drains to the west into wetland 16.
17c	Shrub swamp	Terrene	Basin	Outflow	Organic over depleted mineral soils (A2 - Histlic epipedon)	Saturated at surface	Gentle	woolly bullrush; bluejoint grass	white birch; balsam fir; red maple	None	Drains to the northeast into wetland 17A
17d	Treed swamp	Terrene	Basin	Outflow (ephemeral)	Organic (A1-Histosol)	Saturated at surface	Gentle	New York fern; cinnamon fern; balsam fir; bunchberry	balsam fir; yellow birch; black spruce	balsam fir; yellow birch; red maple	Ephemeral drainage output to the southwest.
17e	Treed swamp	Terrene	Basin	Outflow	Organic over depleted mineral soils (A2 - Histlic epipedon)	1) Saturated at surface 2) Drainage patterns 3) Water stained leaves 4) Groundwater within 15 cm	Gentle	cinnamon fern; evergreen wood fern (<i>Dryopteris intermedia</i>)	yellow birch	yellow birch	Drains to the north into wetland 17A.
17f	Treed swamp	Terrene	Basin	Outflow (ephemeral)	Organic over depleted mineral soils (A2 - Histlic epipedon)	1) Saturated at surface 2) Groundwater at 10 cm 3) Drainage patterns	Gentle	cinnamon fern; New York fern; wood sorrel (<i>Oxalis</i> spp.)	yellow birch	yellow birch; red maple	Drainage output to the south.

Table D1: Wetland Characteristics (pg 3): Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

WETLAND ID	WETLAND TYPE	LANDSCAPE POSITION	LANDFORM	WATER FLOW	SOIL TYPE	SURFACE/HYDROLOGIC CONDITIONS	WETLAND BOUNDARY	DOMINANT VEGETATION			WATERCOURSE / WATER BODY PRESENT
								Herbs	Shrubs	Trees	
18	Treed swamp	Terrene	Basin	Isolated	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Saturated at surface 2) Surface water (10 cm deep)	Gentle	cinnamon fern; New York fern; bunchberry	balsam fir	balsam fir; red maple; white birch	Likely drains to the east via sub-surface seepage into wetland 20.
19	Treed swamp	Terrene	Basin	Outflow (ephemeral)	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Saturated at surface 2) Standing water (3 cm deep)	Gentle	cinnamon fern; evergreen wood fern; wood sorrel; starflower (<i>Trientalis borealis</i>)	yellow birch	black spruce	Drainage output to the south.
20	Treed swamp	Terrene	Slope	Outflow (ephemeral)	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Saturated at surface 2) Surface water (5 cm deep)	Gentle	sensitive fern; fringed sedge; hay scented fern; evergreen wood fern; bluejoint	balsam fir	red maple; white birch	Drainage output to the east.
21	Treed swamp	Terrene	Basin	Throughflow (entrrenched)	Organic (A1-Histosol)	1) Saturated at surface 2) Groundwater at 10 cm	Moderate	three seeded sedge; bunchberry; New York fern	speckled alder (<i>Alnus incana</i>); red maple; yellow birch	red maple	The desktop review results indicate that watercourse 5 flows through this wetland south of the assessment area. Drainage input from the north was also observed.
22	Treed swamp	Terrene	Basin	Throughflow (entrrenched)	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Saturated at surface 2) Groundwater within 10 cm	Gentle to moderate	hay scented fern; evergreen wood fern; cinnamon fern	balsam fir; yellow birch; speckled alder; red maple	red maple; yellow birch; balsam fir	Watercourse 4 flows through this wetland from south to north.
23	Treed swamp	Terrene	Basin	Outflow (inferred)	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Saturated at surface 2) Groundwater within 25 cm	Gentle	New York fern; balsam fir; swamp dewberry (<i>Rubus hispida</i>)	balsam fir; yellow birch	yellow birch	None observed. Likely drains into watercourse 5.
24	Treed swamp	Lotic stream (confined)	Basin	Throughflow	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Saturated at surface 2) Groundwater at 20 cm	Gentle	tall white aster (<i>Aster umbellatus</i>); bog goldenrod (<i>Solidago uliginosa</i>); cinnamon fern	balsam fir; speckled alder	balsam fir	Watercourse 6 flows through this wetland from north to south.
25	Treed swamp	Terrene	Basin	Outflow (inferred)	Organic over depleted mineral soils (A2 - Histic epipedon)	1) Saturated at surface 2) Groundwater at 10 cm	Gentle	Labrador tea (<i>Rhododendron groenlandicum</i>); lambkill (<i>Kalmia agustifolia</i>); snowberry (<i>Symphoricarpos albus</i>); bunchberry	black spruce	black spruce	None observed.

APPENDIX E
ACCDC AND PROJECT SITE PLANT LISTS

Table E1: Short List of Rare Plant and Lichen Species Identified Within 100 KM of the Project Site

Project # 12-4328/4544

SCIENTIFIC NAME	COMMON NAME	SARA Status	NSEA Status	COSEWIC Status	NSDNR Status
<i>Adiantum pedatum</i>	Northern Maidenhair Fern	Not Listed	Not Listed	Not Listed	Red
<i>Allium tricoccum</i>	Wild Leek	Not Listed	Not Listed	Not Listed	Red
<i>Alopecurus aequalis</i>	Short-awned Foxtail	Not Listed	Not Listed	Not Listed	Yellow
<i>Amelanchier nantucketensis</i>	Nantucket Serviceberry	Not Listed	Not Listed	Not Listed	Red
<i>Anemone canadensis</i>	Canada Anemone	Not Listed	Not Listed	Not Listed	Yellow
<i>Anemone quinquefolia</i>	Wood Anemone	Not Listed	Not Listed	Not Listed	Yellow
<i>Anemone virginiana</i>	Virginia Anemone	Not Listed	Not Listed	Not Listed	Yellow
<i>Anemone virginiana</i> var. <i>alba</i>	Virginia Anemone	Not Listed	Not Listed	Not Listed	Yellow
<i>Anemone virginiana</i> var. <i>virginiana</i>	Virginia Anemone	Not Listed	Not Listed	Not Listed	Yellow
<i>Antennaria parlinii</i>	Parlin's Pussytoes	Not Listed	Not Listed	Not Listed	Red
<i>Arabis drummondii</i>	Drummond's Rockcress	Not Listed	Not Listed	Not Listed	Yellow
<i>Arabis hirsuta</i> var. <i>pyncocarpa</i>	Western Hairy Rockcress	Not Listed	Not Listed	Not Listed	Red
<i>Asplenium trichomanes</i>	Maidenhair Spleenwort	Not Listed	Not Listed	Not Listed	Yellow
<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort	Not Listed	Not Listed	Not Listed	Yellow
<i>Betula michauxii</i>	Newfoundland Dwarf Birch	Not Listed	Not Listed	Not Listed	Yellow
<i>Betula pumila</i> var. <i>pumila</i>	Bog Birch	Not Listed	Not Listed	Not Listed	Yellow
<i>Bidens connata</i>	Purple-stemmed Beggarticks	Not Listed	Not Listed	Not Listed	Yellow
<i>Bidens hyperborea</i>	Estuary Beggarticks	Not Listed	Not Listed	Not Listed	Yellow
<i>Botrychium lanceolatum</i> var. <i>angustisegmentum</i>	Triangle Moonwort	Not Listed	Not Listed	Not Listed	Yellow
<i>Botrychium lunaria</i>	Common Moonwort	Not Listed	Not Listed	Not Listed	Red
<i>Botrychium simplex</i>	Least Moonwort	Not Listed	Not Listed	Not Listed	Yellow
<i>Bromus latiglumis</i>	Broad-Glumed Brome	Not Listed	Not Listed	Not Listed	Red
<i>Calamagrostis stricta</i>	Slim-stemmed Reed Grass	Not Listed	Not Listed	Not Listed	Yellow
<i>Calamagrostis stricta</i> ssp. <i>stricta</i>	Slim-stemmed Reed Grass	Not Listed	Not Listed	Not Listed	Yellow
<i>Calamagrostis stricta</i> var. <i>stricta</i>	Slim-stemmed Reed Grass	Not Listed	Not Listed	Not Listed	Yellow
<i>Caltha palustris</i>	Yellow Marsh Marigold	Not Listed	Not Listed	Not Listed	Yellow
<i>Campanula aparinoides</i>	Marsh Bellflower	Not Listed	Not Listed	Not Listed	Yellow
<i>Cardamine maxima</i>	Large Toothwort	Not Listed	Not Listed	Not Listed	Red
<i>Cardamine parviflora</i> var. <i>arenicola</i>	Small-flowered Bittercress	Not Listed	Not Listed	Not Listed	Yellow
<i>Carex adusta</i>	Lesser Brown Sedge	Not Listed	Not Listed	Not Listed	Yellow
<i>Carex atratiformis</i>	Scabrous Black Sedge	Not Listed	Not Listed	Not Listed	Yellow
<i>Carex bebbii</i>	Bebb's Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex capillaris</i>	Hairlike Sedge	Not Listed	Not Listed	Not Listed	Yellow
<i>Carex castanea</i>	Chestnut Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex chordorrhiza</i>	Creeping Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex comosa</i>	Bearded Sedge	Not Listed	Not Listed	Not Listed	Yellow
<i>Carex eburnea</i>	Bristle-leaved Sedge	Not Listed	Not Listed	Not Listed	Yellow
<i>Carex garberi</i>	Garber's Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex haydenii</i>	Hayden's Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex hirtifolia</i>	Pubescent Sedge	Not Listed	Not Listed	Not Listed	Yellow
<i>Carex houghtoniana</i>	Houghton's Sedge	Not Listed	Not Listed	Not Listed	Yellow
<i>Carex hystericina</i>	Porcupine Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex laxiflora</i> var. <i>laxiflora</i>	Loose-Flowered Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex livida</i> var. <i>radiculis</i>	Livid Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex peckii</i>	Peck's Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex pellita</i>	Woolly Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex plantaginea</i>	Plantain-Leaved Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex prairea</i>	Prairie Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex tenera</i>	Tender Sedge	Not Listed	Not Listed	Not Listed	Yellow
<i>Carex tuckermanii</i>	Tuckerman's Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Carex wiegandii</i>	Wiegand's Sedge	Not Listed	Not Listed	Not Listed	Red
<i>Caulophyllum thalictroides</i>	Blue Cohosh	Not Listed	Not Listed	Not Listed	Red
<i>Chenopodium rubrum</i>	Red Pigweed	Not Listed	Not Listed	Not Listed	Red
<i>Clematis occidentalis</i>	Purple Clematis	Not Listed	Not Listed	Not Listed	Red
<i>Clethra alnifolia</i>	Coastal Sweet Pepperbush	Special Concern	Vulnerable	Special Concern	Yellow
<i>Coeloglossum viride</i> var. <i>virescens</i>	Long-bracted Frog Orchid	Not Listed	Not Listed	Not Listed	Red
<i>Conioselinum chinense</i>	Chinese Hemlock-parsley	Not Listed	Not Listed	Not Listed	Yellow
<i>Conopholis americana</i>	American Cancer-root	Not Listed	Not Listed	Not Listed	Red
<i>Cryptogramma stelleri</i>	Steller's Rockbrake	Not Listed	Not Listed	Not Listed	Red
<i>Cuscuta cephalanthi</i>	Buttonbush Dodder	Not Listed	Not Listed	Not Listed	Red
<i>Cynoglossum virginianum</i> var. <i>boreale</i>	Wild Comfrey	Not Listed	Not Listed	Not Listed	Red
<i>Cypripedium arietinum</i>	Ram's-Head Lady's-Slipper	Not Listed	Endangered	Not Listed	Red
<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper	Not Listed	Not Listed	Not Listed	Yellow
<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Yellow Lady's-slipper	Not Listed	Not Listed	Not Listed	Yellow
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Yellow Lady's-slipper	Not Listed	Not Listed	Not Listed	Yellow
<i>Cypripedium reginae</i>	Showy Lady's-Slipper	Not Listed	Not Listed	Not Listed	Red

Table E1: Short List of Rare Plant and Lichen Species Identified Within 100 KM of the Project Site

Project # 12-4328/4544

SCIENTIFIC NAME	COMMON NAME	SARA Status	NSES Status	COSEWIC Status	NSDNR Status
Desmodium canadense	Canada Tick-trefoil	Not Listed	Not Listed	Not Listed	Red
Desmodium glutinosum	Large Tick-Trefoil	Not Listed	Not Listed	Not Listed	Red
Dichanthelium linearifolium	Narrow-leaved Panic Grass	Not Listed	Not Listed	Not Listed	Yellow
Dirca palustris	Eastern Leatherwood	Not Listed	Not Listed	Not Listed	Red
Draba arabisans	Rock Whitlow-Grass	Not Listed	Not Listed	Not Listed	Red
Draba glabella	Rock Whitlow-Grass	Not Listed	Not Listed	Not Listed	Red
Dryopteris fragrans var. remotiuscula	Fragrant Wood Fern	Not Listed	Not Listed	Not Listed	Yellow
Eleocharis olivacea	Yellow Spikerush	Not Listed	Not Listed	Not Listed	Yellow
Eleocharis ovata	Ovate Spikerush	Not Listed	Not Listed	Not Listed	Yellow
Elymus hystrix	Spreading Wild Rye	Not Listed	Not Listed	Not Listed	Red
Elymus hystrix var. bigeloviana	Spreading Wild Rye	Not Listed	Not Listed	Not Listed	Red
Elymus wiegandii	Wiegand's Wild Rye	Not Listed	Not Listed	Not Listed	Red
Empetrum eamesii	Pink Crowberry	Not Listed	Not Listed	Not Listed	Yellow
Epilobium coloratum	Purple-veined Willowherb	Not Listed	Not Listed	Not Listed	Yellow
Epilobium strictum	Downy Willowherb	Not Listed	Not Listed	Not Listed	Yellow
Equisetum pratense	Meadow Horsetail	Not Listed	Not Listed	Not Listed	Yellow
Erigeron hyssopifolius	Hyssop-leaved Fleabane	Not Listed	Not Listed	Not Listed	Yellow
Erigeron philadelphicus	Philadelphia Fleabane	Not Listed	Not Listed	Not Listed	Yellow
Erioderma pedicellatum (Atlantic pop.)	Boreal Felt Lichen (Atlantic pop.)	Endangered	Endangered	Endangered	Red
Eriophorum gracile	Slender Cottongrass	Not Listed	Not Listed	Not Listed	Yellow
Festuca subverticillata	Nodding Fescue	Not Listed	Not Listed	Not Listed	Red
Floerkea proserpinacoides	False Mermaidweed	Not Listed	Not Listed	Not at Risk	Yellow
Fraxinus nigra	Black Ash	Not Listed	Not Listed	Not Listed	Yellow
Fraxinus pennsylvanica	Red Ash	Not Listed	Not Listed	Not Listed	Red
Galium boreale	Northern Bedstraw	Not Listed	Not Listed	Not Listed	Red
Galium labradoricum	Labrador Bedstraw	Not Listed	Not Listed	Not Listed	Yellow
Geocaulon lividum	Northern Comandra	Not Listed	Not Listed	Not Listed	Yellow
Goodyera pubescens	Downy Rattlesnake-Plantain	Not Listed	Not Listed	Not Listed	Red
Goodyera repens	Lesser Rattlesnake-plantain	Not Listed	Not Listed	Not Listed	Yellow
Gratiola neglecta	Clammy Hedge-Hyssop	Not Listed	Not Listed	Not Listed	Yellow
Hedeoma pulegioides	American False Pennyroyal	Not Listed	Not Listed	Not Listed	Yellow
Helianthemum canadense	Long-branched Frostweed	Not Listed	Endangered	Not Listed	Red
Hepatica nobilis	Round-Lobe Hepatica	Not Listed	Not Listed	Not Listed	Red
Hepatica nobilis var. obtusa	Round-lobed Hepatica	Not Listed	Not Listed	Not Listed	Red
Hieracium robinsonii	Robinson's Hawkweed	Not Listed	Not Listed	Not Listed	Yellow
Hudsonia ericoides	Pinebarren Golden Heather	Not Listed	Not Listed	Not Listed	Yellow
Hudsonia tomentosa	Woolly Beach-heath	Not Listed	Not Listed	Not Listed	Red
Hypericum dissimulatum	Disguised St John's-wort	Not Listed	Not Listed	Not Listed	Yellow
Hypericum majus	Large St. John's-wort	Not Listed	Not Listed	Not Listed	Red
Impatiens pallida	Pale Jewelweed	Not Listed	Not Listed	Not Listed	Yellow
Isoetes acadiensis	Acadian Quillwort	Not Listed	Not Listed	Not Listed	Yellow
Isoetes prototypus	Prototype Quillwort	Special Concern	Vulnerable	Special Concern	Red
Juncus dudleyi	Dudley's Rush	Not Listed	Not Listed	Not Listed	Yellow
Juncus greenii	Greene's Rush	Not Listed	Not Listed	Not Listed	Red
Juncus marginatus	Grass-leaved Rush	Not Listed	Not Listed	Not Listed	Yellow
Juncus stygius ssp. americanus	Moor Rush	Not Listed	Not Listed	Not Listed	Yellow
Lactuca hirsuta var. sanguinea	Hairy Lettuce	Not Listed	Not Listed	Not Listed	Yellow
Laportea canadensis	Canada Wood Nettle	Not Listed	Not Listed	Not Listed	Yellow
Lilaeopsis chinensis	Eastern Lilaeopsis	Special Concern	Vulnerable	Special Concern	Yellow
Lilium canadense	Canada Lily	Not Listed	Not Listed	Not Listed	Yellow
Limosella australis	Southern Mudwort	Not Listed	Not Listed	Not Listed	Yellow
Listera australis	Southern Twayblade	Not Listed	Not Listed	Not Listed	Red
Lobelia spicata	Pale-Spiked Lobelia	Not Listed	Not Listed	Not Listed	Red
Malaxis brachypoda	White Adder's-Mouth	Not Listed	Not Listed	Not Listed	Red
Megalodonta beekii	Water Beggarticks	Not Listed	Not Listed	Not Listed	Yellow
Minuartia groenlandica	Greenland Stitchwort	Not Listed	Not Listed	Not Listed	Yellow
Montia fontana	Water Blinks	Not Listed	Not Listed	Not Listed	Red
Myriophyllum farwellii	Farwell's Water Milfoil	Not Listed	Not Listed	Not Listed	Yellow
Myriophyllum verticillatum	Whorled Water Milfoil	Not Listed	Not Listed	Not Listed	Yellow
Ophioglossum pusillum	Northern Adder's-tongue	Not Listed	Not Listed	Not Listed	Yellow
Osmorhiza depauperata	Blunt Sweet Cicely	Not Listed	Not Listed	Not Listed	Red
Osmorhiza longistylis	Smooth Sweet Cicely	Not Listed	Not Listed	Not Listed	Yellow
Pilea pumila	Dwarf Clearweed	Not Listed	Not Listed	Not Listed	Red
Piptatherum canadense	Canada Rice Grass	Not Listed	Not Listed	Not Listed	Yellow
Platanthera flava	Tuberclad Orchid	Not Listed	Not Listed	Not Listed	Yellow
Platanthera flava var. flava	Tuberclad Orchid	Not Listed	Not Listed	Not Listed	Yellow

Table E1: Short List of Rare Plant and Lichen Species Identified Within 100 KM of the Project Site

Project # 12-4328/4544

SCIENTIFIC NAME	COMMON NAME	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
<i>Platanthera flava</i> var. <i>herbiola</i>	Tubercled Orchid	Not Listed	Not Listed	Not Listed	Yellow
<i>Platanthera macrophylla</i>	Large Round-Leaved Orchid	Not Listed	Not Listed	Not Listed	Yellow
<i>Poa glauca</i>	Glaucous Blue Grass	Not Listed	Not Listed	Not Listed	Yellow
<i>Polygala sanguinea</i>	Blood Milkwort	Not Listed	Not Listed	Not Listed	Yellow
<i>Polygonum arifolium</i>	Halberd-leaved Tearthumb	Not Listed	Not Listed	Not Listed	Yellow
<i>Polygonum scandens</i>	Climbing False Buckwheat	Not Listed	Not Listed	Not Listed	Yellow
<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed	Not Listed	Not Listed	Not Listed	Yellow
<i>Potamogeton zosteriformis</i>	Flat-stemmed Pondweed	Not Listed	Not Listed	Not Listed	Yellow
<i>Primula mistassinica</i>	Mistassini Primrose	Not Listed	Not Listed	Not Listed	Yellow
<i>Puccinellia fasciculata</i>	Saltmarsh Alkali Grass	Not Listed	Not Listed	Not Listed	Extirpated
<i>Ranunculus pensylvanicus</i>	Pennsylvania Buttercup	Not Listed	Not Listed	Not Listed	Red
<i>Ranunculus sceleratus</i>	Cursed Buttercup	Not Listed	Not Listed	Not Listed	Red
<i>Rhamnus alnifolia</i>	Alder-leaved Buckthorn	Not Listed	Not Listed	Not Listed	Yellow
<i>Rudbeckia laciniata</i>	Cut-Leaved Coneflower	Not Listed	Not Listed	Not Listed	Yellow
<i>Rudbeckia laciniata</i> var. <i>gaspereauensis</i>	Cut-Leaved Coneflower	Not Listed	Not Listed	Not Listed	Yellow
<i>Rumex salicifolius</i> var. <i>mexicanus</i>	Triangular-valve Dock	Not Listed	Not Listed	Not Listed	Yellow
<i>Salix pedicellaris</i>	Bog Willow	Not Listed	Not Listed	Not Listed	Yellow
<i>Salix sericea</i>	Silky Willow	Not Listed	Not Listed	Not Listed	Yellow
<i>Samolus valerandi</i> ssp. <i>parviflorus</i>	Seaside Brookweed	Not Listed	Not Listed	Not Listed	Yellow
<i>Sanicula odorata</i>	Clustered Sanicle	Not Listed	Not Listed	Not Listed	Red
<i>Saxifraga paniculata</i> ssp. <i>neogaea</i>	White Mountain Saxifrage	Not Listed	Not Listed	Not Listed	Yellow
<i>Senecio pseudoarnica</i>	Seabeach Ragwort	Not Listed	Not Listed	Not Listed	Yellow
<i>Shepherdia canadensis</i>	Soapberry	Not Listed	Not Listed	Not Listed	Yellow
<i>Solidago hispida</i>	Hairy Goldenrod	Not Listed	Not Listed	Not Listed	Red
<i>Spiranthes casei</i> var. <i>casei</i>	Case's Ladies'-Tresses	Not Listed	Not Listed	Not Listed	Yellow
<i>Spiranthes lucida</i>	Shining Ladies'-Tresses	Not Listed	Not Listed	Not Listed	Red
<i>Spiranthes ochroleuca</i>	Yellow Ladies'-tresses	Not Listed	Not Listed	Not Listed	Yellow
<i>Stellaria humifusa</i>	Saltmarsh Starwort	Not Listed	Not Listed	Not Listed	Yellow
<i>Stellaria longifolia</i>	Long-leaved Starwort	Not Listed	Not Listed	Not Listed	Yellow
<i>Suaeda rolandii</i>	Roland's Sea-Blite	Not Listed	Not Listed	Not Listed	Red
<i>Symphyotrichum boreale</i>	Boreal Aster	Not Listed	Not Listed	Not Listed	Yellow
<i>Symphyotrichum ciliolatum</i>	Fringed Blue Aster	Not Listed	Not Listed	Not Listed	Yellow
<i>Symphyotrichum undulatum</i>	Wavy-leaved Aster	Not Listed	Not Listed	Not Listed	Yellow
<i>Teucrium canadense</i>	Canada Germander	Not Listed	Not Listed	Not Listed	Yellow
<i>Thuja occidentalis</i>	Eastern White Cedar	Not Listed	Vulnerable	Not Listed	Red
<i>Tiarella cordifolia</i>	Heart-leaved Foamflower	Not Listed	Not Listed	Not Listed	Yellow
<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed	Not Listed	Not Listed	Not Listed	Yellow
<i>Utricularia gibba</i>	Humped Bladderwort	Not Listed	Not Listed	Not Listed	Yellow
<i>Vaccinium boreale</i>	Northern Blueberry	Not Listed	Not Listed	Not Listed	Red
<i>Vaccinium caespitosum</i>	Dwarf Bilberry	Not Listed	Not Listed	Not Listed	Yellow
<i>Vaccinium uliginosum</i>	Alpine Bilberry	Not Listed	Not Listed	Not Listed	Yellow
<i>Vallisneria americana</i>	Wild Celery	Not Listed	Not Listed	Not Listed	Red
<i>Viburnum edule</i>	Squashberry	Not Listed	Not Listed	Not Listed	Yellow
<i>Viola nephrophylla</i>	Northern Bog Violet	Not Listed	Not Listed	Not Listed	Yellow
<i>Woodsia glabella</i>	Smooth Cliff Fern	Not Listed	Not Listed	Not Listed	Yellow
<i>Zizia aurea</i>	Golden Alexanders	Not Listed	Not Listed	Not Listed	Yellow

Appendix E – Millbrook Footprint, Plant Species Observed during 2012 Field Survey

Project # 12-4328

Scientific Name	Common Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
<i>Abies balsamea</i>	Balsam Fir	Not Listed	Not Listed	Not Listed	Green
<i>Acer pensylvanicum</i>	Striped Maple	Not Listed	Not Listed	Not Listed	Green
<i>Acer rubrum</i>	Red Maple	Not Listed	Not Listed	Not Listed	Green
<i>Acer saccharum</i>	Sugar Maple	Not Listed	Not Listed	Not Listed	Green
<i>Acer spicatum</i>	Mountain Maple	Not Listed	Not Listed	Not Listed	Green
<i>Achillea millefolium</i>	Common Yarrow	Not Listed	Not Listed	Not Listed	Green
<i>Actaea rubra</i>	Red Baneberry	Not Listed	Not Listed	Not Listed	Green
<i>Agrostis perennans</i>	Upland Bent Grass	Not Listed	Not Listed	Not Listed	Green
<i>Alnus incana</i>	Speckled Alder	Not Listed	Not Listed	Not Listed	Green
<i>Amelanchier bartramiana</i>	Bartram's Serviceberry	Not Listed	Not Listed	Not Listed	Green
<i>Anaphalis margaritacea</i>	Pearly Everlasting	Not Listed	Not Listed	Not Listed	Green
<i>Aralia nudicaulis</i>	Wild Sarsaparilla	Not Listed	Not Listed	Not Listed	Green
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	Not Listed	Not Listed	Not Listed	Green
<i>Betula alleghaniensis</i>	Yellow Birch	Not Listed	Not Listed	Not Listed	Green
<i>Betula papyrifera</i>	Paper Birch	Not Listed	Not Listed	Not Listed	Green
<i>Betula populifolia</i>	Gray Birch	Not Listed	Not Listed	Not Listed	Green
<i>Brachyelytrum septentrionale</i>	Bearded Short-Husk	Not Listed	Not Listed	Not Listed	Green
<i>Calamagrostis canadensis</i>	Bluejoint Reed Grass	Not Listed	Not Listed	Not Listed	Green
<i>Carex crinita</i>	Fringed Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Carex debilis</i>	White-edged Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Carex exilis</i>	Coastal Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Carex intumescens</i>	Bladder Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Carex lurida</i>	Sallow Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Carex scoparia</i>	Broom Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Carex stipitata</i>	Awl-fruited Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Carex trisperma</i>	Three-seeded Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Centaurea nigra</i>	Black Knapweed	Not Listed	Not Listed	Not Listed	Exotic
<i>Circaea alpina</i>	Small Enchanter's Nightshade	Not Listed	Not Listed	Not Listed	Green
<i>Clintonia borealis</i>	Yellow Bluebead Lily	Not Listed	Not Listed	Not Listed	Green
<i>Coptis trifolia</i>	Goldthread	Not Listed	Not Listed	Not Listed	Green
<i>Cornus canadensis</i>	Bunchberry	Not Listed	Not Listed	Not Listed	Green
<i>Cypripedium acaule</i>	Pink Lady's-slipper	Not Listed	Not Listed	Not Listed	Green
<i>Danthonia compressa</i>	Flattened Oat Grass	Not Listed	Not Listed	Not Listed	Green

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Project # 12-4328

Scientific Name	Common Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
<i>Danthonia spicata</i>	Poverty Oat Grass	Not Listed	Not Listed	Not Listed	Green
<i>Dennstaedtia punctilobula</i>	Eastern Hay-scented Fern	Not Listed	Not Listed	Not Listed	Green
<i>Doellingeria umbellata</i>	Hairy Flat-top White Aster	Not Listed	Not Listed	Not Listed	Green
<i>Dryopteris campyloptera</i>	Mountain Wood Fern	Not Listed	Not Listed	Not Listed	Green
<i>Dryopteris cristata</i>	Crested Wood Fern	Not Listed	Not Listed	Not Listed	Green
<i>Dryopteris intermedia</i>	Evergreen Wood Fern	Not Listed	Not Listed	Not Listed	Green
<i>Equisetum arvense</i>	Field Horsetail	Not Listed	Not Listed	Not Listed	Green
<i>Equisetum sylvaticum</i>	Woodland Horsetail	Not Listed	Not Listed	Not Listed	Green
<i>Eriophorum virginicum</i>	Tawny Cottongrass	Not Listed	Not Listed	Not Listed	Green
<i>Eriophorum viridicar-inatum</i>	Green-keeled Cottongrass	Not Listed	Not Listed	Not Listed	Green
<i>Euphrasia stricta</i>	Stiff Eyebright	Not Listed	Not Listed	Not Listed	Exotic
<i>Eurybia radula</i>	Low Rough Aster	Not Listed	Not Listed	Not Listed	Green
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	Not Listed	Not Listed	Not Listed	Green
<i>Fagus grandifolia</i>	American Beech	Not Listed	Not Listed	Not Listed	Green
<i>Fragaria virginiana</i>	Wild Strawberry	Not Listed	Not Listed	Not Listed	Green
<i>Fraxinus americana</i>	White Ash	Not Listed	Not Listed	Not Listed	Green
<i>Galium palustre</i>	Common Marsh Bedstraw	Not Listed	Not Listed	Not Listed	Green
<i>Gaultheria hispida</i>	Creeping Snowberry	Not Listed	Not Listed	Not Listed	Green
<i>Gaultheria procumbens</i>	Eastern Teaberry	Not Listed	Not Listed	Not Listed	Green
<i>Gaylussacia baccata</i>	Black Huckleberry	Not Listed	Not Listed	Not Listed	Green
<i>Glyceria canadensis</i>	Canada Manna Grass	Not Listed	Not Listed	Not Listed	Green
<i>Glyceria striata</i>	Fowl Manna Grass	Not Listed	Not Listed	Not Listed	Green
<i>Gymnocarpium dryopteris</i>	Common Oak Fern	Not Listed	Not Listed	Not Listed	Green
<i>Hieracium canadense</i>	Canada Hawkweed	Not Listed	Not Listed	Not Listed	Green
<i>Hieracium vulgatum</i>	Common Hawkweed	Not Listed	Not Listed	Not Listed	Exotic
<i>Hieracium paniculatum</i>	Panicled Hawkweed	Not Listed	Not Listed	Not Listed	Green
<i>Hieracium pilosella</i>	Mouse-ear Hawkweed	Not Listed	Not Listed	Not Listed	Exotic
<i>Hieracium piloselloides</i>	Tall Hawkweed	Not Listed	Not Listed	Not Listed	Exotic
<i>Hypericum perforatum</i>	Common St. John's-wort	Not Listed	Not Listed	Not Listed	Exotic
<i>Ilex verticillata</i>	Common Winterberry	Not Listed	Not Listed	Not Listed	Green
<i>Impatiens capensis</i>	Spotted Jewelweed	Not Listed	Not Listed	Not Listed	Green
<i>Juncus canadensis</i>	Canada Rush	Not Listed	Not Listed	Not Listed	Green
<i>Juncus effusus</i>	Soft Rush	Not Listed	Not Listed	Not Listed	Green

Appendix E – Millbrook Footprint, Plant Species Observed during 2012 Field Survey

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Scientific Name	Common Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
<i>Juncus tenuis</i>	Path Rush	Not Listed	Not Listed	Not Listed	Green
<i>Kalmia angustifolia</i>	Sheep Laurel	Not Listed	Not Listed	Not Listed	Green
<i>Ledum groenlandicum</i>	Common Labrador Tea	Not Listed	Not Listed	Not Listed	Green
<i>Leontodon autumnalis</i>	Fall Dandelion	Not Listed	Not Listed	Not Listed	Exotic
<i>Linnaea borealis</i>	Twinflower	Not Listed	Not Listed	Not Listed	Green
<i>Lonicera villosa</i>	Mountain Fly Honeysuckle	Not Listed	Not Listed	Not Listed	Green
<i>Lycopodium annotinum</i>	Stiff Clubmoss	Not Listed	Not Listed	Not Listed	Green
<i>Lycopodium dendroideum</i>	Round-branched Tree-clubmoss	Not Listed	Not Listed	Not Listed	Green
<i>Lycopus uniflorus</i>	Northern Water Horehound	Not Listed	Not Listed	Not Listed	Green
<i>Lysimachia terrestris</i>	Swamp Yellow Loosestrife	Not Listed	Not Listed	Not Listed	Green
<i>Lythrum salicaria</i>	Purple Loosestrife	Not Listed	Not Listed	Not Listed	Exotic
<i>Maianthemum canadense</i>	Wild Lily-of-the-valley	Not Listed	Not Listed	Not Listed	Green
<i>Mitchella repens</i>	Partridgeberry	Not Listed	Not Listed	Not Listed	Green
<i>Monotropa uniflora</i>	Indian Pipe	Not Listed	Not Listed	Not Listed	Green
<i>Nemopanthus mucronatus</i>	Mountain Holly	Not Listed	Not Listed	Not Listed	Green
<i>Oclemena acuminata</i>	Whorled Wood Aster	Not Listed	Not Listed	Not Listed	Green
<i>Onoclea sensibilis</i>	Sensitive Fern	Not Listed	Not Listed	Not Listed	Green
<i>Osmunda cinnamomea</i>	Cinnamon Fern	Not Listed	Not Listed	Not Listed	Green
<i>Osmunda claytoniana</i>	Interrupted Fern	Not Listed	Not Listed	Not Listed	Green
<i>Oxalis montana</i>	Common Wood Sorrel	Not Listed	Not Listed	Not Listed	Green
<i>Petasites frigidus</i>	Northern Sweet Coltsfoot	Not Listed	Not Listed	Not Listed	Green
<i>Phlegopteris connectilis</i>	Northern Beech Fern	Not Listed	Not Listed	Not Listed	Green
<i>Phleum pratense</i>	Common Timothy	Not Listed	Not Listed	Not Listed	Exotic
<i>Picea glauca</i>	White Spruce	Not Listed	Not Listed	Not Listed	Green
<i>Picea mariana</i>	Black Spruce	Not Listed	Not Listed	Not Listed	Green
<i>Picea rubens</i>	Red Spruce	Not Listed	Not Listed	Not Listed	Green
<i>Pinus strobus</i>	Eastern White Pine	Not Listed	Not Listed	Not Listed	Green
<i>Plantago major</i>	Common Plantain	Not Listed	Not Listed	Not Listed	Exotic
<i>Platanthera clavellata</i>	Club Spur Orchid	Not Listed	Not Listed	Not Listed	Green
<i>Platanthera lacera</i>	Ragged Fringed Orchid	Not Listed	Not Listed	Not Listed	Green
<i>Polygonum (Fallopia) convolvulus</i>	Black Bindweed	Not Listed	Not Listed	Not Listed	Exotic
<i>Polygonum sagittatum</i>	Arrow-Leaved Tearthumb	Not Listed	Not Listed	Not Listed	Green
<i>Polystichum acrostichoides</i>	Christmas Fern	Not Listed	Not Listed	Not Listed	Green

Appendix E – Millbrook Footprint, Plant Species Observed during 2012 Field Survey

Project # 12-4328

Scientific Name	Common Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
<i>Populus grandidentata</i>	Large-toothed Aspen	Not Listed	Not Listed	Not Listed	Green
<i>Populus tremuloides</i>	Trembling Aspen	Not Listed	Not Listed	Not Listed	Green
<i>Potamogeton epiphychus</i>	Ribbon-leaved Pondweed	Not Listed	Not Listed	Not Listed	Green
<i>Potentilla simplex</i>	Old Field Cinquefoil	Not Listed	Not Listed	Not Listed	Green
<i>Prenanthes altissima</i>	Tall Rattlesnakeroot	Not Listed	Not Listed	Not Listed	Green
<i>Prenanthes trifoliolata</i>	Three-leaved Rattlesnakeroot	Not Listed	Not Listed	Not Listed	Green
<i>Prunella vulgaris</i>	Common Self-heal	Not Listed	Not Listed	Not Listed	Green
<i>Prunus pensylvanica</i>	Pin Cherry	Not Listed	Not Listed	Not Listed	Green
<i>Pteridium aquilinum</i>	Bracken Fern	Not Listed	Not Listed	Not Listed	Green
<i>Ranunculus repens</i>	Creeping Buttercup	Not Listed	Not Listed	Not Listed	Exotic
<i>Rhododendron canadense</i>	Rhodora	Not Listed	Not Listed	Not Listed	Green
<i>Ribes glandulosum</i>	Skunk Currant	Not Listed	Not Listed	Not Listed	Green
<i>Rubus allegheniensis</i>	Alleghaney Blackberry	Not Listed	Not Listed	Not Listed	Green
<i>Rubus hispidus</i>	Bristly Dewberry	Not Listed	Not Listed	Not Listed	Green
<i>Rubus idaeus</i>	Red Raspberry	Not Listed	Not Listed	Not Listed	Green
<i>Rubus pubescens</i>	Dwarf Red Raspberry	Not Listed	Not Listed	Not Listed	Green
<i>Rumex acetosella</i>	Sheep Sorrel	Not Listed	Not Listed	Not Listed	Exotic
<i>Salix discolor</i>	Pussy Willow	Not Listed	Not Listed	Not Listed	Green
<i>Sarracenia purpurea</i>	Northern Pitcher Plant	Not Listed	Not Listed	Not Listed	Green
<i>Scirpus cyperinus</i>	Common Woolly Bulrush	Not Listed	Not Listed	Not Listed	Green
<i>Senecio viscosus</i>	Sticky Ragwort	Not Listed	Not Listed	Not Listed	Exotic
<i>Solidago canadensis</i>	Canada Goldenrod	Not Listed	Not Listed	Not Listed	Green
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	Not Listed	Not Listed	Not Listed	Green
<i>Solidago rugosa</i>	Rough-stemmed Goldenrod	Not Listed	Not Listed	Not Listed	Green
<i>Sparganium americanum</i>	American Burreed	Not Listed	Not Listed	Not Listed	Green
<i>Spiraea alba</i>	White Meadowsweet	Not Listed	Not Listed	Not Listed	Green
<i>Spiraea tomentosa</i>	Steeplebush	Not Listed	Not Listed	Not Listed	Green
<i>Spiranthes cernua</i>	Nodding Ladies'-tresses	Not Listed	Not Listed	Not Listed	Green
<i>Streptopus lanceolatus</i>	Rose Twisted-stalk	Not Listed	Not Listed	Not Listed	Green
<i>Symphotrichum lateriflorum</i>	Calico Aster	Not Listed	Not Listed	Not Listed	Green
<i>Symphotrichum novi-belgii</i>	New York Aster	Not Listed	Not Listed	Not Listed	Green
<i>Thelypteris noveboracensis</i>	New York Fern	Not Listed	Not Listed	Not Listed	Green
<i>Trientalis borealis</i>	Northern Starflower	Not Listed	Not Listed	Not Listed	Green

Appendix E – Millbrook Footprint, Plant Species Observed during 2012 Field Survey

Project # 12-4328

Scientific Name	Common Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
<i>Trillium undulatum</i>	Painted Trillium	Not Listed	Not Listed	Not Listed	Green
<i>Tsuga canadensis</i>	Eastern Hemlock	Not Listed	Not Listed	Not Listed	Green
<i>Tussilago farfara</i>	Coltsfoot	Not Listed	Not Listed	Not Listed	Exotic
<i>Typha latifolia</i>	Broad-leaved Cattail	Not Listed	Not Listed	Not Listed	Green
<i>Vaccinium myrtilloides</i>	Velvet-leaved Blueberry	Not Listed	Not Listed	Not Listed	Green
<i>Veronica americana</i>	American Speedwell	Not Listed	Not Listed	Not Listed	Green
<i>Veronica officinalis</i>	Common Speedwell	Not Listed	Not Listed	Not Listed	Exotic
<i>Viburnum lantanoides</i>	Hobblebush	Not Listed	Not Listed	Not Listed	Green
<i>Viburnum nudum</i>	Northern Wild Raisin	Not Listed	Not Listed	Not Listed	Green
<i>Viola sp.</i>	N/A	N/A	N/A	N/A	N/A

Appendix E – Truro Heights Footprint, Plant Species Observed during 2012 Field Survey

Project # 12-4544

Scientific Name	Common Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
<i>Abies balsamea</i>	Balsam Fir	Not Listed	Not Listed	Not Listed	Green
<i>Acer pensylvanicum</i>	Striped Maple	Not Listed	Not Listed	Not Listed	Green
<i>Acer rubrum</i>	Red Maple	Not Listed	Not Listed	Not Listed	Green
<i>Agrimonia striata</i>	Woodland Agrimony	Not Listed	Not Listed	Not Listed	Green
<i>Alnus incana</i>	Speckled Alder	Not Listed	Not Listed	Not Listed	Green
<i>Anaphalis margaritacea</i>	Pearly Everlasting	Not Listed	Not Listed	Not Listed	Green
<i>Aralia nudicaulis</i>	Wild Sarsaparilla	Not Listed	Not Listed	Not Listed	Green
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	Not Listed	Not Listed	Not Listed	Green
<i>Betula alleghaniensis</i>	Yellow Birch	Not Listed	Not Listed	Not Listed	Green
<i>Betula papyrifera</i>	Paper Birch	Not Listed	Not Listed	Not Listed	Green
<i>Betula populifolia</i>	Gray Birch	Not Listed	Not Listed	Not Listed	Green
<i>Brachelytrium septentrionale</i>	Bearded Short-Husk	Not Listed	Not Listed	Not Listed	Green
<i>Calamagrostis canadensis</i>	Bluejoint Reed Grass	Not Listed	Not Listed	Not Listed	Green
<i>Carex crinita</i>	Fringed Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Carex intumescens</i>	Bladder Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Carex lurida</i>	Sallow Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Carex trisperma</i>	Three-seeded Sedge	Not Listed	Not Listed	Not Listed	Green
<i>Clintonia borealis</i>	Yellow Bluehead Lily	Not Listed	Not Listed	Not Listed	Green
<i>Comptonia peregrina</i>	Sweet-fern	Not Listed	Not Listed	Not Listed	Green
<i>Coptis trifolia</i>	Goldthread	Not Listed	Not Listed	Not Listed	Green
<i>Cornus canadensis</i>	Bunchberry	Not Listed	Not Listed	Not Listed	Green
<i>Corylus cornuta</i>	Beaked Hazel	Not Listed	Not Listed	Not Listed	Green
<i>Danthonia compressa</i>	Flattened Oat Grass	Not Listed	Not Listed	Not Listed	Green
<i>Danthonia spicata</i>	Poverty Oat Grass	Not Listed	Not Listed	Not Listed	Green
<i>Dennstaedtia punctilobula</i>	Eastern Hay-scented Fern	Not Listed	Not Listed	Not Listed	Green
<i>Diervilla lonicera</i>	Northern Bush Honeysuckle	Not Listed	Not Listed	Not Listed	Green
<i>Doellingeria umbellata</i>	Hairy Flat-top White Aster	Not Listed	Not Listed	Not Listed	Green
<i>Dryopteris campyloptera</i>	Mountain Wood Fern	Not Listed	Not Listed	Not Listed	Green
<i>Dryopteris cristata</i>	Crested Wood Fern	Not Listed	Not Listed	Not Listed	Green
<i>Equisetum arvense</i>	Field Horsetail	Not Listed	Not Listed	Not Listed	Green
<i>Equisetum sylvaticum</i>	Woodland Horsetail	Not Listed	Not Listed	Not Listed	Green
<i>Eriophorum virginicum</i>	Tawny Cottongrass	Not Listed	Not Listed	Not Listed	Green
<i>Eupatorium perfoliatum</i>	Common Boneset	Not Listed	Not Listed	Not Listed	Green

Appendix E – Truro Heights Footprint, Plant Species Observed during 2012 Field Survey

Project # 12-4544

Scientific Name	Common Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
<i>Eurybia radula</i>	Low Rough Aster	Not Listed	Not Listed	Not Listed	Green
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	Not Listed	Not Listed	Not Listed	Green
<i>Fagus grandifolia</i>	American Beech	Not Listed	Not Listed	Not Listed	Green
<i>Fragaria virginiana</i>	Wild Strawberry	Not Listed	Not Listed	Not Listed	Green
<i>Frangula alnus</i>	Glossy Buckthorn	Not Listed	Not Listed	Not Listed	Exotic
<i>Fraxinus americana</i>	White Ash	Not Listed	Not Listed	Not Listed	Green
<i>Galium palustre</i>	Common Marsh Bedstraw	Not Listed	Not Listed	Not Listed	Green
<i>Gaultheria hispida</i>	Creeping Snowberry	Not Listed	Not Listed	Not Listed	Green
<i>Gaultheria procumbens</i>	Eastern Teaberry	Not Listed	Not Listed	Not Listed	Green
<i>Gaylussacia baccata</i>	Black Huckleberry	Not Listed	Not Listed	Not Listed	Green
<i>Geum macrophyllum</i>	Large-leaved Avens	Not Listed	Not Listed	Not Listed	Green
<i>Glyceria striata</i>	Fowl Manna Grass	Not Listed	Not Listed	Not Listed	Green
<i>Gymnocarpium dryopteris</i>	Common Oak Fern	Not Listed	Not Listed	Not Listed	Green
<i>Hydrocotyle americana</i>	American Marsh Pennywort	Not Listed	Not Listed	Not Listed	Green
<i>Hypericum canadense</i>	Canada St. John's-wort	Not Listed	Not Listed	Not Listed	Green
<i>Ilex verticillata</i>	Common Winterberry	Not Listed	Not Listed	Not Listed	Green
<i>Juncus canadensis</i>	Canada Rush	Not Listed	Not Listed	Not Listed	Green
<i>Juncus effusus</i>	Soft Rush	Not Listed	Not Listed	Not Listed	Green
<i>Kalmia angustifolia</i>	Sheep Laurel	Not Listed	Not Listed	Not Listed	Green
<i>Ledum groenlandicum</i>	Common Labrador Tea	Not Listed	Not Listed	Not Listed	Green
<i>Linnaea borealis</i>	Twinflower	Not Listed	Not Listed	Not Listed	Green
<i>Lonicera villosa</i>	Mountain Fly Honeysuckle	Not Listed	Not Listed	Not Listed	Green
<i>Lycopus uniflorus</i>	Northern Water Horehound	Not Listed	Not Listed	Not Listed	Green
<i>Lycopodium annotinum</i>	Stiff Clubmoss	Not Listed	Not Listed	Not Listed	Green
<i>Lycopodium dendroideum</i>	Round-branched Tree-clubmoss	Not Listed	Not Listed	Not Listed	Green
<i>Lysimachia terrestris</i>	Swamp Yellow Loosestrife	Not Listed	Not Listed	Not Listed	Green
<i>Maianthemum canadense</i>	Wild Lily-of-the-valley	Not Listed	Not Listed	Not Listed	Green
<i>Medeola virginiana</i>	Indian Cucumber Root	Not Listed	Not Listed	Not Listed	Green
<i>Mitchella repens</i>	Partridgeberry	Not Listed	Not Listed	Not Listed	Green
<i>Monotropa uniflora</i>	Indian Pipe	Not Listed	Not Listed	Not Listed	Green
<i>Nemopanthes mucronatus</i>	Mountain Holly	Not Listed	Not Listed	Not Listed	Green
<i>Oclemena acuminata</i>	Whorled Wood Aster	Not Listed	Not Listed	Not Listed	Green
<i>Onoclea sensibilis</i>	Sensitive Fern	Not Listed	Not Listed	Not Listed	Green

Appendix E – Truro Heights Footprint, Plant Species Observed during 2012 Field Survey

Project # 12-4544

Scientific Name	Common Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
<i>Osmunda cinnamomea</i>	Cinnamon Fern	Not Listed	Not Listed	Not Listed	Green
<i>Osmunda claytoniana</i>	Interrupted Fern	Not Listed	Not Listed	Not Listed	Green
<i>Oxalis montana</i>	Common Wood Sorrel	Not Listed	Not Listed	Not Listed	Green
<i>Packera schweinitziana</i>	Schweinitz's Groundsel	Not Listed	Not Listed	Not Listed	Green
<i>Picea mariana</i>	Black Spruce	Not Listed	Not Listed	Not Listed	Green
<i>Picea rubens</i>	Red Spruce	Not Listed	Not Listed	Not Listed	Green
<i>Pinus strobus</i>	Eastern White Pine	Not Listed	Not Listed	Not Listed	Green
<i>Polygonum sagittatum</i>	Arrow-Leaved Tearthumb	Not Listed	Not Listed	Not Listed	Green
<i>Polystichum acrostichoides</i>	Christmas Fern	Not Listed	Not Listed	Not Listed	Green
<i>Potamogeton epiphydrus</i>	Ribbon-leaved Pondweed	Not Listed	Not Listed	Not Listed	Green
<i>Potentilla simplex</i>	Old Field Cinquefoil	Not Listed	Not Listed	Not Listed	Green
<i>Populus grandidentata</i>	Large-toothed Aspen	Not Listed	Not Listed	Not Listed	Green
<i>Populus tremuloides</i>	Trembling Aspen	Not Listed	Not Listed	Not Listed	Green
<i>Prenanthes trifoliolata</i>	Three-leaved Rattlesnakeroot	Not Listed	Not Listed	Not Listed	Green
<i>Prunella vulgaris</i>	Common Self-heal	Not Listed	Not Listed	Not Listed	Green
<i>Pteridium aquilinum</i>	Bracken Fern	Not Listed	Not Listed	Not Listed	Green
<i>Ranunculus recurvatus</i>	Hooked Buttercup	Not Listed	Not Listed	Not Listed	Green
<i>Ranunculus repens</i>	Creeping Buttercup	Not Listed	Not Listed	Not Listed	Exotic
<i>Ribes hirtellum</i>	Smooth Gooseberry	Not Listed	Not Listed	Not Listed	Green
<i>Rubus allegheniensis</i>	Alleghany Blackberry	Not Listed	Not Listed	Not Listed	Green
<i>Rubus hispida</i>	Bristly Dewberry	Not Listed	Not Listed	Not Listed	Green
<i>Rubus idaeus</i>	Red Raspberry	Not Listed	Not Listed	Not Listed	Green
<i>Rubus pubescens</i>	Dwarf Red Raspberry	Not Listed	Not Listed	Not Listed	Green
<i>Scirpus cyperinus</i>	Common Woolly Bulrush	Not Listed	Not Listed	Not Listed	Green
<i>Scutellaria lateriflora</i>	Mad-dog Skullcap	Not Listed	Not Listed	Not Listed	Green
<i>Solidago canadensis</i>	Canada Goldenrod	Not Listed	Not Listed	Not Listed	Green
<i>Solidago rugosa</i>	Rough-stemmed Goldenrod	Not Listed	Not Listed	Not Listed	Green
<i>Sparganium americanum</i>	American Burreed	Not Listed	Not Listed	Not Listed	Green
<i>Spiraea alba</i>	White Meadowsweet	Not Listed	Not Listed	Not Listed	Green
<i>Spiraea tomentosa</i>	Steeplebush	Not Listed	Not Listed	Not Listed	Green
<i>Symphoricarum lateriflorum</i>	Calico Aster	Not Listed	Not Listed	Not Listed	Green
<i>Taraxacum officinale</i>	Common Dandelion	Not Listed	Not Listed	Not Listed	Exotic
<i>Thalictrum pubescens</i>	Tall Meadow-rue	Not Listed	Not Listed	Not Listed	Green

Appendix E – Truro Heights Footprint, Plant Species Observed during 2012 Field Survey

Project # 12-4544

Scientific Name	Common Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status
<i>Thelypteris noveboracensis</i>	New York Fern	Not Listed	Not Listed	Not Listed	Green
<i>Trientalis borealis</i>	Northern Starflower	Not Listed	Not Listed	Not Listed	Green
<i>Tussilago farfara</i>	Coltsfoot	Not Listed	Not Listed	Not Listed	Exotic
<i>Typha latifolia</i>	Broad-leaved Cattail	Not Listed	Not Listed	Not Listed	Green
<i>Vaccinium myrtilloides</i>	Velvet-leaved Blueberry	Not Listed	Not Listed	Not Listed	Green
<i>Viburnum nudum</i>	Northern Wild Raisin	Not Listed	Not Listed	Not Listed	Green

APPENDIX F

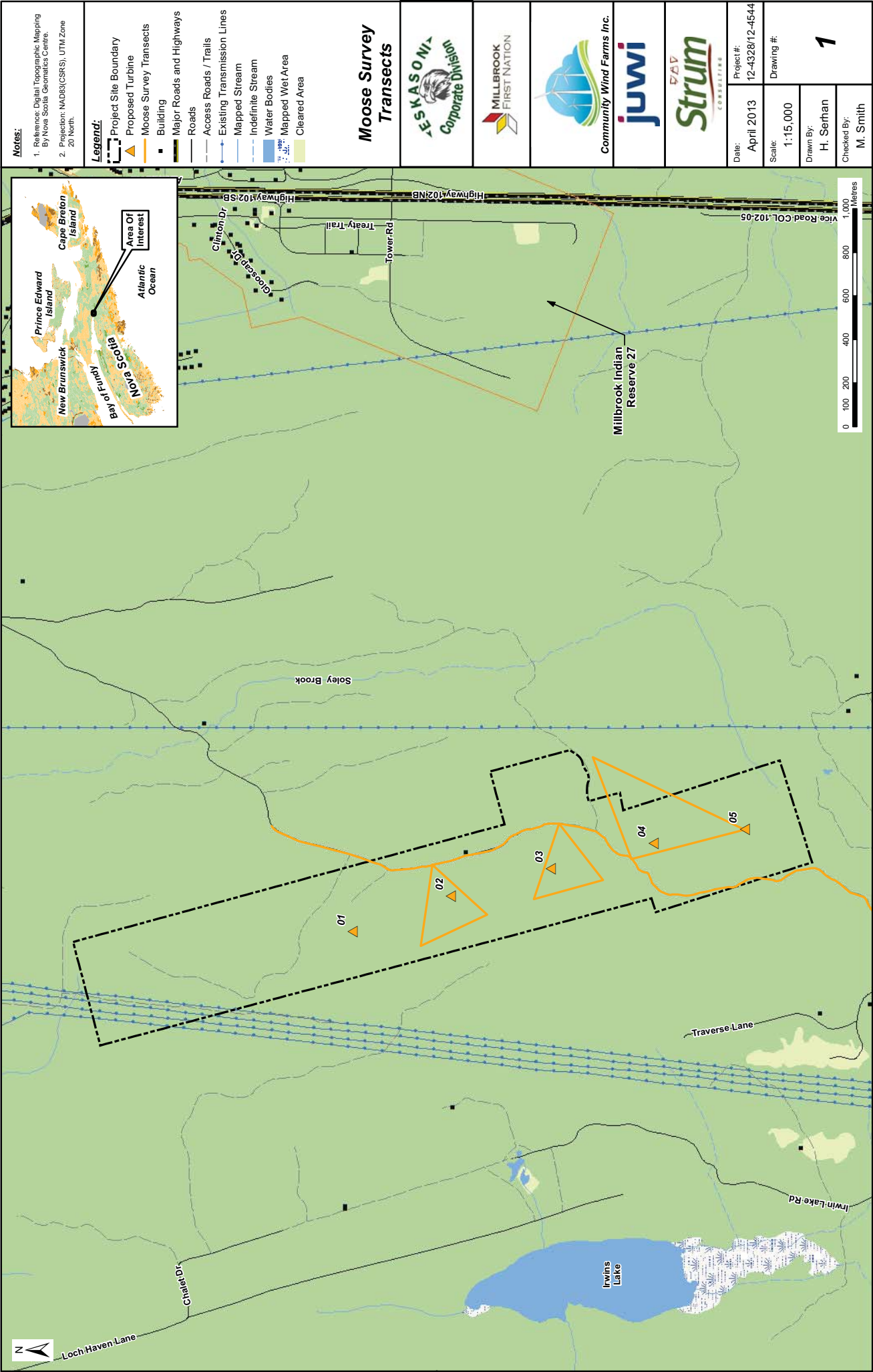
MOOSE SURVEY METHODOLOGY

Snow-tracking surveys are an effective method of evaluating the terrestrial fauna community in an area. Survey areas within the Project site were developed with the following considerations:

- Coverage of the Project site: Survey areas were designed to cover as much of the Project site as possible;
- Habitat: Multiple habitats were targeted including mature softwood forest, young hardwood forest, mixed wood forest, and wetlands;
- Development footprint: Survey areas focused on land incorporating the development footprint (access roads and turbines), to the extent possible; and
- Access: The Project site incorporates a large tract of land which is only accessible via a limited number of logging roads. Transects were designed to start and finish at existing logging roads/access roads.

Two pre-construction surveys were completed on February 11 and the March 26, 2013 using the snow-tracking methodology, and were conducted 1 to 7 days after a ≥ 10 cm snowfall. Survey areas were located across the Project site, and included a total of nine transects ranging in lengths from 329 m to 772 m, as well of 2.8 km of logging roads (Drawing F1). Surveys were conducted by a team of biologists with a demonstrable knowledge of mammalian animal sign and the ability to distinguish Mainland moose sign from that of other species. Logging roads were surveyed via snowmobile, while the remaining three transects were surveyed on-foot. All wildlife sign, primarily tracks but also including foraging sign, scat, and rubs, encountered during the surveys were identified to species, where possible. In addition, the locations of all noteworthy observations were recorded using GPS receivers capable of sub 5 m accuracy, with representative photos taken.

It should be noted that survey areas did not include the Tower Road Extension. Previous field studies revealed that habitats in this area consist primarily of extremely dense, softwood regeneration, along with large areas of windthrow. It is likely that Mainland moose would actively avoid this area due to travel hindrance created by the dense vegetation and downed woody debris. Furthermore, if Mainland moose were to occur in this area, the effectiveness of snow-tracking would be limited by lack of visibility in the thick brush.



APPENDIX G
BIRD SURVEY METHODOLOGY AND RESULTS

Pre-construction (baseline) avian field surveys were completed to complement desktop information and to characterize the pre-construction (baseline) bird community at the Project site throughout the year. These surveys were carried out by an expert birder and were designed with the purpose of collecting data on species presence, abundance, and habitat usage at the Project site during the months coinciding with fall migration, spring migration, breeding season and the winter season. All field surveys were designed to conform to protocols outlined in the document "Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds" (CWS 2007).

Surveys were completed in February, April, May, June, September, October, and November of 2012 and February 2013. The following information was recorded at each survey location:

- Weather conditions (temperature, wind speed, cloud cover, and presence of precipitation);
- Date and time of day;
- Habitat description; and
- GPS coordinates of the survey location.

Surveys employed point count, area search, and stopover count methodologies depending on the season and target species. Regardless of survey methodology, the following elements were consistent among surveys:

- surveys were four hours in duration, commencing as close to sunrise as possible;
- species presence and abundance were recorded based on visual and acoustic observations;
- approximate distance to each bird was recorded using a scale of 0-50 m, 50-100 m and further than 100 m;
- behavioural patterns were noted to determine whether birds flying over the site would be within the future blade-swept area of a turbine; and
- survey locations during each survey were separated by a minimum distance of 300 m, whenever possible, to account for all present habitat types throughout the Project site.

REFERENCES

CWS (Canadian Wildlife Service). 2007. Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds. 33 pp.

Table G1: Detailed Winter Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)
				Wind Speed and Direction	Temperature °C	Sky	Precipitation				
February 21/2012	Mill/TH1	0474149E, 5022136N	Field, some standing mixedwoods	10 km/h NE	-14	Clear	None	7:44 AM	American Crow	18	50-100
...	...	...	...	...	...	...	...	...	Bald Eagle	1	50-100
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	6	50-100
...	...	...	...	...	...	...	...	...	Common Raven	6	50-100
...	...	...	...	...	...	...	...	...	European Starling	27	50-100
...	...	...	...	...	...	...	...	...	Herring Gull	14	50-100
...	...	...	...	...	...	...	...	...	Red-breasted Nuthatch	2	50-100
...	...	...	...	...	...	...	...	...	Rock Pigeon	9	50-100
...	...	...	...	...	...	...	...	...	Snow Bunting	9	50-100
...	...	...	...	...	...	...	...	...	American Crow	4	50-100
...	Mill/TH2	0473219E, 5019219N	Shrub hardwoods, high proportion of yellow birch	10 km/h NE	-14	Clear	None	8:14 AM	American Goldfinch	20	0-50
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	12	0-50
...	...	...	...	...	...	...	...	...	Blue Jay	8	50-100
...	...	...	...	...	...	...	...	...	Common Raven	1	100+
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	8	50-100
...	...	...	...	...	...	...	...	...	Mourning Dove	2	FO
...	...	...	...	...	...	...	...	...	Red-breasted Nuthatch	2	50-100
...	...	...	...	...	...	...	...	...	White-winged Crossbill	4	0-50
...	...	...	...	...	...	...	...	...	Blue Jay	1	50-100
...	Mill/TH3	0473332E, 5018951N	Young hardwood	10 km/h NE	-14	Clear	None	8:27 AM	Boreal Chickadee	2	0-50
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	6	FO
...	...	...	...	...	...	...	...	...	White-breasted Nuthatch	2	50-100
...	...	...	...	...	...	...	...	...	American Goldfinch	16	50-100
...	Mill/TH4	0473341E, 5018660N	Young hardwood	10 km/h NE	-14	Clear	None	8:39 AM	Blue Jay	2	50-100
...	...	...	...	...	...	...	...	...	Common Raven	2	100+
...	...	...	...	...	...	...	...	...	Pine Siskin	8	FO
...	...	...	...	...	...	...	...	...	White-winged Crossbill	6	50-100
...	...	...	...	...	...	...	...	...	American Crow	4	100+
...	Mill/TH5	0473185E, 5018431N	Young mixed	10 km/h NE	-14	Clear	None	8:51 AM	Black-capped Chickadee	16	0-50
...	...	...	...	...	...	...	...	...	Blue Jay	4	50-100
...	...	...	...	...	...	...	...	...	Common Raven	1	100+
...	...	...	...	...	...	...	...	...	Evening Grosbeak	1	FO
...	...	...	...	...	...	...	...	...	Gray Jay	2	0-50
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100
...	Mill/TH6	0473155E, 5019500N	Young hardwood	10 km/h NE	-14	Clear	None	9:27 AM	Pine Siskin	1	50-100

Table G1: Detailed Winter Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

[illegible]

Table G1: Detailed Winter Bird Survey Results, Millbrook/Truro Heights Community Wind Projects **Project # 12-4328/12-4544**

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)
				Wind Speed and Direction	Temperature °C	Sky	Precipitation				
...	...	...	...	...	...	...	...	...	Common Raven	1	100+
...	...	...	...	...	...	...	...	...	Downy Woodpecker	2	0-50
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	0-50
...	Mill/TH15	473096E, 5017936N	Young hardwood	10km/h	6	Clear	None	8:25 AM	American Crow	2	100+
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50
...	Mill/TH16	473563E, 5017826N	Softwood/Stream	10km/h	6	Clear	None	8:49 AM	Black-capped Chickadee	3	100+
...	...	...	...	...	...	...	...	...	Blue Jay	2	100+
...	...	...	...	...	...	...	...	...	Hairy Woodpecker	1	50-100
...	...	...	...	...	...	...	...	...	Hairy Woodpecker	1	100+
...	Mill/TH17	473487E, 5018013N	Sugar maple mid-mature	10km/h	6	Clear	None	9:07 AM	Black-capped Chickadee	1	100+
...	...	...	...	...	...	...	...	...	Downy Woodpecker	1	100+
...	Mill/TH18	473389E, 5018413N	Mixedwood	10km/h	6	Clear	None	9:41 AM	None Observed	-	-
...	Mill/TH19	473488E, 5018282N	Regenerating Cutblock	10km/h	6	Clear	None	9:25 AM	None Observed	-	-
...	Mill/TH20	473275E, 5018249N	Regenerating Cutblock Fir dominated	10km/h	6	Clear	None	9:59 AM	Common Raven	1	50-100
...	...	...	...	...	...	...	...	...	Downy Woodpecker	1	100+
...	Mill/TH21	473287E, 5017963N	Windfall hardwood stand	10km/h	6	Clear	None	10:19 AM	American Crow	1	100+
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	100+
...	...	...	...	...	...	...	...	...	Blue Jay	2	0-50
...	...	...	...	...	...	...	...	...	Common Raven	1	100+
...	Mill/TH22	473039E, 5018225N	Young mixed wood	10km/h	5	Clear	None	10:42 AM	Black-capped Chickadee	2	50-100
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+
...	Mill/TH23	473158E, 5018392N	Young Hardwood	10km/h	5	Clear	None	10:52 AM	Downy Woodpecker	1	100+
...	Mill/TH24	473305E, 5018563N	Young Hardwood	10km/h	5	Clear	None	11:06 AM	Common Raven	4	100+
...	...	...	...	...	...	...	...	...	Common Redpoll	1	0-50
...	...	...	...	...	...	...	...	...	Downy Woodpecker	2	100+

Table G2: Winter Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects **Project # 12-4328/12-4544**

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	Number of Observations	Number of Individuals Observed
American Crow	<i>Corvus brachyrhynchos</i>	Not Listed	Not Listed	Not Listed	Green	11	41
American Goldfinch	<i>Spinus tristis</i>	Not Listed	Not Listed	Not Listed	Green	3	40
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Not Listed	Not Listed	Not at Risk	Green	1	1
Barred Owl	<i>Strix varia</i>	Not Listed	Not Listed	Not Listed	Green	1	1
Black-capped Chickadee	<i>Poecile atricapillus</i>	Not Listed	Not Listed	Not Listed	Green	10	50
Blue Jay	<i>Cyanocitta cristata</i>	Not Listed	Not Listed	Not Listed	Green	10	24
Boreal Chickadee	<i>Poecile hudsonicus</i>	Not Listed	Not Listed	Not Listed	Yellow	2	4
Common Raven	<i>Corvus corax</i>	Not Listed	Not Listed	Not Listed	Green	13	26
Common Redpoll	<i>Acanthis flammea</i>	Not Listed	Not Listed	Not Listed	Green	1	1
Dark-eyed Junco	<i>Junco hyemalis</i>	Not Listed	Not Listed	Not Listed	Green	2	14
Downy Woodpecker	<i>Picoides pubescens</i>	Not Listed	Not Listed	Not Listed	Green	6	9
European Starling	<i>Sturnus vulgaris</i>	Not Listed	Not Listed	Not Listed	Exotic	1	27
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Not Listed	Not Listed	Not Listed	Green	2	2
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Not Listed	Not Listed	Not Listed	Yellow	3	4
Gray Jay	<i>Perisoreus canadensis</i>	Not Listed	Not Listed	Not Listed	Yellow	2	3
Hairy Woodpecker	<i>Picoides villosus</i>	Not Listed	Not Listed	Not Listed	Green	3	3
Herring Gull	<i>Larus argentatus</i>	Not Listed	Not Listed	Not Listed	Green	1	14
Mourning Dove	<i>Zenaidura macroura</i>	Not Listed	Not Listed	Not Listed	Green	1	2
Pine Siskin	<i>Spinus pinus</i>	Not Listed	Not Listed	Not Listed	Yellow	5	15
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Not Listed	Not Listed	Not Listed	Green	3	5
Rock Pigeon	<i>Columba livia</i>	Not Listed	Not Listed	Not Listed	Exotic	1	9
Snow Bunting	<i>Plectrophenax nivalis</i>	Not Listed	Not Listed	Not Listed	Green	1	9
White-breasted Nuthatch	<i>Sitta carolinensis</i>	Not Listed	Not Listed	Not Listed	Green	1	2
White-winged Crossbill	<i>Loxia leucoptera</i>	Not Listed	Not Listed	Not Listed	Green	4	18

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
April 28/2012	Mill/TH2	0473219E, 5019219N	Shrub hardwoods, high proportion of yellow birch	40 km/h W	3	Overcast	None	9:00 AM	American Crow	1	100+	-
...	...	...	...	...	...	...	...	...	Blue Jay	1	50-100	-
...	...	...	...	...	...	...	...	...	Purple Finch	1	0-50	-
...	...	0473332E, 5018951N	Young hardwood	40 km/h W	3	Overcast	None	9:20 AM	Black-capped Chickadee	2	50-100	-
...	...	...	...	...	...	...	...	...	Blue Jay	2	100+	-
...	...	...	...	...	...	...	...	...	Pine Siskin	2	50-100	-
...	...	...	...	...	...	...	...	...	Purple Finch	1	50-100	-
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	-
...	...	0473341E, 5018660N	Young hardwood	40 km/h W	4	Overcast	None	9:44 AM	American Crow	2	100+	-
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	-
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	-
...	...	0473185E, 5018431N	Young mixed	40 km/h W	4	Overcast	None	9:58 AM	Golden-crowned Kinglet	1	50-100	-
...	...	0473155E, 5019500N	Young hardwood	40 km/h W	3	Overcast	None	8:44 AM	American Robin	2	0-50	-
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	-
...	...	0473243E, 5019782N	Young hardwood	40 km/h SE	2	Flurries	Flurries	6:54 AM	American Black Duck	1	0-50	-
...	...	...	...	...	...	...	...	...	American Crow	1	100+	-
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	0-50	-
...	...	...	...	...	...	...	...	...	Mallard	1	0-50	-
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	-
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	-
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	50-100	-
...	...	0473319E, 5020050N	Young mixed	40 km/h SE	2	Flurries	Flurries	6:38 AM	American Crow	1	100+	-
...	...	...	...	...	...	...	...	...	American Robin	2	0-50	-
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	50-100	-
...	...	...	...	...	...	...	...	...	Mourning Dove	1	0-50	-
...	...	...	...	...	...	...	...	...	Purple Finch	1	0-50	-
...	...	0472984E, 50119881N	Young mixed	40 km/h W	2	Flurries	Flurries	7:15 AM	Common Raven	2	100+	-
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	50-100	-
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	-
...	...	...	...	...	...	...	...	...	Pileated Woodpecker	1	100+	-
...	...	...	...	...	...	...	...	...	Purple Finch	1	0-50	-

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	-
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	-
...	Mill/TH10	0472736E, 5019990N	Young mixed	40 km/h W	2	Overcast	None	7:37 AM	American Goldfinch	4	50-100	-
...	...	...	...	...	...	...	...	...	American Robin	1	0-50	-
...	...	...	...	...	...	...	...	...	American Robin	1	50-100	-
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	1P
...	...	...	...	...	...	...	...	...	Blue Jay	1	0-50	1P
...	...	...	...	...	...	...	...	...	Common Raven	1	50-100	-
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	1P
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	0-50	-
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	...	Pileated Woodpecker	1	50-100	1P
...	...	...	...	...	...	...	...	...	Purple Finch	1	0-50	1P
...	...	...	...	...	...	...	...	...	Purple Finch	1	100+	1P
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	0-50	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	50-100	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	1P
...	Mill/TH11	0472577E, 5020184N	Mid-aged mixed	40 km/h W	2	Overcast	None	7:59 AM	American Robin	1	50-100	1P
...	...	...	...	...	...	...	...	...	American Robin	1	100+	1P
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	1P
...	...	...	...	...	...	...	...	...	Common Raven	1	FO NW	1P
...	...	...	...	...	...	...	...	...	Northern Flicker	1	50-100	1P
...	...	...	...	...	...	...	...	...	Pine Siskin	2	0-50	1P
...	...	...	...	...	...	...	...	...	Purple Finch	3	0-50	1P
...	...	...	...	...	...	...	...	...	Song Sparrow	1	50-100	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	50-100	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	1P
...	Mill/TH12	0472670E, 5020441N	Young hardwood	40 km/h W	2	Overcast	None	8:18 AM	Hermit Thrush	1	50-100	1P
...	...	...	...	...	...	...	...	...	American Robin	1	0-50	1P
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	0-50	1P
...	...	...	...	...	...	...	...	...	Blue Jay	1	50-100	1P
...	...	...	...	...	...	...	...	...	Pine Siskin	2	0-50	1P
...	...	...	...	...	...	...	...	...	Purple Finch	4	50-100	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	0-50	1P
May 7/2012	Mill/TH8	0473319E, 5020050N	Young mixed	Calm	5	Overcast	Light showers	6:09 AM	American Crow	1	100+	1P
...	...	...	...	...	...	...	...	...	American Goldfinch	1	0-50	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky					
...	...	...	...	...	...	...	...	American Robin	3	0-50	1P
...	...	...	...	...	...	...	...	American Robin	4	50-100	1P
...	...	...	...	...	...	...	...	American Robin	6	100+	1P
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	0-50	1P
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	50-100	1P
...	...	...	...	...	...	...	...	Blue Jay	1	50-100	1P
...	...	...	...	...	...	...	...	Common Raven	1	100+	1P
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	0-50	1P
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	1P
...	...	...	...	...	...	...	...	Hairy Woodpecker	1	0-50	1P
...	...	...	...	...	...	...	...	Hermit Thrush	8	100+	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Pileated Woodpecker	1	50-100	1P
...	...	...	...	...	...	...	...	Winter Wren	2	100+	1P
...	Mill/TH7	0473243E, 5019782N	Young hardwood	Calm	5	Overcast	6:25 AM	American Crow	2	100+	1P
...	...	...	...	...	...	...	...	American Robin	2	0-50	1P
...	...	...	...	...	...	...	...	American Robin	4	50-100	1P
...	...	...	...	...	...	...	...	American Robin	7	100+	1P
...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	1P
...	...	...	...	...	...	...	...	Blue Jay	1	100+	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	0-50	1P
...	...	...	...	...	...	...	...	Common Raven	1	100+	1P
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	1P
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	1P
...	...	...	...	...	...	...	...	Downy Woodpecker	1	50-100	1P
...	...	...	...	...	...	...	...	Hermit Thrush	1	0-50	1P
...	...	...	...	...	...	...	...	Hermit Thrush	8	100+	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Purple Finch	1	0-50	1P
...	...	...	...	...	...	...	...	Purple Finch	1	50-100	1P
...	...	...	...	...	...	...	...	Red-breasted Nuthatch	1	100+	1P
...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	50-100	1P
...	...	...	...	...	...	...	...	Ruffed Grouse	1	50-100	1P
...	...	...	...	...	...	...	...	Swainson's Thrush	2	100+	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	4	0-50	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	2	50-100	1P
...	...	...	...	...	...	...	...	Winter Wren	1	100+	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	100+	1P
...	Mill/TH9	0472984E, 50119881N	Young mixed	Calm	5	Overcast	6:48 AM	American Crow	2	100+	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky					
...	...	...	...	...	...	...	...	American Robin	3	50-100	1P
...	...	...	...	...	...	...	...	American Robin	6	100+	1P
...	...	...	...	...	...	...	...	Blue Jay	1	50-100	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	50-100	1P
...	...	...	...	...	...	...	...	Common Raven	1	100+	1P
...	...	...	...	...	...	...	...	Hermit Thrush	3	100+	1P
...	...	...	...	...	...	...	...	Mourning Dove	1	50-100	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	50-100	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Pine Siskin	3	0-50	1P
...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	2	0-50	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	2	50-100	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	1	100+	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	1P
...	...	0472736E, 5019990N	Young mixed	Calm	6	Overcast	7:09 AM	American Crow	1	100+	1P
...	Mill/TH10	...	...	...	...	...	...	American Robin	5	0-50	1P
...	...	...	...	...	...	...	...	American Robin	7	50-100	1P
...	...	...	...	...	...	...	...	American Robin	7	100+	1P
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	50-100	1P
...	...	...	...	...	...	...	...	Blue Jay	1	100+	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	0-50	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	50-100	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+	1P
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	1P
...	...	...	...	...	...	...	...	Hermit Thrush	5	100+	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	50-100	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Pine Siskin	2	50-100	1P
...	...	...	...	...	...	...	...	Purple Finch	2	0-50	1P
...	...	...	...	...	...	...	...	Purple Finch	1	50-100	1P
...	...	...	...	...	...	...	...	Purple Finch	1	100+	1P
...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	1P
...	...	...	...	...	...	...	...	Swainson's Thrush	2	100+	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	1	0-50	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	3	50-100	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	7	100+	1P
...	...	...	...	...	...	...	...	Winter Wren	1	100+	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	100+	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	Mill/TH11	0472577E, 5020184N	Mid-aged mixed	Calm	6	Overcast	Very light showers	7:31 AM	American Crow	1	100+	1P
...	...	...	...	...	...	...	...	...	American Goldfinch	2	0-50	1P
...	...	...	...	...	...	...	...	...	American Goldfinch	1	100+	1P
...	...	...	...	...	...	...	...	...	American Robin	4	0-50	1P
...	...	...	...	...	...	...	...	...	American Robin	5	50-100	1P
...	...	...	...	...	...	...	...	...	American Robin	8	100+	1P
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	100+	1P
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	50-100	1P
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+	1P
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	2	100+	1P
...	...	...	...	...	...	...	...	...	Evening Grosbeak	1	0-50	1P
...	...	...	...	...	...	...	...	...	Hairy Woodpecker	2	50-100	1P
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	...	Purple Finch	1	50-100	1P
...	...	...	...	...	...	...	...	...	Purple Finch	2	100+	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	3	0-50	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	5	50-100	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	100+	1P
...	...	...	...	...	...	...	...	...	American Robin	2	0-50	1P
...	Mill/TH12	0472670E, 5020441N	Young hardwood	Calm	7	Overcast	None	7:52 AM	American Crow	1	100+	1P
...	...	...	...	...	...	...	...	...	American Goldfinch	3	FO SW	1P
...	...	...	...	...	...	...	...	...	American Robin	6	50-100	1P
...	...	...	...	...	...	...	...	...	American Robin	5	100+	1P
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	3	0-50	1P
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	50-100	1P
...	...	...	...	...	...	...	...	...	Blue Jay	1	50-100	1P
...	...	...	...	...	...	...	...	...	Common Raven	1	0-50	1P
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	1P
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	1P
...	...	...	...	...	...	...	...	...	Evening Grosbeak	1	50-100	1P
...	...	...	...	...	...	...	...	...	Mourning Dove	1	50-100	1P
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	...	Purple Finch	2	0-50	1P
...	...	...	...	...	...	...	...	...	Red-winged Blackbird	1	FO NW	1P
...	...	...	...	...	...	...	...	...	Ring-necked Pheasant	2	100+	1P
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	50-100	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	4	0-50	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	3	50-100	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	100+	1P
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	1P
...	...	0473155E, 5019500N	Young hardwood	Calm	7	Overcast	None	8:20 AM	American Crow	1	100+	1P
...	Mill/TH6	...	...	...	...	...	...	...	American Goldfinch	1	50-100	1P
...	...	...	...	...	...	...	...	...	American Robin	4	0-50	1P
...	...	...	...	...	...	...	...	...	American Robin	4	50-100	1P
...	...	...	...	...	...	...	...	...	American Robin	9	100+	1P
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	0-50	1P
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	1P
...	...	...	...	...	...	...	...	...	Common Grackle	1	FO NW	1P
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	1P
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	0-50	1P
...	...	...	...	...	...	...	...	...	Hermit Thrush	5	100+	1P
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	...	Purple Finch	2	0-50	1P
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	0-50	1P
...	...	...	...	...	...	...	...	...	Swainson's Thrush	1	100+	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	5	50-100	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	100+	1P
...	...	0473219E, 5019219N	Shrub hardwoods, high proportion of yellow birch	Calm	7	Overcast	None	8:39 AM	American Crow	2	100+	1P
...	Mill/TH2	...	...	...	...	...	...	...	American Goldfinch	2	50-100	1P
...	...	...	...	...	...	...	...	...	American Robin	5	0-50	1P
...	...	...	...	...	...	...	...	...	American Robin	5	50-100	1P
...	...	...	...	...	...	...	...	...	American Robin	2	100+	1P
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	50-100	1P
...	...	...	...	...	...	...	...	...	Blue Jay	2	50-100	1P
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	50-100	1P
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+	1P
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	1P
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky					
...	...	...	...	...	...	...	...	Evening Grosbeak	1	0-50	1P
...	...	...	...	...	...	...	...	Hermit Thrush	1	50-100	1P
...	...	...	...	...	...	...	...	Hermit Thrush	4	100+	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Purple Finch	2	0-50	1P
...	...	...	...	...	...	...	...	Purple Finch	1	50-100	1P
...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	0-50	1P
...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	100+	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	2	0-50	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	3	50-100	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	4	100+	1P
...	...	...	...	...	...	...	...	Winter Wren	1	100+	1P
...	...	0473332E, 5018951N	Young hardwood	Calm	8	Overcast	9:01 AM	American Goldfinch	1	0-50	1P
...	...	...	...	...	...	...	...	American Goldfinch	2	50-100	1P
...	...	...	...	...	...	...	...	American Goldfinch	2	100+	1P
...	...	...	...	...	...	...	...	American Robin	2	0-50	1P
...	...	...	...	...	...	...	...	American Robin	4	50-100	1P
...	...	...	...	...	...	...	...	American Robin	7	100+	1P
...	...	...	...	...	...	...	...	Black-capped Chickadee	2	50-100	1P
...	...	...	...	...	...	...	...	Blue Jay	1	50-100	1P
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	1P
...	...	...	...	...	...	...	...	Hairy Woodpecker	1	100+	1P
...	...	...	...	...	...	...	...	Hermit Thrush	5	100+	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	50-100	1P
...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	2	100+	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	2	0-50	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	2	50-100	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	4	100+	1P
...	...	...	...	...	...	...	...	Winter Wren	1	100+	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	50-100	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	100+	1P
...	...	0473341E, 5018660N	Young hardwood	Calm	8	Overcast	9:31 AM	American Crow	1	100+	1P
...	...	...	...	...	...	...	...	American Robin	3	50-100	1P
...	...	...	...	...	...	...	...	American Robin	4	100+	1P
...	...	...	...	...	...	...	...	Black-capped Chickadee	2	50-100	1P
...	...	...	...	...	...	...	...	Blue Jay	2	50-100	1P
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	1P
...	...	...	...	...	...	...	...	Hermit Thrush	2	0-50	1P
...	...	...	...	...	...	...	...	Hermit Thrush	3	50-100	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky					
...	...	...	...	...	...	...	...	Hermit Thrush	6	100+	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Pine Siskin	1	50-100	1P
...	...	...	...	...	...	...	...	Purple Finch	1	50-100	1P
...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	50-100	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	2	0-50	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	3	100+	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	0-50	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	1P
...	...	0473185E, 5018431N	Young mixed	Calm	8	Overcast	9:46 AM	American Crow	1	100+	1P
...	Mill/TH5	...	...	...	...	...	...	American Robin	2	0-50	1P
...	...	...	...	...	...	...	...	American Robin	2	50-100	1P
...	...	...	...	...	...	...	...	American Robin	6	100+	1P
...	...	...	...	...	...	...	...	Blue Jay	1	100+	1P
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	0-50	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Purple Finch	1	50-100	1P
...	...	...	...	...	...	...	...	Red-breasted Nuthatch	1	100+	1P
...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	0-50	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	10	0-50	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	100+	1P
May 21/2012	...	0473319E, 5020050N	Young mixed	10 km/h S	13	Clear	9:09 AM	American Crow	1	100+	1P
...	...	...	...	...	...	...	...	American Robin	4	0-50	1P
...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	Blue Jay	2	0-50	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	50-100	1P
...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	Hermit Thrush	2	100+	1P
...	...	...	...	...	...	...	...	Least Flycatcher	1	0-50	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	1	0-50	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	1	100+	1P
...	...	...	...	...	...	...	...	Mourning Dove	2	50-100	1P
...	...	...	...	...	...	...	...	Northern Parula	1	0-50	1P
...	...	...	...	...	...	...	...	Ovenbird	1	50-100	1P
...	...	...	...	...	...	...	...	Ovenbird	1	100+	1P
...	...	...	...	...	...	...	...	Purple Finch	1	50-100	1P
...	...	...	...	...	...	...	...	Winter Wren	2	100+	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky					
...	Mill/TH7	0473243E, 5019782N	Young hardwood	10 km/h S	13	Clear	9:22 AM	American Crow	1	100+	1P
...	...	...	...	...	...	...	...	American Goldfinch	1	0-50	1P
...	...	...	...	...	...	...	...	American Robin	1	50-100	1P
...	...	...	...	...	...	...	...	American Robin	2	100+	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	1	0-50	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	1	100+	1P
...	...	...	...	...	...	...	...	Black-throated Green	1	0-50	1P
...	...	...	...	...	...	...	...	Black-throated Green	1	50-100	1P
...	...	...	...	...	...	...	...	Black-throated Green	1	100+	1P
...	...	...	...	...	...	...	...	Blue Jay	1	50-100	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+	1P
...	...	...	...	...	...	...	...	Hermit Thrush	2	100+	1P
...	...	...	...	...	...	...	...	Mourning Dove	1	100+	1P
...	...	...	...	...	...	...	...	Ovenbird	2	100+	1P
...	...	...	...	...	...	...	...	Purple Finch	2	50-100	1P
...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	1P
...	...	...	...	...	...	...	...	Yellow-bellied Flycatcher	1	50-100	1P
...	Mill/TH9	0472984E, 50119881N	Young mixed	10 km/h S	13	Clear	9:35 AM	American Crow	4	100+	1P
...	...	...	...	...	...	...	...	American Robin	2	0-50	1P
...	...	...	...	...	...	...	...	American Robin	2	50-100	1P
...	...	...	...	...	...	...	...	American Robin	3	100+	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	3	0-50	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	1	100+	1P
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	100+	1P
...	...	...	...	...	...	...	...	Black-throated Blue	1	50-100	1P
...	...	...	...	...	...	...	...	Black-throated Green	1	50-100	1P
...	...	...	...	...	...	...	...	Black-throated Green	1	100+	1P
...	...	...	...	...	...	...	...	Blue Jay	1	50-100	1P
...	...	...	...	...	...	...	...	Eastern Wood-Pewee	1	100+	1P
...	...	...	...	...	...	...	...	Hermit Thrush	2	0-50	1P
...	...	...	...	...	...	...	...	Hermit Thrush	4	100+	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	1	0-50	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	2	50-100	1P
...	...	...	...	...	...	...	...	Mourning Dove	1	50-100	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	0-50	1P
...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	1P
...	Mill/TH10	0472736E, 5019990N	Young mixed	10 km/h S	15	Clear	9:48 AM	American Crow	1	100+	1P
...	...	...	...	...	...	...	...	American Robin	4	0-50	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation				
...	...	...	...	...	...	...	...	American Robin	2	50-100	1P
...	...	...	...	...	...	...	...	American Robin	3	100+	1P
...	...	...	...	...	...	...	...	Black-throated Green	4	0-50	1P
...	...	...	...	...	...	...	...	Black-throated Green	2	50-100	1P
...	...	...	...	...	...	...	...	Black-throated Green	1	100+	1P
...	...	...	...	...	...	...	...	Blue Jay	1	100+	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	2	50-100	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+	1P
...	...	...	...	...	...	...	...	Hermit Thrush	4	100+	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	3	50-100	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	2	100+	1P
...	...	...	...	...	...	...	...	Mourning Dove	1	100+	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Ovenbird	2	0-50	1P
...	...	...	...	...	...	...	...	Ovenbird	2	100+	1P
...	...	...	...	...	...	...	...	Purple Finch	1	50-100	1P
...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	50-100	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	2	50-100	2P
...	...	...	...	...	...	...	...	Black-and-white Warbler	2	100+	2P
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	50-100	2P
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	100+	2P
...	...	...	...	...	...	...	...	White-throated Sparrow	4	0-50	2P
...	...	...	...	...	...	...	...	White-throated Sparrow	1	50-100	2P
...	...	...	...	...	...	...	...	Common Yellowthroat	1	50-100	2P
...	...	047257E, 5020184N	Mid-aged mixed	10 km/h S	15	Clear	None	American Goldfinch	6	50-100	1P
...	...	...	...	...	...	...	...	American Robin	2	50-100	2P
...	...	...	...	...	...	...	...	American Robin	3	100+	2P
...	...	...	...	...	...	...	...	Black-and-white Warbler	3	0-50	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	2	50-100	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	2	100+	1P
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	0-50	1P
...	...	...	...	...	...	...	...	Black-throated Green	3	0-50	1P
...	...	...	...	...	...	...	...	Black-throated Green	4	50-100	1P
...	...	...	...	...	...	...	...	Black-throated Green	5	100+	1P
...	...	...	...	...	...	...	...	Blue Jay	2	50-100	2P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	50-100	2P
...	...	...	...	...	...	...	...	Common Yellowthroat	1	0-50	1P
...	...	...	...	...	...	...	...	Common Yellowthroat	1	50-100	1P
...	...	...	...	...	...	...	...	Eastern Wood-Pewee	1	100+	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	...	...	...	...	...	...	...	...	Hermit Thrush	3	100+	1P
...	...	...	...	...	...	...	...	...	Magnolia Warbler	4	0-50	2P
...	...	...	...	...	...	...	...	...	Magnolia Warbler	4	50-100	2P
...	...	...	...	...	...	...	...	...	Magnolia Warbler	2	100+	2P
...	...	...	...	...	...	...	...	...	Mourning Dove	1	100+	1P
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100	2P
...	...	...	...	...	...	...	...	...	Northern Parula	1	100+	2P
...	...	...	...	...	...	...	...	...	Ovenbird	2	50-100	2P
...	...	...	...	...	...	...	...	...	Ovenbird	3	100+	2P
...	...	...	...	...	...	...	...	...	Pine Siskin	1	0-50	2P
...	...	...	...	...	...	...	...	...	Purple Finch	1	50-100	2P
...	...	...	...	...	...	...	...	...	Ruby-throated Hummingbird	2	0-50	2P
...	...	...	...	...	...	...	...	...	Swainson's Thrush	1	100+	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	0-50	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	50-100	1P
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	1P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	2P
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	2P
...	...	...	...	...	...	...	...	...				
...	Mill/TH12	0472670E, 5020441N	Young hardwood	10 km/h S	15	Clear	None	10:28 AM	Alder Flycatcher	2	0-50	1P
...	...	...	...	...	...	...	...	...	American Crow	1	50-100	1P
...	...	...	...	...	...	...	...	...	American Goldfinch	2	50-100	1P
...	...	...	...	...	...	...	...	...	American Redstart	1	0-50	1P
...	...	...	...	...	...	...	...	...	American Redstart	2	50-100	1P
...	...	...	...	...	...	...	...	...	American Redstart	1	100+	1P
...	...	...	...	...	...	...	...	...	American Robin	2	100+	1P
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	2	0-50	1P
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	2	100+	1P
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	50-100	1P
...	...	...	...	...	...	...	...	...	Black-throated Green	7	0-50	1P
...	...	...	...	...	...	...	...	...	Black-throated Green	4	50-100	1P
...	...	...	...	...	...	...	...	...	Black-throated Green	5	100+	1P
...	...	...	...	...	...	...	...	...	Least Flycatcher	1	50-100	1P
...	...	...	...	...	...	...	...	...	Magnolia Warbler	3	50-100	1P
...	...	...	...	...	...	...	...	...	Mourning Dove	1	100+	1P
...	...	...	...	...	...	...	...	...	Ovenbird	2	100+	1P
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	0-50	1P
...	...	...	...	...	...	...	...	...	Ruby-throated	1	0-50	1P
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	50-100	1P
...	...	...	...	...	...	...	...	...	Yellow-bellied Flycatcher	1	100+	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation				
...	Mill/TH6	0473155E, 5019500N	Young hardwood	10 km/h S	15	Clear	None	10:50 AM	American Redstart	2	0-50
...	...	...	...	...	...	...	...	...	American Redstart	1	100+
...	...	...	...	...	...	...	...	...	American Robin	1	0-50
...	...	...	...	...	...	...	...	...	American Robin	1	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	2	0-50
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	2	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	100+
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	50-100
...	...	...	...	...	...	...	...	...	Black-throated Green	6	0-50
...	...	...	...	...	...	...	...	...	Black-throated Green	4	50-100
...	...	...	...	...	...	...	...	...	Black-throated Green	4	100+
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	50-100
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	0-50
...	...	...	...	...	...	...	...	...	Magnolia Warbler	3	0-50
...	...	...	...	...	...	...	...	...	Magnolia Warbler	4	50-100
...	...	...	...	...	...	...	...	...	Magnolia Warbler	2	100+
...	...	...	...	...	...	...	...	...	Mourning Dove	1	100+
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	2	100+
...	...	...	...	...	...	...	...	...	Purple Finch	1	0-50
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	0-50
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	50-100
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	0-50
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+
...	...	...	Shrub hardwoods, high proportion of yellow birch	10 km/h S	15	Clear	None	11:04 AM	American Crow	1	100+
...	Mill/TH2	0473219E, 5019219N	...	...	...	...	...	...	American Redstart	2	50-100
...	...	...	...	...	...	...	...	...	American Robin	2	0-50
...	...	...	...	...	...	...	...	...	American Robin	2	100+
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	2	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	100+

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation				
...	...	...	...	...	...	...	...	Black-billed Cuckoo	1	50-100	1P
...	...	...	...	...	...	...	...	Black-throated Green Warbler	3	0-50	1P
...	...	...	...	...	...	...	...	Black-throated Green	6	50-100	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	0-50	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	2	50-100	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	2	100+	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	3	0-50	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	4	50-100	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	2	100+	1P
...	...	...	...	...	...	...	...	Northern Parula	1	50-100	1P
...	...	...	...	...	...	...	...	Ovenbird	1	50-100	1P
...	...	...	...	...	...	...	...	Ovenbird	2	100+	1P
...	...	...	...	...	...	...	...	Purple Finch	1	0-50	1P
...	...	...	...	...	...	...	...	Purple Finch	4	50-100	1P
...	...	...	...	...	...	...	...	Red-eyed Vireo	1	50-100	1P
...	Mill/TH3	0473332E, 5018951N	Young hardwood	10 km/h S	15	Clear	None	American Goldfinch	1	50-100	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	50-100	1P
...	...	...	...	...	...	...	...	Black-throated Green	4	100+	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	2	100+	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	1	0-50	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	2	100+	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Ovenbird	1	0-50	1P
...	...	...	...	...	...	...	...	Ovenbird	2	100+	1P
...	...	...	...	...	...	...	...	Purple Finch	1	50-100	1P
...	Mill/TH4	0473341E, 5018660N	Young hardwood	10 km/h S	15	Clear	None	American Crow	1	100+	1P
...	...	...	...	...	...	...	...	American Goldfinch	2	50-100	1P
...	...	...	...	...	...	...	...	American Robin	1	50-100	1P
...	...	...	...	...	...	...	...	American Robin	1	100+	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	2	100+	1P
...	...	...	...	...	...	...	...	Black-throated Green	2	50-100	1P
...	...	...	...	...	...	...	...	Black-throated Green	4	100+	1P
...	...	...	...	...	...	...	...	Blue Jay	1	100+	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	50-100	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+	1P
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	1P

Table G3: Detailed Spring Bird Survey Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation				
...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	3	100+	1P
...	...	...	...	...	...	...	...	Northern Parula	1	100+	1P
...	...	...	...	...	...	...	...	Ovenbird	1	0-50	1P
...	...	...	...	...	...	...	...	Ovenbird	2	50-100	1P
...	...	...	...	...	...	...	...	Ovenbird	4	100+	1P
...	...	...	...	...	...	...	...	Pine Siskin	1	100+	1P
...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	1P
...	...	...	...	...	...	...	...	White-throated Sparrow	2	50-100	1P
...	Mill/TH5	0473185E, 5018431N	Young mixed	10 km/h S	16	Clear	None	American Crow	1	100+	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100	1P
...	...	...	...	...	...	...	...	Black-and-white Warbler	1	100+	1P
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	100+	1P
...	...	...	...	...	...	...	...	Black-throated Green	1	50-100	1P
...	...	...	...	...	...	...	...	Black-throated Green	2	100+	1P
...	...	...	...	...	...	...	...	Blue Jay	1	100+	1P
...	...	...	...	...	...	...	...	Blue-headed Vireo	1	50-100	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	1	0-50	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	2	50-100	1P
...	...	...	...	...	...	...	...	Magnolia Warbler	3	100+	1P
...	...	...	...	...	...	...	...	Northern Flicker	1	100+	1P
...	...	...	...	...	...	...	...	Northern Parula	1	100+	1P
...	...	...	...	...	...	...	...	Ovenbird	1	50-100	1P
...	...	...	...	...	...	...	...	Ovenbird	2	100+	1P

Table G4: Spring Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects Project # 12-4328/12-4544

Common Name	Scientific Name	NSDNR Status	COSEWIC Status	SARA Status	NSESA Status	Number of Times Observed	Number of Individuals Observed
Alder Flycatcher	<i>Empidonax alhorum</i>	Green	Not Listed	Not Listed	Not Listed	1	2
American Black Duck	<i>Anas rubripes</i>	Green	Not Listed	Not Listed	Not Listed	1	1
American Crow	<i>Corvus brachyrhynchos</i>	Green	Not Listed	Not Listed	Not Listed	22	29
American Goldfinch	<i>Spinus tristis</i>	Green	Not Listed	Not Listed	Not Listed	15	31
American Redstart	<i>Setophaga ruticilla</i>	Green	Not Listed	Not Listed	Not Listed	6	9
American Robin	<i>Turdus migratorius</i>	Green	Not Listed	Not Listed	Not Listed	56	190
Black-and-white Warbler	<i>Mniotilta varia</i>	Green	Not Listed	Not Listed	Not Listed	23	37
Black-billed Cuckoo	<i>Coccyz erythrophthalmus</i>	Red	Not Listed	Not Listed	Not Listed	1	1
Black-capped Chickadee	<i>Parus atricapillus</i>	Green	Not Listed	Not Listed	Not Listed	24	33
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Black-throated Green Warbler	<i>Dendroica virens</i>	Green	Not Listed	Not Listed	Not Listed	25	77
Blue Jay	<i>Cyanocitta cristata</i>	Green	Not Listed	Not Listed	Not Listed	22	27
Blue-headed Vireo	<i>Vireo solitarius</i>	Green	Not Listed	Not Listed	Not Listed	23	27
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Common Grackle	<i>Quiscalus quiscula</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Common Raven	<i>Corvus corax</i>	Green	Not Listed	Not Listed	Not Listed	7	8
Common Yellowthroat	<i>Geothlypis trichas</i>	Green	Not Listed	Not Listed	Not Listed	3	3
Dark-eyed Junco	<i>Junco hyemalis</i>	Green	Not Listed	Not Listed	Not Listed	17	18
Downy Woodpecker	<i>Picoides pubescens</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Eastern Wood-Pewee	<i>Contopus virens</i>	Yellow	Not Listed	Not Listed	Not Listed	2	2
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Green	Not Listed	Not Listed	Not Listed	3	3
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Yellow	Not Listed	Not Listed	Not Listed	2	2
Hairy Woodpecker	<i>Picoides villosus</i>	Green	Not Listed	Not Listed	Not Listed	3	4
Hermit Thrush	<i>Catharus guttatus</i>	Green	Not Listed	Not Listed	Not Listed	23	74
Least Flycatcher	<i>Empidonax minimus</i>	Green	Not Listed	Not Listed	Not Listed	2	2
Magnolia Warbler	<i>Dendroica magnolia</i>	Green	Not Listed	Not Listed	Not Listed	23	54
Mallard	<i>Anas platyrhynchos</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Mourning Dove	<i>Zenaidura macroura</i>	Green	Not Listed	Not Listed	Not Listed	10	11
Nashville Warbler	<i>Vermivora ruficapilla</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Northern Flicker	<i>Colaptes auratus</i>	Green	Not Listed	Not Listed	Not Listed	21	21
Northern Parula	<i>Parula americana</i>	Green	Not Listed	Not Listed	Not Listed	6	6
Ovenbird	<i>Seiurus aurocapilla</i>	Green	Not Listed	Not Listed	Not Listed	19	34
Palm Warbler	<i>Dendroica palmarum</i>	Green	Not Listed	Not Listed	Not Listed	3	3
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Green	Not Listed	Not Listed	Not Listed	3	3
Pine Siskin	<i>Spinus pinus</i>	Yellow	Not Listed	Not Listed	Not Listed	8	14
Purple Finch	<i>Carpodacus purpureus</i>	Green	Not Listed	Not Listed	Not Listed	29	43
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Green	Not Listed	Not Listed	Not Listed	2	2
Red-eyed Vireo	<i>Vireo olivaceus</i>	Green	Not Listed	Not Listed	Not Listed	2	2
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Ring-necked Pheasant	<i>Phasianus colchicus</i>	Exotic	Not Listed	Not Listed	Not Listed	1	2
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Yellow	Not Listed	Not Listed	Not Listed	11	12
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Green	Not Listed	Not Listed	Not Listed	2	3
Ruffed Grouse	<i>Bonasa umbellus</i>	Green	Not Listed	Not Listed	Not Listed	14	14
Song Sparrow	<i>Melospiza melodia</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Swainson's Thrush	<i>Catharus ustulatus</i>	Green	Not Listed	Not Listed	Not Listed	4	6
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Green	Not Listed	Not Listed	Not Listed	34	96
Winter Wren	<i>Troglodytes troglodytes</i>	Green	Not Listed	Not Listed	Not Listed	8	10
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	Yellow	Not Listed	Not Listed	Not Listed	2	2
Yellow-rumped Warbler	<i>Dendroica coronata</i>	Green	Not Listed	Not Listed	Not Listed	34	46

Table G5: Detailed Breeding Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
June 8/2012	Mill/TH8	0473319E, 5020050N	Young mixed	Calm	9	Overcast/Fog	None	6:23AM	American Crow	1	100+	
									American Goldfinch	4	0-50	
									American Redstart	1	0-50	
									American Redstart	1	50-100	
									American Robin	2	0-50	
									American Robin	2	50-100	
									American Robin	4	100+	
									Black-and-white Warbler	1	0-50	
									Black-capped Chickadee	2	0-50	1P
									Black-throated Green Warbler	2	0-50	
									Black-throated Green Warbler	2	50-100	
									Common Yellowthroat	1	0-50	
									Dark-eyed Junco	1	0-50	
									Least Flycatcher	3	0-50	
									Magnolia Warbler	1	0-50	
									Magnolia Warbler	1	50-100	
									Mourning Dove	4	0-50	2 Adult, 2 young
									Northern Flicker	2	0-50	1P
									Ovenbird	1	0-50	
									Red Crossbill	1	100+	
									Red-eyed Vireo	2	0-50	
									Red-eyed Vireo	1	50-100	
									Red-eyed Vireo	1	100+	
									Swainson's Thrush	1	0-50	
									Swainson's Thrush	1	50-100	
									White-throated Sparrow	2	0-50	1P
									White-throated Sparrow	2	50-100	1P
									Winter Wren	1	0-50	
									Winter Wren	1	100+	
									American Goldfinch	2	0-50	
	Mill/TH7	0473243E, 5019782N	Young hardwood	10 km/h NE	9	Overcast/Fog	None	6:43AM	American Redstart	4	0-50	
									American Redstart	2	50-100	
									American Robin	6	0-50	
									American Robin	4	50-100	
									American Robin	2	100+	
									Black-and-white Warbler	1	0-50	
									Black-throated Green Warbler	2	0-50	
									Magnolia Warbler	1	0-50	
									Magnolia Warbler	1	50-100	
									Mourning Dove	1	0-50	
									Northern Flicker	3	0-50	Family
									Ovenbird	4	0-50	
									Ovenbird	1	50-100	
									Red-eyed Vireo	2	0-50	
									Red-eyed Vireo	2	50-100	
									Ruffed Grouse	1	100+	
	Mill/TH9	0472984E, 50119881N	Young mixed	Calm	9	Overcast/Fog	None	7:14AM	American Crow	2	100+	

Table G5: Detailed Breeding Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
	Mill/TH11	0472577E, 5020184N	Mid-aged mixed	Calm	11	Overcast/Fog	None	8:08AM	American Crow	1	0-50	
									American Goldfinch	4	0-50	
									American Robin	3	0-50	
									American Robin	5	50-100	
									Black-and-white Warbler	2	0-50	
									Black-and-white Warbler	1	100+	
									Blue Jay	1	0-50	
									Chestnut-sided Warbler	1	0-50	
									Common Yellowthroat	1	0-50	
									Common Yellowthroat	1	100+	
									Eastern Wood-Pewee	2	0-50	
									Least Flycatcher	1	100+	
									Mourning Dove	1	0-50	
									Northern Flicker	1	50-100	
									Red-eyed Vireo	1	0-50	
									Red-eyed Vireo	2	50-100	
									Red-tailed Hawk	1	100+	
									Ruffed Grouse	1	100+	
									Song Sparrow	1	0-50	
									Swainson's Thrush	3	0-50	
									Swainson's Thrush	2	50-100	
									Swainson's Thrush	1	100+	
									Tennessee Warbler	1	50-100	
									Yellow-bellied Flycatcher	4	0-50	
	Mill/TH12	0472670E, 5020441N	Young hardwood	Calm	11	Overcast/Fog	None	8:27AM	American Crow	1	50-100	
									American Redstart	6	0-50	
									American Redstart	2	50-100	
									American Robin	7	0-50	
									Black-capped Chickadee	1	0-50	
									Black-throated Green Warbler	1	0-50	
									Black-throated Green Warbler	2	50-100	
									Chestnut-sided Warbler	1	0-50	
									Chipping Sparrow	1	0-50	
									Hermit Thrush	1	0-50	
									Hermit Thrush	2	50-100	
									Hermit Thrush	5	100+	
									Mourning Dove	1	50-100	
									Ovenbird	1	0-50	
									Ovenbird	1	100+	
									Purple Finch	1	0-50	
									Red-eyed Vireo	2	0-50	
									Red-eyed Vireo	2	50-100	
									Red-eyed Vireo	1	100+	
									Red-tailed Hawk	1	0-50	
									Swainson's Thrush	9	0-50	
									Swainson's Thrush	2	50-100	
									Tennessee Warbler	1	0-50	
									Yellow Warbler	1	0-50	

Table G5: Detailed Breeding Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
	Mill/TH6	0473155E, 5019500N	Young hardwood	Calm	11	Cloudy	None	8:58AM	American Goldfinch	2	0-50	
									American Goldfinch	4	50-100	
									American Redstart	3	0-50	
									American Redstart	1	50-100	
									Black-and-white Warbler	1	0-50	
									Black-and-white Warbler	1	100+	
									Black-throated Green Warbler	2	0-50	
									Black-throated Green Warbler	4	50-100	
									Black-throated Green Warbler	4	100+	
									Blue Jay	1	100+	
									Common Yellowthroat	1	0-50	
									Common Yellowthroat	1	50-100	
									Dark-eyed Junco	4	0-50	2P
									Mourning Dove	3	0-50	Family
									Nashville Warbler	1	50-100	
									Northern Flicker	1	0-50	
									Northern Flicker	1	100+	
									Ovenbird	1	50-100	
									Ovenbird	1	100+	
									Purple Finch	2	0-50	
									Red-eyed Vireo	3	0-50	
									Red-eyed Vireo	3	50-100	
									Red-eyed Vireo	1	100+	
									Veery	2	50-100	
			Shrub hardwoods, high proportion of yellow birch									
	Mill/TH2	0473219E, 5019219N		Calm	12	Sunny	None	9:14AM	American Crow	1	100+	
									American Goldfinch	2	0-50	1P
									American Goldfinch	2	50-100	
									American Robin	3	0-50	
									American Robin	4	50-100	
									American Robin	2	100+	
									Black-and-white Warbler	1	0-50	
									Black-and-white Warbler	2	50-100	
									Black-throated Green Warbler	2	0-50	
									Black-throated Green Warbler	3	50-100	
									Common Yellowthroat	2	0-50	
									Common Yellowthroat	1	50-100	
									Hairy Woodpecker	2	0-50	
									Mourning Dove	1	0-50	
									Northern Flicker	1	50-100	
									Northern Parula	1	0-50	
									Northern Parula	2	50-100	
									Red-eyed Vireo	4	0-50	
									Red-eyed Vireo	5	50-100	
									Swainson's Thrush	4	50-100	
									Swainson's Thrush	4	100+	

Table G5: Detailed Breeding Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
	Mill/TH3	0473332E, 5018951N	Young hardwood	Calm	12	Sunny	None	9:41AM	American Crow	1	50-100	
									American Goldfinch	1	0-50	
									American Robin	1	0-50	
									American Robin	3	50-100	
									American Robin	2	100+	
									Black-and-white Warbler	2	0-50	
									Black-and-white Warbler	3	50-100	
									Black-capped Chickadee	2	0-50	1P
									Black-throated Green Warbler	3	0-50	
									Black-throated Green Warbler	2	50-100	
									Blue-headed Vireo	2	0-50	
									Magnolia Warbler	2	0-50	
									Magnolia Warbler	2	50-100	
									Mourning Dove	1	0-50	
									Northern Flicker	1	100+	
									Ovenbird	1	0-50	
									Ovenbird	2	50-100	
									Purple Finch	1	0-50	
									Red-breasted Nuthatch	1	0-50	
									Red-eyed Vireo	3	0-50	
									Red-eyed Vireo	3	50-100	
									Sharp-shinned Hawk	1	0-50	
									Swainson's Thrush	3	100+	
									Winter Wren	1	100+	
	Mill/TH4	0473341E, 5018660N	Young hardwood	Calm	14	Sunny	None	10:11AM	American Crow	2	100+	
									American Robin	2	0-50	
									American Robin	3	50-100	
									American Robin	1	100+	
									Black-throated Green Warbler	1	0-50	
									Black-throated Green Warbler	2	50-100	
									Black-throated Green Warbler	2	100+	
									Blue Jay	1	100+	
									Magnolia Warbler	1	50-100	
									Magnolia Warbler	1	100+	
									Mourning Dove	1	100+	
									Ovenbird	1	0-50	
									Ovenbird	1	50-100	
									Ovenbird	1	100+	
									Red-eyed Vireo	2	0-50	
									Red-eyed Vireo	3	50-100	
									Ruby-crowned Kinglet	1	100+	
									Ruffed Grouse	1	100+	
									Swainson's Thrush	1	0-50	
									Swainson's Thrush	2	100+	
									Yellow-bellied Flycatcher	1	50-100	
June 20/2012	Mill/TH8	0473319E, 5020050N	Young mixed	Calm	13	Overcast	None	4:52AM	American Robin	8	0-50	
									American Robin	4	50-100	

Table G5: Detailed Breeding Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
									American Robin	7	100+	
									Black-and-white Warbler	1	0-50	
									Black-throated Green Warbler	1	50-100	
									Black-throated Green Warbler	1	100+	
									Common Loon	1	100+	
									Common Nighthawk	1	F/O SE	
									Common Yellowthroat	1	0-50	
									Common Yellowthroat	1	50-100	
									Hermit Thrush	5	50-100	
									Hermit Thrush	6	100+	
									Least Flycatcher	2	0-50	
									Magnolia Warbler	1	0-50	
									Magnolia Warbler	1	100+	
									Mourning Dove	2	0-50	
									Nashville Warbler	1	0-50	
									Purple Finch	1	0-50	
									Red-eyed Vireo	1	0-50	
									Red-eyed Vireo	2	100+	
									Swainson's Thrush	2	0-50	
									Swainson's Thrush	4	50-100	
									Swainson's Thrush	1	100+	
									White-throated Sparrow	2	0-50	1P
									White-throated Sparrow	4	50-100	
									Yellow Warbler	1	100+	
									Yellow-rumped Warbler	1	100+	
									American Redstart	1	0-50	
	Mill/TH7	0473243E, 5019782N	Young hardwood	Calm	13	Overcast	None	5:10AM	American Redstart	1	50-100	
									American Redstart	1	50-100	
									American Robin	6	0-50	
									American Robin	6	50-100	
									American Robin	7	100+	
									American Robin	1	0-50	
									Black-and-white Warbler	1	0-50	
									Black-capped Chickadee	1	50-100	
									Black-throated Green Warbler	1	50-100	
									Black-throated Green Warbler	1	100+	
									Common Yellowthroat	2	0-50	
									Common Yellowthroat	1	50-100	
									Dark-eyed Junco	2	0-50	1P
									Magnolia Warbler	2	0-50	
									Mourning Dove	3	0-50	Family
									Northern Parula	1	0-50	
									Ovenbird	1	50-100	
									Red-eyed Vireo	2	0-50	
									Red-eyed Vireo	1	100+	
									Rose-breasted Grosbeak	2	0-50	
									Ruffed Grouse	1	100+	
									White-throated Sparrow	1	0-50	
									White-throated Sparrow	2	50-100	
									Winter Wren	1	100+	

Table G5: Detailed Breeding Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
	Mill/TH9	0472984E, 50119881N	Young mixed	Calm	13	Overcast	None	5:37AM	American Crow	2	100+	
									American Redstart	1	0-50	
									American Robin	4	0-50	
									American Robin	5	50-100	
									American Robin	4	100+	
									Black-and-white Warbler	1	0-50	
									Black-throated Green Warbler	2	0-50	
									Common Yellowthroat	2	0-50	
									Hermit Thrush	1	0-50	
									Magnolia Warbler	1	50-100	
									Magnolia Warbler	1	100+	
									Mourning Dove	3	50-100	
									Nashville Warbler	1	0-50	
									Northern Parula	1	100+	
									Ovenbird	1	50-100	
									Ovenbird	2	0-50	
									Purple Finch	2	0-50	
									Red-eyed Vireo	1	0-50	
									Red-eyed Vireo	1	50-100	
									Ring-necked Pheasant	1	100+	
									Rose-breasted Grosbeak	1	0-50	
									Swainson's Thrush	3	0-50	
									Yellow Warbler	1	0-50	
	Mill/TH10	0472736E, 5019990N	Young mixed	Calm	13	Overcast	None	6:06AM	Alder Flycatcher	1	100+	
									American Crow	1	100+	
									American Goldfinch	1	0-50	
									American Robin	5	0-50	
									American Robin	4	50-100	
									American Robin	6	100+	
									Black-and-white Warbler	1	0-50	
									Black-throated Green Warbler	2	50-100	
									Black-throated Green Warbler	2	100+	
									Blue Jay	1	50-100	
									Common Loon	1	100+	
									Common Raven	1	100+	
									Common Yellowthroat	2	50-100	
									Hermit Thrush	2	100+	
									Magnolia Warbler	1	0-50	
									Magnolia Warbler	1	50-100	
									Nashville Warbler	1	0-50	
									Northern Parula	1	0-50	
									Purple Finch	2	0-50	
									Purple Finch	2	50-100	
									Purple Finch	3	100+	
									Red-eyed Vireo	2	0-50	
									Red-eyed Vireo	2	100+	
									Swainson's Thrush	1	50-100	
									Swainson's Thrush	1	100+	

Table G5: Detailed Breeding Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
									White-throated Sparrow	1	0-50	
									White-throated Sparrow	2	50-100	
	Mill/TH11	047257E, 5020184N	Mid-aged mixed	10 km/hr W with Gusts of 20 km/hr	13	Overcast	None	6:30AM	American Crow	3	100+	
									American Goldfinch	1	0-50	
									American Redstart	1	0-50	
									American Robin	2	0-50	
									American Robin	4	50-100	
									American Robin	3	100+	
									Black-and-white Warbler	1	0-50	
									Black-capped Chickadee	6	50-100	Family
									Black-throated Blue Warbler	1	100+	
									Black-throated Green Warbler	1	0-50	
									Black-throated Green Warbler	1	50-100	
									Black-throated Green Warbler	2	100+	
									Blue Jay	1	100+	
									Blue-headed Vireo	1	50-100	
									Blue-headed Vireo	1	100+	
									Cedar Waxwing	2	0-50	
									Chestnut-sided Warbler	1	0-50	
									Common Yellowthroat	1	50-100	
									Golden-crowned Kinglet	1	0-50	
									Hairy Woodpecker	1	50-100	
									Hermit Thrush	1	0-50	
									Hermit Thrush	2	100+	
									Magnolia Warbler	1	0-50	
									Magnolia Warbler	1	50-100	
									Mourning Dove	2	50-100	
									Northern Parula	1	100+	
									Ovenbird	1	0-50	
									Ovenbird	1	100+	
									Pileated Woodpecker	2	100+	1 Adult, 1 Young
									Purple Finch	2	0-50	
									Red-eyed Vireo	1	0-50	
									Red-eyed Vireo	2	100+	
									Red-tailed Hawk	1	100+	
									Swainson's Thrush	1	50-100	
									White-throated Sparrow	3	50-100	
	Mill/TH12	0472670E, 5020441N	Young hardwood	10 km/hr W with Gusts of 20 km/hr	13	Overcast	None	7:00AM	American Crow	3	100+	
									American Robin	2	0-50	
									American Robin	3	50-100	
									American Robin	7	100+	
									Black-and-white Warbler	1	0-50	
									Black-capped Chickadee	7	0-50	Family
									Black-throated Blue Warbler	1	100+	
									Black-throated Green Warbler	1	0-50	
									Black-throated Green Warbler	2	50-100	

Table G5: Detailed Breeding Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Pairs
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
	Mill/TH2	0473219E, 5019219N	Shrub hardwoods, high proportion of yellow birch	10 km/hr W with Gusts of 20 km/hr	13	Overcast	None	8:03AM	American Crow	1	100+	
									American Goldfinch	2	0-50	
									American Robin	3	0-50	
									American Robin	1	50-100	
									Black-and-white Warbler	1	0-50	
									Black-and-white Warbler	1	50-100	
									Blue-headed Vireo	1	0-50	
									Blue-headed Vireo	1	50-100	
									Common Loon	1	100+	
									Common Yellowthroat	1	50-100	
									Least Flycatcher	2	0-50	
									Magnolia Warbler	2	0-50	
									Magnolia Warbler	2	50-100	
									Mourning Dove	2	0-50	
									Northern Flicker	1	50-100	
									Northern Flicker	1	100+	
									Osprey	1	F/O S	
									Purple Finch	1	0-50	
									Red-eyed Vireo	2	0-50	
									Red-eyed Vireo	2	50-100	
	Mill/TH3	0473332E, 5018951N	Young hardwood	10 km/hr W with Gusts of 20 km/hr	13	Overcast	None	8:32AM	American Redstart	1	0-50	
									American Robin	1	0-50	
									American Robin	2	50-100	
									American Robin	4	100+	
									Blue-headed Vireo	1	0-50	
									Common Yellowthroat	1	0-50	
									Magnolia Warbler	1	0-50	
									Magnolia Warbler	2	50-100	
									Mourning Dove	1	0-50	
									Ovenbird	1	0-50	
									Ovenbird	2	50-100	
									Ovenbird	2	100+	
									Red-eyed Vireo	1	0-50	
									Red-eyed Vireo	1	50-100	
									Red-eyed Vireo	2	100+	

Table G6: Breeding Bird Survey Results Summary, Millbrook/Tuoro Heights Community Wind Projects

Common Name	Scientific Name	NSDNR Status	COSEWIC Status	SARA Status	NSESA Status	Number of Times Observed	Number of Individuals Observed
Alder Flycatcher	<i>Empidonax alnorum</i>	Green	Not Listed	Not Listed	Not Listed	2	5
American Robin	<i>Turdus migratorius</i>	Green	Not Listed	Not Listed	Not Listed	50	182
American Crow	<i>Corvus brachyrhynchos</i>	Green	Not Listed	Not Listed	Not Listed	13	20
American Goldfinch	<i>Spinus tristis</i>	Green	Not Listed	Not Listed	Not Listed	13	28
American Redstart	<i>Setophaga ruticilla</i>	Green	Not Listed	Not Listed	Not Listed	19	38
American Woodcock	<i>Scolopax minor</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Black-and-white Warbler	<i>Mniotilta varia</i>	Green	Not Listed	Not Listed	Not Listed	22	27
Black-capped Chickadee	<i>Poecile atricapillus</i>	Green	Not Listed	Not Listed	Not Listed	8	22
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	Green	Not Listed	Not Listed	Not Listed	2	2
Black-throated Green Warbler	<i>Dendroica virens</i>	Green	Not Listed	Not Listed	Not Listed	33	64
Blue Jay	<i>Cyanocitta cristata</i>	Green	Not Listed	Not Listed	Not Listed	8	9
Blue-headed Vireo	<i>Vireo solitarius</i>	Green	Not Listed	Not Listed	Not Listed	10	11
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Green	Not Listed	Not Listed	Not Listed	1	2
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	Green	Not Listed	Not Listed	Not Listed	5	6
Chipping Sparrow	<i>Spizella passerina</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Common Loon	<i>Gavia immer</i>	Red	Not at Risk	Not Listed	Not Listed	4	4
Common Nighthawk	<i>Chordeiles minor</i>	Red	Threatened	Threatened	Threatened	1	1
Common Raven	<i>Corvus corax</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Common Yellowthroat	<i>Geothlypis trichas</i>	Green	Not Listed	Not Listed	Not Listed	18	23
Dark-eyed Junco	<i>Junco hyemalis</i>	Green	Not Listed	Not Listed	Not Listed	3	7
Eastern Wood-Pewee	<i>Contopus virens</i>	Yellow	Not Listed	Not Listed	Not Listed	1	2
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Yellow	Not Listed	Not Listed	Not Listed	1	1
Hairy Woodpecker	<i>Picoides villosus</i>	Green	Not Listed	Not Listed	Not Listed	3	5
Hermit Thrush	<i>Catharus guttatus</i>	Green	Not Listed	Not Listed	Not Listed	13	35
Least Flycatcher	<i>Empidonax minimus</i>	Green	Not Listed	Not Listed	Not Listed	5	9
Magnolia Warbler	<i>Dendroica magnolia</i>	Green	Not Listed	Not Listed	Not Listed	28	41
Mourning Dove	<i>Zenaidura macroura</i>	Green	Not Listed	Not Listed	Not Listed	18	33
Nashville Warbler	<i>Vermivora ruficapilla</i>	Green	Not Listed	Not Listed	Not Listed	5	5
Northern Flicker	<i>Colaptes auratus</i>	Green	Not Listed	Not Listed	Not Listed	10	15
Northern Parula	<i>Parula americana</i>	Green	Not Listed	Not Listed	Not Listed	6	7
Osprey	<i>Pandion haliaetus</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Ovenbird	<i>Seiurus aurocapilla</i>	Green	Not Listed	Not Listed	Not Listed	26	36
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Green	Not Listed	Not Listed	Not Listed	1	2
Purple Finch	<i>Carpodacus purpureus</i>	Green	Not Listed	Not Listed	Not Listed	13	24
Red Crossbill	<i>Loxia curvirostra</i>	Green	Not Listed	Not Listed	Not Listed	1	1
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Green	Not Listed	Not Listed	Not Listed	2	3
Red-eyed Vireo	<i>Vireo olivaceus</i>	Green	Not Listed	Not Listed	Not Listed	44	85
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Green	Not at Risk	Not Listed	Not Listed	3	3
Ring-necked Pheasant	<i>Phasianus colchicus</i>	Exotic	Not Listed	Not Listed	Not Listed	2	2
Rose-breasted Grosbeak	<i>Phoebastria ludovicianus</i>	Yellow	Not Listed	Not Listed	Not Listed	3	4
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Yellow	Not Listed	Not Listed	Not Listed	1	1
Ruffed Grouse	<i>Bonasa umbellus</i>	Green	Not Listed	Not Listed	Not Listed	4	4
Sharp-shinned Hawk	<i>Accipiter striatus</i>	Green	Not at Risk	Not Listed	Not Listed	1	1
Song Sparrow	<i>Melospiza melodia</i>	Green	Not Listed	Not Listed	Not Listed	1	1

Table G6 (pg 2): Breeding Bird Survey - Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Common Name	Scientific Name	NSDNR Status	COSEWIC Status	SARA Status	NSESA Status	Number of Times Observed	Number of Individuals Observed
Swainson's Thrush	<i>Catharus ustulatus</i>	Green	Not Listed	Not Listed	Not Listed	25	57
Tennessee Warbler	<i>Vermivora peregrina</i>	Yellow	Not Listed	Not Listed	Not Listed	2	2
Veery	<i>Catharus fuscescens</i>	Green	Not Listed	Not Listed	Not Listed	2	3
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Green	Not Listed	Not Listed	Not Listed	11	23
Winter Wren	<i>Troglodytes troglodytes</i>	Green	Not Listed	Not Listed	Not Listed	5	5
Yellow Warbler	<i>Dendroica petechia</i>	Green	Not Listed	Not Listed	Not Listed	3	3
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	Yellow	Not Listed	Not Listed	Not Listed	3	8
Yellow-rumped Warbler	<i>Dendroica coronata</i>	Green	Not Listed	Not Listed	Not Listed	1	1
	Confirmed Breeder						
	Probable Breeder						
	Possible Breeder						

Table G7: Detailed Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Height for flyovers (m)
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
Sept. 18/2012	Mill/TH7	0473243E, 5019782N	Young hardwood	<10 km/h	8	Clear	None	7:34 AM	American Crow	4	100+	-
								***	American Robin	1	50-100	-
								***	Blue Jay	2	100+	-
								***	Common Raven	1	100+	-
								***	Mourning Dove	2	100+	-
								***	Palm Warbler	1	0-50	-
								***	Purple Finch	2	50-100	-
								***	White-throated Sparrow	4	50-100	-
								***	Yellow-rumped Warbler	1	0-50	-

	Mill/TH6	0473155E, 5019500N	Young hardwood	<10 km/h	8	Clear	None	7:53 AM	American Crow	4	100+	-
								***	American Goldfinch	1	0-50	-
								***	American Robin	2	100+	-
								***	Black-capped Chickadee	6	50-100	-
								***	Blue Jay	2	50-100	-
								***	Blue Jay	1	F/O SE-NW	-
								***	Golden-crowned Kinglet	6	0-50	-
								***	Mourning Dove	2	100+	-
								***	Purple Finch	2	0-50	-
								***	Red-breasted Nuthatch	1	100+	-
	Mill/TH2	0473219E, 5019219N	Shrub hardwoods, high proportion of yellow birch	<10 km/h	8	Clear	None	8:09 AM	American Goldfinch	5	0-50	-
								***	Blue Jay	2	0-50	-
								***	Blue Jay	2	50-100	-
								***	Hermit Thrush	1	0-50	-
								***	Magnolia Warbler	1	0-50	-
								***	Mourning Dove	2	100+	-
								***	Northern Flicker	1	F/O W-E	<100 m
								***	Palm Warbler	1	0-50	-
								***	Purple Finch	2	0-50	-
								***	White-throated Sparrow	6	0-50	-
	Mill/TH3	0473332E, 5018951N	Young hardwood	<10 km/h	8	Clear	None	8:38 AM	American Crow	4	100+	-
								***	American Goldfinch	2	50-100	-
								***	American Redstart	1	0-50	-
								***	Black-and-white Warbler	1	0-50	-
								***	Blackburnian Warbler	1	0-50	-
								***	Black-capped Chickadee	10	0-50	-
								***	Blackpoll Warbler	2	0-50	-
								***	Black-throated Green Warbler	2	0-50	-
								***	Blue Jay	1	0-50	-
								***	Blue Jay	2	50-100	-
								***	Blue-headed Vireo	3	0-50	-
								***	Common Loon	1	100+	-
								***	Magnolia Warbler	4	0-50	-
								***	Nashville Warbler	2	0-50	-
								***	Northern Parula	1	0-50	-

Table G7: Detailed Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Height for flyovers (m)
				Wind Speed and Direction	Temperature °C	Sky					
...	...	...	...	...	...	...	...	Purple Finch	2	50-100	-
...	...	...	...	...	...	...	...	Red-eyed Vireo	1	0-50	-
...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	2	0-50	-
...	...	...	...	...	...	...	...	White-throated Sparrow	6	50-100	-
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	0-50	-
...	Mill/TH4	0473341E, 5018660N	Young hardwood	<10 km/h	8	Clear	8:58 AM	American Crow	2	100+	-
...	...	...	...	...	...	...	...	Blackpoll Warbler	3	0-50	-
...	...	...	...	...	...	...	...	Dark-eyed Junco	7	0-50	-
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	4	0-50	-
...	Mill/TH5	0473185E, 5018431N	Young mixed	<10 km/h	8	Clear	9:15 AM	American Crow	4	100+	-
...	...	...	...	...	...	...	...	American Robin	1	100+	-
...	...	...	...	...	...	...	...	Purple Finch	2	0-50	-
...	...	...	...	...	...	...	...	Ruffed Grouse	2	0-50	-
...	Mill/TH9	0472984E, 50119881N	Young mixed	<10 km/h	8	Clear	9:49 AM	American Goldfinch	2	50-100	-
...	...	...	...	...	...	...	...	American Robin	2	0-50	-
...	...	...	...	...	...	...	...	American Robin	1	50-100	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	6	50-100	-
...	...	...	...	...	...	...	...	Blue Jay	2	50-100	-
...	...	...	...	...	...	...	...	Common Grackle	1	50-100	-
...	...	...	...	...	...	...	...	Purple Finch	2	0-50	-
...	Mill/TH10	0472736E, 5019990N	Young mixed	<10 km/h	8	Clear	10:06 AM	American Goldfinch	2	0-50	-
...	...	...	...	...	...	...	...	American Robin	1	0-50	-
...	...	...	...	...	...	...	...	Black-and-white Warbler	2	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	1	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	2	50-100	-
...	...	...	...	...	...	...	...	Dark-eyed Junco	8	0-50	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	4	0-50	-
...	...	...	...	...	...	...	...	Magnolia Warbler	3	0-50	-
...	...	...	...	...	...	...	...	Pileated Woodpecker	1	0-50	-
...	...	...	...	...	...	...	...	Purple Finch	4	0-50	-
...	...	...	...	...	...	...	...	Red-breasted Nuthatch	1	0-50	-
...	...	...	...	...	...	...	...	Ruby-throated Hummingbird	1	0-50	-
...	...	...	...	...	...	...	...	White-throated Sparrow	6	0-50	-
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	7	0-50	-
...	Mill/TH11	0472577E, 5020184N	Mid-aged mixed	<10 km/h	8	Clear	10:24 AM	American Crow	2	50-100	-
...	...	...	...	...	...	...	...	American Crow	2	100+	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	7	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	2	0-50	-
...	...	...	...	...	...	...	...	Magnolia Warbler	2	0-50	-
...	...	...	...	...	...	...	...	Northern Flicker	1	50-100	-
...	Mill/TH12	0472670E, 5020441N	Young hardwood	<10 km/h	8	Clear	10:41 AM	American Crow	4	100+	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	-
...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	2	50-100	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Magnolia Warbler	2	0-50	-

Table G7: Detailed Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Height for flyovers (m)
				Wind Speed and Direction	Temperature °C	Sky					
...	...	...	...	...	...	...	...	Purple Finch	2	50-100	-
...	MIII/TH8	0473319E, 5020050N	Young mixed	<10 km/h	8	Clear	11:15 AM	American Goldfinch	2	0-50	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	1	0-50	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Dark-eyed Junco	2	0-50	-
...	...	...	...	...	...	...	...	Mourning Dove	1	FO W-E	100 m
...	...	...	...	...	...	...	...	Red-breasted Nuthatch	1	0-50	-
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	0-50	-
October 5/2012	MIII/TH1	0474149E, 5022136N	Field, some standing mixedwoods	Calm	14	Overcast/ Fog	7:37 AM	American Crow	4	0-50	-
...	...	...	...	...	...	...	...	American Crow	2	100+	-
...	...	...	...	...	...	...	...	American Robin	7	0-50	-
...	...	...	...	...	...	...	...	Mourning Dove	1	100+	-
...	...	...	Shrub hardwoods, high proportion of yellow birch	Calm	14	Overcast/ Fog	7:53 AM	American Crow	4	0-50	-
...	MIII/TH2	0473219E, 5019219N	...	...	...	...	...	American Crow	2	100+	-
...	...	...	...	...	...	...	...	American Robin	7	0-50	-
...	...	...	...	...	...	...	...	Mourning Dove	1	100+	-
...	MIII/TH3	0473332E, 5018951N	Young hardwood	Calm	16	Overcast/ Fog	8:19 AM	American Robin	2	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Dark-eyed Junco	6	0-50	-
...	MIII/TH4	0473341E, 5018660N	Young hardwood	Calm	16	Overcast/ Fog	8:46 AM	American Crow	2	100+	-
...	...	...	...	...	...	...	...	American Robin	2	0-50	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	10	0-50	-
...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	1	50-100	-
...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	Boreal Chickadee	2	50-100	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Dark-eyed Junco	8	0-50	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	10	0-50	-
...	...	...	...	...	...	...	...	Purple Finch	2	0-50	-
...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	2	0-50	-
...	...	...	...	...	...	...	...	White-throated Sparrow	15	0-50	-
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	10	0-50	-
...	MIII/TH5	0473185E, 5018431N	Young mixed	Calm	16	Overcast/ Fog	9:07 AM	American Crow	3	50-100	-
...	...	...	...	...	...	...	...	American Crow	4	100+	-
...	...	...	...	...	...	...	...	Ruffed Grouse	1	0-50	-
...	MIII/TH6	0473155E, 5019500N	Young hardwood	Calm	16	Overcast/ Fog	9:30 AM	Blue Jay	2	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	2	50-100	-
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	-
...	MIII/TH7	0473243E, 5019782N	Young hardwood	Calm	16	Overcast/ Fog	9:44 AM	American Crow	4	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	4	0-50	-

Table G7: Detailed Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Height for flyovers (m)
				Wind Speed and Direction	Temperature °C	Sky					
...	...	...	...	...	...	...	...	Gray Jay	2	0-50	-
...	Mill/TH8	0473319E, 5020050N	Young mixed	Calm	16	Overcast/ Fog	10:25 AM	American Crow	16	100+	-
...	Mill/TH8	0473319E, 5020050N	...	...	...	...	...	American Goldfinch	2	50-100	-
...	...	...	...	...	...	...	...	Blue Jay	1	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	3	100+	-
...	...	...	...	...	...	...	...	Common Raven	2	100+	-
...	...	...	...	...	...	...	...	Dark-eyed Junco	6	0-50	-
...	...	...	...	...	...	...	...	Purple Finch	2	0-50	-
...	...	...	...	...	...	...	...	Ruffed Grouse	1	50-100	-
...	Mill/TH9	0472984E, 50119881N	Young mixed	Calm	16	Overcast/ Fog	10:49 AM	American Crow	1	0-50	-
...	...	...	...	...	...	...	...	American Crow	6	100+	-
...	...	...	...	...	...	...	...	American Robin	2	0-50	-
...	...	...	...	...	...	...	...	American Robin	12	50-100	-
...	...	...	...	...	...	...	...	Black-billed Cuckoo	1	0-50	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	20	0-50	-
...	...	...	...	...	...	...	...	Blackpoll Warbler	2	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	3	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	4	50-100	-
...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	Common Grackle	135	0-50	-
...	...	...	...	...	...	...	...	Common Grackle	6	50-100	-
...	...	...	...	...	...	...	...	Common Raven	2	0-50	-
...	...	...	...	...	...	...	...	Common Raven	2	100+	-
...	...	...	...	...	...	...	...	Common Yellowthroat	2	0-50	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	11	0-50	-
...	...	...	...	...	...	...	...	Herring Gull	1	100+	-
...	...	...	...	...	...	...	...	Pine Siskin	2	0-50	-
...	...	...	...	...	...	...	...	Red-winged Blackbird	60	FO SW to NW	100 m
...	...	...	...	...	...	...	...	Red-winged Blackbird	80	0-50	-
...	...	...	...	...	...	...	...	White-breasted Nuthatch	1	0-50	-
...	...	...	...	...	...	...	...	Yellow-rumped Warbler	3	0-50	-
...	Mill/TH10	0472736E, 5019990N	Young mixed	Calm	17	Overcast/ og	11:09 AM	American Crow	1	50-100	-
...	...	...	...	...	...	...	...	American Crow	2	100+	-
...	...	...	...	...	...	...	...	American Robin	6	0-50	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	5	50-100	-
...	...	...	...	...	...	...	...	Blue Jay	4	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	4	100+	-
...	...	...	...	...	...	...	...	Hermit Thrush	2	50-100	-
...	...	...	...	...	...	...	...	Purple Finch	4	50-100	-
...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	-
...	...	...	...	...	...	...	...	White-throated Sparrow	6	50-100	-
...	Mill/TH12	0472670E, 5020441N	...	Calm	17	Overcast/ og	11:23 AM	American Robin	11	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	2	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	2	50-100	-
...	...	...	...	...	...	...	...	Dark-eyed Junco	4	0-50	-
...	...	...	...	...	...	...	...	Pileated Woodpecker	1	0-50	-
...	...	...	...	...	...	...	...	Swinson's Thrush	2	0-50	-

Table G7: Detailed Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Precipitation	Time	Species	Number Observed	Distance to Observer (m)	Height for flyovers (m)
				Wind Speed and Direction	Temperature °C	Sky	Wind						
October 24/2012	Mill/TH24	473305E, 5018563N	Young Hardwood	10 km/h W	5	Partical Cloudy	10 km/h W	None	8:00 AM	American Crow	1	100+	-
...	...	...	...	...	...	...	...	...	...	White-throated Sparrow	7	0-50	-
...	...	...	...	...	...	...	...	...	...	Black-capped Chickadee	3	0-50	-
...	...	...	...	...	...	...	...	...	...	Blue Jay	1	F/O E-W	-
...	...	...	...	...	...	...	...	...	...	Brown Creeper	1	0-50	-
...	...	...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	...	...	Downy Woodpecker	1	0-50	-
...	...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	3	0-50	-
...	...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	-
...	...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	100+	-
...	...	...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100	-
...	...	...	...	...	...	...	...	...	...	American Crow	3	100+	-
...	...	...	...	...	...	...	...	...	...	Black-capped Chickadee	4	0-50	-
...	...	...	...	...	...	...	...	...	...	Evening Grosbeak	1	100+	-
...	...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	3	0-50	-
...	...	...	...	...	...	...	...	...	...	Pine Siskin	1	0-50	-
...	...	...	...	...	...	...	...	...	...	Red-breasted Nuthatch	1	0-50	-
...	...	...	...	...	...	...	...	...	...	Rose-breasted Grosbeak	2	50-100	-
...	...	...	...	...	...	...	...	...	...	Rose-breasted Grosbeak	1	0-50	-
...	...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	-
...	...	...	...	...	...	...	...	...	...	Brown Creeper	1	0-50	-
...	...	...	...	...	...	...	...	...	...	Common Raven	2	100+	-
...	...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	3	0-50	-
...	...	...	...	...	...	...	...	...	...	American Crow	1	100+	-
...	...	...	...	...	...	...	...	...	...	Common Raven	1	0-50	-
...	...	...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	-
...	...	...	...	...	...	...	...	...	...	Black-capped Chickadee	4	0-50	-
...	...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	2	0-50	-
...	...	...	...	...	...	...	...	...	...	Ruffed Grouse	3	50-100	-
...	...	...	...	...	...	...	...	...	...	American Crow	1	100+	-
...	...	...	...	...	...	...	...	...	...	Common Raven	2	50-100	-
...	...	...	...	...	...	...	...	...	...	Pine Grosbeak	2	50-100	-
...	...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	...	...	Brown Creeper	1	50-100	-
...	...	...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	...	...	Common Raven	1	0-50	-
...	...	...	...	...	...	...	...	...	...	Downy Woodpecker	1	50-100	-

Table G7: Detailed Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Height for flyovers (m)
				Wind Speed and Direction	Temperature °C	Sky					
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	4	0-50	-
...	...	...	...	...	...	...	...	Red-breasted Nuthatch	1	50-100	-
...	Mill/TH19	473488E, 5018282N	Regenerating Cutblock	10 km/h W	6	Partly Cloudy	10:44 AM	American Crow	1	100+	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	2	50-100	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	-
...	...	...	...	...	...	...	...	Brown Creeper	1	50-100	-
...	...	...	...	...	...	...	...	Common Raven	2	50-100	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	3	50-100	-
...	...	...	...	...	...	...	...	White-winged Crossbill	2	0-50	-
...	...	...	...	...	...	...	...	American Goldfinch	2	100+	-
...	Mill/TH20	473275E, 5018249N	Regenerating Cutblock Fir dominated	15 km/h W gusts 25 km/h	6	Partly Cloudy	11:06 AM	Black-capped Chickadee	3	50-100	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Downy Woodpecker	1	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100	-
...	...	...	...	...	...	...	...	Pine Grosbeak	1	50-100	-
...	...	...	...	...	...	...	...	White-winged Crossbill	4	F/O NW-SE	-
...	Mill/TH21	473287E, 5017963N	Windfall hardwood stand	15 km/h W gusts 25 km/h	6	Partly Cloudy	11:27 AM	American Crow	1	100+	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Pine Grosbeak	3	0-50	-
November 5/2012	Mill/TH9	0472984E, 50119881N	Young mixed	Calm	5	Cloudy	7:14 AM	American Crow	2	100+	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	4	50-100	-
...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	0-50	-
...	...	...	...	...	...	...	...	Herring Gull	1	F/O W	-
...	...	...	...	...	...	...	...	Pileated Woodpecker	1	100+	-
...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	-
...	...	...	...	...	...	...	...	White-winged Crossbill	2	100+	-
...	...	...	...	...	...	...	...	American Crow	3	100+	-
...	Mill/TH10	0472736E, 5019990N	Young mixed	Calm	5	Cloudy	7:30 AM	American Goldfinch	2	100+	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	7	100+	-
...	...	...	...	...	...	...	...	Blue Jay	2	100+	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	-
...	...	...	...	...	...	...	...	Downy Woodpecker	2	100+	-
...	...	...	...	...	...	...	...	Ruffed Grouse	1	0-50	-
...	...	...	...	...	...	...	...	White-winged Crossbill	2	100+	-
...	...	...	...	...	...	...	...	American Crow	2	100+	-
...	Mill/TH11	0472577E, 5020184N	Mid-aged mixed	Calm	5	Cloudy	7:51 AM	Black-capped Chickadee	3	50-100	-
...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	Blue Jay	3	0-50	-
...	...	...	...	...	...	...	...	Common Raven	2	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100	-

Table G7: Detailed Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Height for flyovers (m)
				Wind Speed and Direction	Temperature °C	Sky					
...	...	...	...	...	...	...	...	Pileated Woodpecker	1	100+	-
...	...	...	...	...	...	...	...	Song Sparrow	1	50-100	-
...	...	...	...	...	...	...	...	White-winged Crossbill	2	100+	-
...	Mill/TH12	0472670E, 5020441N	Young hardwood	Calm	5	Partly Cloudy	8:07 AM	American Crow	3	100+	-
...	...	...	...	...	...	...	...	Blue Jay	2	0-50	-
...	...	...	...	...	...	...	...	Boreal Chickadee	1	0-50	-
...	...	...	...	...	...	...	...	Dark-eyed Junco	1	0-50	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	2	0-50	-
...	...	...	...	...	...	...	...	Hairy Woodpecker	1	0-50	-
...	...	...	...	...	...	...	...	Pileated Woodpecker	2	100+	-
...	...	...	...	...	...	...	...	American Goldfinch	1	100+	-
...	Mill/TH6	0473155E, 5019500N	Young hardwood	Calm	7	Mainly Sunny	8:40 AM	Black-capped Chickadee	3	50-100	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	3	100+	-
...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	0-50	-
...	...	...	Shrub hardwoods, high proportion of yellow birch	Calm	7	Mainly Sunny	8:58 AM	American Crow	21	F/O N	-
...	Mill/TH2	0473219E, 5019219N	...	...	...	...	...	American Goldfinch	1	F/O E	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	0-50	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	2	50-100	-
...	...	...	...	...	...	...	...	White-winged Crossbill	1	F/O S	-
...	...	...	...	...	...	...	...	American Crow	5	100+	-
...	Mill/TH3	0473332E, 5018951N	Young hardwood	Calm	7	Mainly Sunny	9:13 AM	American Robin	1	100+	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	4	50-100	-
...	...	...	...	...	...	...	...	Brown Creeper	1	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	2	50-100	-
...	...	...	...	...	...	...	...	American Crow	5	100+	-
...	Mill/TH4	0473341E, 5018660N	Young hardwood	Calm	7	Mainly Sunny	9:27 AM	American Goldfinch	2	F/O NE	-
...	...	...	...	...	...	...	...	Blue Jay	1	0-50	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	4	0-50	-
...	...	...	...	...	...	...	...	White-winged Crossbill	2	100+	-
...	...	...	...	...	...	...	...	American Goldfinch	1	100+	-
...	Mill/TH7	0473243E, 5019782N	Young hardwood	Calm	9	Mainly Cloudy	9:52 AM	Black-capped Chickadee	2	50-100	-
...	...	...	...	...	...	...	...	Blue Jay	3	100+	-
...	...	...	...	...	...	...	...	American Crow	1	100+	-
...	Mill/TH8	0473319E, 5020050N	Young mixed	Calm	9	Mainly Cloudy	10:08 AM	Black-capped Chickadee	4	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	1	50-100	-
...	...	...	...	...	...	...	...	Blue Jay	2	100+	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	100+	-
...	...	...	...	...	...	...	...	Pine Grosbeak	1	100+	-
...	...	...	...	...	...	...	...	Ruffed Grouse	1	0-50	-

Table G7: Detailed Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions			Time	Species	Number Observed	Distance to Observer (m)	Height for flyovers (m)
				Wind Speed and Direction	Temperature °C	Sky					
...	Mill/TH5	0473185E, 5018431N	Young mixed	Calm	9	Mainly Cloudy	10:42 AM	American Crow	2	F/O E	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	1	100+	-
...	...	...	...	...	...	...	...	Brown Creeper	1	50-100	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100	-
November 15/2012	Mill/TH24	473305E, 5018563N	Young Hardwood	25 km/h N (Gusts 40 km/h stopped survey for 2 minutes)	5	Overcast	7:30 AM	Golden-crowned Kinglet	1	50-100	-
...	...	...	...	...	...	...	...	Pine Grosbeak	10	F/O SW	-
...	...	...	...	...	...	...	...	Ruffed Grouse	1	0-50	-
...	...	...	...	...	...	...	...	Pine Grosbeak	1	100+	-
...	Mill/TH23	473158E, 5018392N	Young Hardwood	20 km/h N (Gust 35 km/h stopped survey for one minute)	5	Mainly Cloudy	7:49 AM	Black-capped Chickadee	4	0-50	-
...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	Mill/TH22	473039E, 5018225N	Young mixed wood	20 km/h N	5	Mainly Cloudy	8:04 AM	White-winged Crossbill	3	F/O E-W	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	0-50	-
...	...	...	...	...	...	...	...	Ruffed Grouse	1	0-50	-
...	Mill/TH15	473096E, 5017936N	Young hardwood	20 km/h N (Gust 35 km/h stopped survey for one minute)	5	Mainly Cloudy	8:21 AM	Golden-crowned Kinglet	1	0-50	-
...	...	...	...	...	...	...	...	Ruffed Grouse	1	0-50	-
...	...	...	...	...	...	...	...	American Crow	2	100+	-
...	Mill/TH13	473105E, 5017743N	Young Mixedwood	20 km/h N (Gust 35 km/h stopped survey for one minute)	5	Mainly Cloudy	8:37 AM	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	Common Raven	2	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	0-50	-
...	...	...	...	...	...	...	...	White-winged Crossbill	1	100+	-
...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	-
...	Mill/TH14	473348E, 5017645N	Mixedwood	20 km/h N (Gust 35 km/h stopped survey for two minutes)	5	Mainly Cloudy	8:58 AM	Blue Jay	2	100+	-
...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Downy Woodpecker	1	0-50	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	2	0-50	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100	-
...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	Mill/TH16	473563E, 5017826N	Softwood/Stream	15 km/h N (Gusts 40 km/h stopped survey for a minute)	5	Mainly Cloudy	9:21 AM	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	2	0-50	-
...	...	...	...	...	...	...	...	Pine Grosbeak	1	F/O NE	-
...	...	...	...	...	...	...	...	American Crow	1	100+	-
...	Mill/TH17	473487E, 5018013N	Sugar maple mid- mature	15 km/h N	5	Mainly Cloudy	9:38 AM	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	Blue Jay	1	100+	-

Table G7: Detailed Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Species	Number Observed	Distance to Observer (m)	Height for flyovers (m)
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	...	...	...	...	...	...	...	...	Blue Jay	1	F/O N-S	-
...	Mill/TH18	473389E, 5018413N	Mixedwood	25 km/h N (Gust 40 km/h stopped survey for 3 minutes)	5	Mainly Cloudy	None	9:54 AM	American Crow	1	100+	-
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	100+	-
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100	-
...	...	...	...	...	...	...	...	...	White-winged Crossbill	1	F/O NW-SE	-
...	...	...	...	...	...	...	...	...	White-winged Crossbill	3	F/O E-W	-
...	...	...	...	25 km/h N (Gust 40 km/h stopped survey for 3 minutes)	5	Mainly Cloudy	None	10:12 AM	No Birds Observed	...	...	-
...	Mill/TH19	473488E, 5018282N	Regenerating Cutblock	25 km/h N (Gust 40 km/h stopped survey for 3 minutes)	5	Sun and Cloud	None	10:32 AM	American Crow	1	F/O NW-SE	-
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100	-
...	Mill/TH20	473275E, 5018249N	Regenerating Cutblock Fir dominated	...	...	...	...	...	White-winged Crossbill	4	F/O NW-SE	-
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	4	100+	-
...	Mill/TH21	473287E, 5017963N	Windfall hardwood stand	20 km/h N	5	Sun and Cloud	None	11:10 AM	Blue Jay	1	100+	-
...	...	...	...	...	...	...	...	...	Common Raven	1	100+	-
...	...	...	...	...	...	...	...	...	Evening Grosbeak	1	100+	-
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	2	100+	-
...	...	...	...	...	...	...	...	...	Pine Grosbeak	2	100+	-
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	0-50	-
...	...	...	...	...	...	...	...	...	White-winged Crossbill	2	100+	-

Table G8: Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	Number of Observations	Number of Individuals Observed
American Crow	<i>Corvus brachyrhynchos</i>	Not Listed	Not Listed	Not Listed	Green	40	134
American Goldfinch	<i>Spinus tristis</i>	Not Listed	Not Listed	Not Listed	Green	13	25
American Redstart	<i>Setophaga ruticilla</i>	Not Listed	Not Listed	Not Listed	Green	1	1
American Robin	<i>Turdus migratorius</i>	Not Listed	Not Listed	Not Listed	Green	15	58
Black-and-white Warbler	<i>Mniotilta varia</i>	Not Listed	Not Listed	Not Listed	Green	2	3
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	Not Listed	Not Listed	Not Listed	Red	1	1
Blackburnian Warbler	<i>Dendroica fusca</i>	Not Listed	Not Listed	Not Listed	Green	1	1
Black-capped Chickadee	<i>Poecile atricapillus</i>	Not Listed	Not Listed	Not Listed	Green	31	132
Blackpoll Warbler	<i>Dendroica striata</i>	Not Listed	Not Listed	Not Listed	Yellow	3	7
Black-throated Green Warbler	<i>Dendroica virens</i>	Not Listed	Not Listed	Not Listed	Green	3	4
Blue Jay	<i>Cyanocitta cristata</i>	Not Listed	Not Listed	Not Listed	Green	50	84
Blue-headed Vireo	<i>Vireo solitarius</i>	Not Listed	Not Listed	Not Listed	Green	1	3
Boreal Chickadee	<i>Poecile hudsonicus</i>	Not Listed	Not Listed	Not Listed	Yellow	2	3
Brown Creeper	<i>Certhia americana</i>	Not Listed	Not Listed	Not Listed	Green	6	6
Common Grackle	<i>Quiscalus quiscula</i>	Not Listed	Not Listed	Not Listed	Green	3	142
Common Loon	<i>Gavia immer</i>	Not Listed	Not Listed	Not at Risk	Red	1	1
Common Raven	<i>Corvus corax</i>	Not Listed	Not Listed	Not Listed	Green	32	40
Common Yellowthroat	<i>Geothlypis trichas</i>	Not Listed	Not Listed	Not Listed	Green	1	2
Dark-eyed Junco	<i>Junco hyemalis</i>	Not Listed	Not Listed	Not Listed	Green	9	43
Downy Woodpecker	<i>Picoides pubescens</i>	Not Listed	Not Listed	Not Listed	Green	5	6
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Not Listed	Not Listed	Not Listed	Green	2	2
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Not Listed	Not Listed	Not Listed	Yellow	33	84
Gray Jay	<i>Perisoreus canadensis</i>	Not Listed	Not Listed	Not Listed	Yellow	1	2
Hairy Woodpecker	<i>Picoides villosus</i>	Not Listed	Not Listed	Not Listed	Green	1	1
Hermit Thrush	<i>Catharus guttatus</i>	Not Listed	Not Listed	Not Listed	Green	2	3
Herring Gull	<i>Larus argentatus</i>	Not Listed	Not Listed	Not Listed	Green	2	2
Magnolia Warbler	<i>Dendroica magnolia</i>	Not Listed	Not Listed	Not Listed	Green	5	12
Mourning Dove	<i>Zenaidura macroura</i>	Not Listed	Not Listed	Not Listed	Green	6	9
Nashville Warbler	<i>Vermivora ruficapilla</i>	Not Listed	Not Listed	Not Listed	Green	1	2
Northern Flicker	<i>Colaptes auratus</i>	Not Listed	Not Listed	Not Listed	Green	3	3
Northern Parula	<i>Parula americana</i>	Not Listed	Not Listed	Not Listed	Green	1	1
Palm Warbler	<i>Dendroica palmarum</i>	Not Listed	Not Listed	Not Listed	Green	2	2
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Not Listed	Not Listed	Not Listed	Green	5	6
Pine Grosbeak	<i>Pinicola enucleator</i>	Not Listed	Not Listed	Not Listed	Red	8	21
Pine Siskin	<i>Spinus pinus</i>	Not Listed	Not Listed	Not Listed	Yellow	2	3
Purple Finch	<i>Carpodacus purpureus</i>	Not Listed	Not Listed	Not Listed	Green	11	26
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Not Listed	Not Listed	Not Listed	Green	5	5
Red-eyed Vireo	<i>Vireo olivaceus</i>	Not Listed	Not Listed	Not Listed	Green	1	1
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Not Listed	Not Listed	Not Listed	Green	2	140
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Not Listed	Not Listed	Not Listed	Yellow	2	3

Table G8: Fall Bird Survey Results Summary, Millbrook/Truro Heights Community Wind Projects Project # 12-4328/12-4544

Common Name	Scientific Name	SARA Status	NESA Status	COSEWIC Status	NSDNR Status	Number of Observations	Number of Individuals Observed
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Not Listed	Not Listed	Not Listed	Yellow	2	4
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Not Listed	Not Listed	Not Listed	Green	1	1
Ruffed Grouse	<i>Bonasa umbellus</i>	Not Listed	Not Listed	Not Listed	Green	11	14
Song Sparrow	<i>Melospiza melodia</i>	Not Listed	Not Listed	Not Listed	Green	1	1
Swainson's Thrush	<i>Catharus ustulatus</i>	Not Listed	Not Listed	Not Listed	Green	1	2
White-breasted Nuthatch	<i>Sitta carolinensis</i>	Not Listed	Not Listed	Not Listed	Green	1	1
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Not Listed	Not Listed	Not Listed	Green	8	56
White-winged Crossbill	<i>Loxia leucoptera</i>	Not Listed	Not Listed	Not Listed	Green	13	29
Yellow-rumped Warbler	<i>Dendroica coronata</i>	Not Listed	Not Listed	Not Listed	Green	11	35

APPENDIX H
ARIA RESPONSE LETTER FROM NS COMMUNITIES,
CULTURE AND HERITAGE



**Communities,
Culture & Heritage**

1747 Summer Street
Halifax, Nova Scotia
B3H 3A6

Tel: (902) 424-6475
Fax: (902) 424-0560

April 29, 2013

Ms. April MacIntyre
Davis, MacIntyre and Associates
109 John Stewart Drive
Cole Harbour, NS B2W 4J7

Dear Ms. MacIntyre:

**RE: Heritage Research Permit Report
A2012NS088- Millbrook Wind Farm**

We have received and reviewed your report on work conducted under the terms of Heritage Research Permit A2012NS088 of an archaeological resource impact assessment of the proposed Millbrook and Truro Heights Community Wind Farms, Colchester County.

The report details the archaeological resource impact assessment of the proposed 5 turbine project area for the combined Millbrook Community and Truro Heights Community Wind Project by Davis, MacIntyre & Associates in October 2012. The assessment included background and historical research as well as field reconnaissance of the proposed project area in order to determine the potential for archaeological resources.

The assessment of the proposed Millbrook Community Wind Project area indicated that although First Nations and later, Acadians, were in the wider area, there is no indication that they were present in the study area. First Nations peoples would not have had access to the necessary resources or transportation routes in the study area that the Bay would have afforded them. The Acadians would have had little reason to settle away from the fertile marshland and move to the rocky soil characteristic of the study area. Roads in to the uplands were not present until 1902. The reconnaissance indicated that the study area was largely logged throughout the later quarter of the 20th century and no evidence of pre-contact or historic archaeological activity was observed. Note that though archaeological resources are unlikely to exist on the west side of Soley Brook in the area that could not be surveyed, it is recommended that this area be surveyed prior to construction when a center line has been cut or the blow down removed. It is also noted, that a preliminary project footprint was assessed. Should the project footprint divert from that which was investigated during the assessment, it is recommended that the area be subjected to an archaeological reconnaissance.

The assessment of the proposed Truro Heights Community Wind Project area indicated that although First Nations and later, Acadians, were in the wider area, there is no indication that they were present in the study area. First Nations peoples would not have had access to the necessary resources or transportation routes in the study area that the Bay would have afforded them. The Acadians would have had little reason to settle away from the fertile marshland and move to the rocky soil characteristic of the study area. Roads in to the uplands were not present until 1902. The reconnaissance indicated that the study area was largely logged throughout the later quarter of the 20th century and no evidence of pre-contact or historic archaeological activity was observed. Note that a preliminary project footprint was assessed. Should the project footprint divert from that which was investigated during the assessment, it is recommended that the area be subjected to an archaeological reconnaissance.

A. MacIntyre
April 29, 2013
Page 2

Overall, the study area was determined to be of low archaeological potential for both First Nations and Euro-Canadian resources therefore no further mitigation is recommended for the current proposed turbine sites. The only cultural activity near the study area was located along north along Soley and McNutt's Brooks where sawmills and related camps were established and to the south where a single building, possibly a camp related to gypsum extraction, were located. Should the project footprint divert from the footprint that was surveyed at the time of the reconnaissance, it is recommended that these areas be surveyed by a qualified archaeologist to ensure that no archaeological resources are present or will be impacted by construction. Finally, in the unlikely event that archaeological resources are encountered during construction, it is required that all activity cease and the Coordinator of Special places be contacted. Staff agree with the recommendations, and find the report acceptable as submitted. If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,



Laura Bennett
Coordinator, Special Places

cc. Andy Walter, Strum Environmental

APPENDIX I
MI'KMAQ ECOLOGICAL KNOWLEDGE STUDY

**A MI'KMAQ HISTORICAL AND ECOLOGICAL
KNOWLEDGE STUDY FOR:
MILLBROOK WIND FARM**

SUBMITTED BY:



NEXUS Coastal Resource Management
103-287 Lacewood Drive, Suite 222
Halifax, NS
B3M 3Y7

April 30, 2013



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1 INTRODUCTION

1.1 Indigenous Knowledge and Knowledge Systems

The collective rights of Indigenous Peoples have gained an increased recognition at the international level over the past 25 years. The International Labor Organization Convention-169 recognized the right of Indigenous Peoples to take control over their own institutions, way of life and economic development, as well as to maintain and develop their culture (ILO, 1989). More recently, the United Nations Declaration on the Rights of Indigenous Peoples set out the individual and collective rights of Indigenous Peoples as well as their rights to culture, identity, language, employment, health, education and other issues (UN, 2008). Indigenous knowledge is an integral component of the Indigenous rights movement. Knowledge manifests itself in the Indigenous community's language, identity and culture.

Indigenous Knowledge (IK)¹ fuses the cultural, social and ecological histories of a community. In general, IK systems assume that people are part of the land, they do not own the land and are instead stewards of the land. IK is dynamic, based upon an intimate understanding of the components of non-living (abiotic) and living (biotic) environments. The knowledge is owned by Indigenous Peoples, which differs between peoples. IK is based on four principles (Singh, 2007):

1. IK is dynamic in nature.
2. IK is tradition based: the way in which knowledge is created, preserved and disseminated.
3. IK is collective in nature and is often considered to be the property of the community.
4. IK is transferred through cultural specific transmission mechanisms².

The use of IK has been the subject of international discourse. Growing recognition of the limitations of conventional science in solving ecological problems of increasing complexity and magnitude has turned focus back to IK. IK systems are based on the shared experiences, customs, values, traditions, lifestyles, social interactions and spiritual beliefs specific to Indigenous communities. These systems are forever evolving as new knowledge is obtained or generated.

Over the years, the use of Indigenous Traditional Knowledge (ITK) in Environmental Assessments, Environmental Impact Statements and co-management agreements has

¹ Other phrases for Indigenous Knowledge (IK) include Aboriginal Knowledge (AK), Indigenous Traditional Knowledge (ITK) and Aboriginal Traditional Knowledge (ATK).

² Mechanisms include but are not limited to storytelling, ceremonies, dances, traditions, arts and crafts, hunting and trapping, beliefs, medicines, innovations



increased substantially. IK is an accumulation of multiple knowledge sources, one of which is 'Traditional Ecological Knowledge'³ (TEK) (Stevenson, 1996).

IK studies differ from TEK studies in such that IK includes spiritual, cultural and environmental components in the study, while TEK focuses on the environmental knowledge of an Indigenous Nation. TEK studies have been designed to parallel the western science discipline of ecology (Simpson, 2001). Constructing IK into TEK is a process of 'scientizing' IK for use in Western society. A properly designed TEK includes viewing IK as worldviews, values and processes (Simpson, 2001). It is important to include the context in which gives the knowledge its meaning.

The increased awareness and application of IK through TEK studies in non-indigenous society has brought both opportunities and challenges for Indigenous Nations. Meaningful use of IK can provide Indigenous Nations leverage in pursuing both political and property rights (Stevenson, 1996). With the increased use of IK particular attention has been directed to protect and preserve this knowledge from misappropriation, misuse and theft. Of particular concern to Indigenous Peoples has been the unlicensed use by industry, researchers, artists and authors of traditional knowledge that has been developed over centuries (AFN, n.d.).

In Canada, the application of IK in collaboration with the western approach to resource management has occurred primarily through committees and IK studies. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) established an Aboriginal Traditional Knowledge⁴ Sub-Committee to facilitate access to and gathering of available IK as well as the incorporation of this knowledge into the COSEWIC species assessment process (COSEWIC, 2012). Section 16.1 of the *Canadian Environmental Assessment Act*, 2012, provides authorities the discretion to consider IK in an Environmental Assessment.

In Nova Scotia an IK study is referred to as Mi'kmaq Ecological Knowledge study (MEKs).

1.2 The Mi'kmaq Nation

Since time immemorial, Mi'kmaq have used and occupied their traditional territory known as *Mi'kma'ki*, which includes Nova Scotia, Prince Edward Island, New Brunswick, parts of Quebec, Newfoundland and the northeastern parts of Maine. Archaeological sites in Nova Scotia provide evidence of Mi'kmaq occupation for over 10,500 years (Assembly of Nova Scotia Mi'kmaq Chiefs, 2007).

Mi'kma'ki is identified through its seven districts: *Kespukwitk*, *Sikepne'katik*, *Eski'kewaq*, *Unama'kik*, *Piktuk aqq Epetwitk*, *Sikniktewaq* and *Kespe'kewaq* (Figure 1). Mi'kmaw names for the seven districts came from the geographical characteristics of the area. Traditional socio-political organization consisted of hereditary Local, District and Grand

³ A review of traditional knowledge sources can be found in Stevensn (1996).

Chiefs. The Local Chief took care of village affairs in a district with advice from a council of Elders. The District Chief presided over all the Local Chiefs in a given district, while the Grand Chief assigned fishing and hunting privileges and was the official spokesperson for the Mi'kmaq Nation. The Grand Chief has the authority to make treaties with other First Nations and governments. Presently, the Grand Chief and Council (Grand Council) are located in *Unama'kik*.

There are 13 Mi'kmaq Bands in Nova Scotia, each occupying specific areas of land, known as reserves. As set forth in the *Indian Act, 1951*, each Band is led by a Chief and Council.

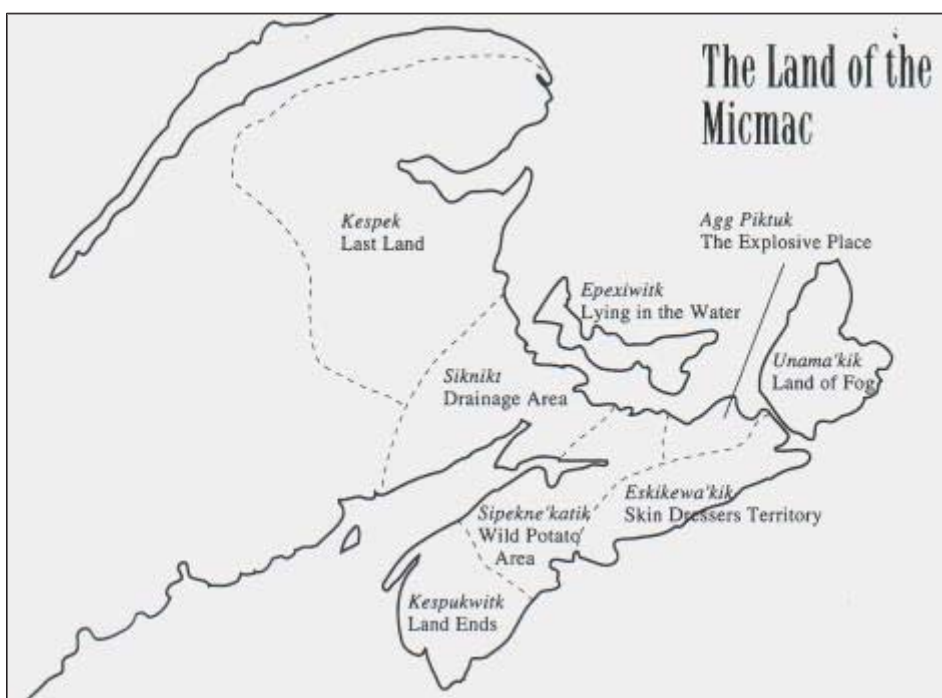


Figure 1: Traditional Mi'kmaq Districts (from <http://www.danielnpaul.com/Map-Mi'kmaqTerritory.html>)

1.3 Mi'kmaq Ecological Knowledge

The Mi'kmaq approach to resource management is best defined through the word, *Netukulimk*. *Netukulimk* describes the relationship between Mi'kmaq and the Creator in which the Mi'kmaq use the resources provided by the Creator for self-support and wellbeing of the individual and community. *Netukulimk* is achieving adequate standards of community nutrition and economic well-being without jeopardizing the integrity, diversity, or productivity of the environment (UINR, 2011). Simply put, one takes only what he or she needs from the environment to provide a livelihood. *Netukulimk* is expressed through the performance of rituals and the keeping of customary practices (Prosper et al., 2011). While some have argued that the eventual dominance of British



colonial rule eroded traditional Mi'kmaq worldviews, there is strong evidence that Mi'kmaq harvests are still governed by *Netukulimk* principles (Prosper et al., 2011).

Mi'kmaq, like many Indigenous Nations, incorporate cultural and social attributes along with sustenance in resource management. A case study provides insight into the Mi'kmaq relationship with *Ka't* (American Eel- *Anguilla rostrata*) (Davis et al., 2004). Mi'kmaq would spend the winter months near Antigonish, Nova Scotia fishing for *Ka't*. Mi'kmaq use *Ka't* for food, and it is considered to have spiritual qualities as evident by its frequent appearance in many legends and its use as ceremonial offerings. *Ka't* was also used medicinally as the skin was used as braces and bandages.

Mi'kmaq and Western (Post-Colonial) approaches to resource management are different. This difference can be attributed to Mi'kmaq and Western views of the environment.

In the Mi'kmaq culture, it is understood that *Mi'kma'ki* is held in communal ownership and does not belong to a particular person as it is believed that the land was inherited from their ancestors and would be passed on to their children (Berneshawi, 1997). Natural resources, renewable or non-renewable are considered as gifts from the Creator and therefore can neither be owned nor sold (Lyons, 1984 in Berneshawi, 1997). Similarly, neither the land nor its resources are viewed as commodities. In contrast Western approaches to resource management employ the control and ownership of land and resources. In Canada, it is understood that the Crown, represented by the federal government owns resources (renewable and non-renewable), lands and waters that fall within state boundaries. The federal government facilitates access to the resources and land through a series of licenses and agreement made between federal departments and individuals or corporations. In the Western approach to resource management, these assets are viewed as commodities that can be sold for profit.

In 2008, the Assembly of Nova Scotia Mi'kmaq Chiefs adopted a Mi'kmaq Ecological Knowledge Study protocol which described MEK as a term that "refers to any knowledge relating to the environment including water, land and resources" (MRI, 2008, 1). This knowledge can be cultural, spiritual or ecological. The concept of MEK is not static, but is instead derived from the cumulative experiences of the Mi'kmaq people, based in their traditional territory. In this manner MEK considers and incorporates emerging resource issues. It is therefore important for any MEKS to accurately include Mi'kmaq knowledge of the affected resources, lands and waters in order to understand the relationship between the Mi'kmaq and the project area. As discussed above (section 1.1), a MEKS must describe the cultural, spiritual and ecological relationship of Mi'kmaq with the proposed project site.

1.4 Project Study Areas

Mi'kmaq Ecological Knowledge studies for four wind farms: Millbrook, Truro Heights, Whynott's Settlement and Pockwock are being conducted simultaneously. NEXUS Coastal Resource Management has been engaged to conduct Mi'kmaq Ecological Knowledge Study for the four Study Areas. The proposed wind turbine farms are located in two Mi'kmaq Districts: *Kespukwitk* and *Sikepne'katik*

This report deals with the specifics of the Millbrook wind farm. The Millbrook and Truro Heights wind farms are being developed collaboratively.

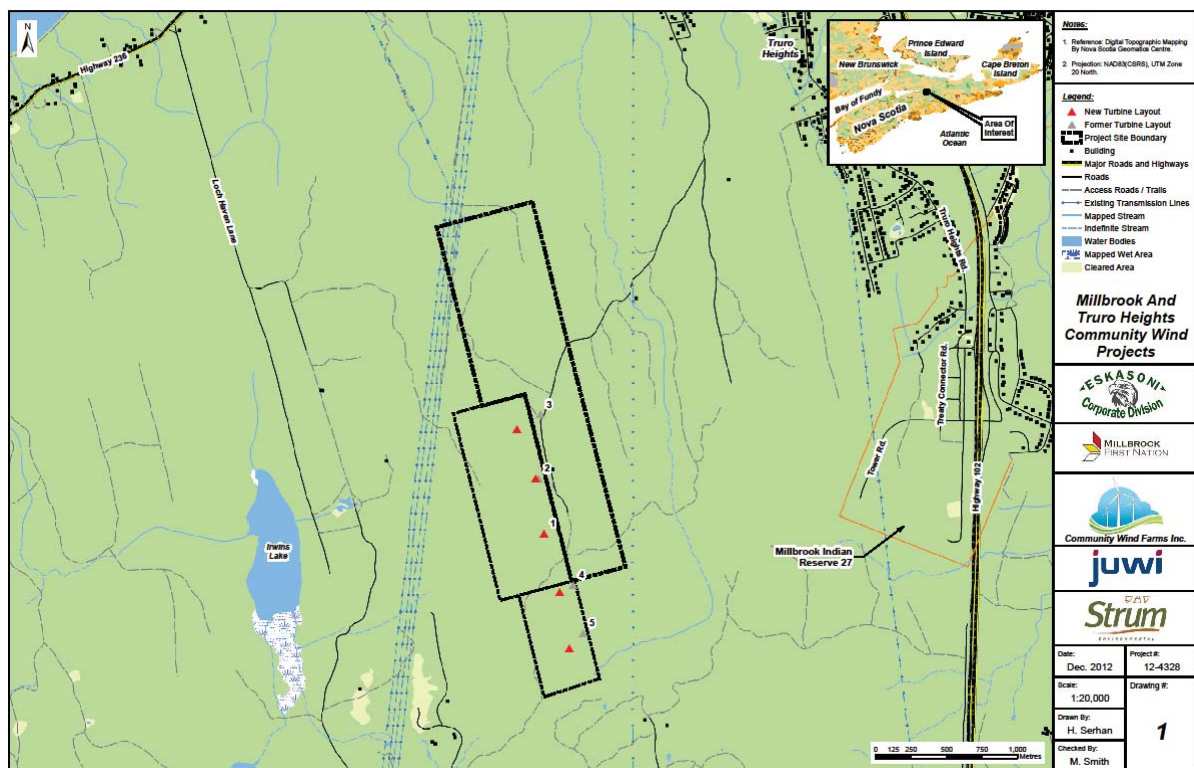


Figure 2: Proposed wind farm in Millbrook, NS



2 BACKGROUND

2.1 Historical Context

Traditionally the Mi'kmaq Nation was a member of the Wabanaki Confederacy, a loose coalition that included the Maliseets, the Pasamaquoddy, the Penobscots, Wonenock and the Eastern and Western Abenakis (Berneshawi, 1997). The Confederacy influenced tribal life from the Gaspé Peninsula to northern New England. The Confederacy continued to function until the early 1700s, at which time the decimation of its member nations by disease and war with the English caused it to become dormant (Paul, 2006).

Traditional Mi'kmaq social structure consisted of a matrilineal, egalitarian and is family centered with living with extended family being common place (Berneshawi, 1997). The strong family connection ensured that the needs of a community were put ahead of individuals. Sharing and the communal use of resources were important for the survival of the Mi'kmaq. There was no hierarchy authority amongst Mi'kmaq. Decision making was made through a consensus approach. The daily life of the Mi'kmaq centered on finding and preparing food, and the sharing of wealth among members of the village (CMM, 2007). Mi'kmaq depended on their knowledge of the seasons, weather, animals, plants and hunting and preparation skills for survival. This knowledge was passed down from generation to generation. Mi'kmaq education included the teaching of traditional hunting skills, construction techniques, food preparation, etc. Traditional teachings, stories, and histories were collected and passed on through an oral tradition.

Archaeological evidence and oral histories suggest that Mi'kmaq travelled to various camps throughout the year. The proportion of terrestrial mammals, marine mammals, fish and shellfish vary greatly across sites and occupations indicating that Mi'kmaq used camps for specific uses (Barsh, 2002).

In the early 1500s, European fishermen travelled to the coasts of North America to fish the Grand Banks off Newfoundland. These fishermen would occasionally come to shore to dry the fish they caught. In the late 1500s a fur trade between Mi'kmaq and Europeans was established and Europeans begun to create settlements throughout *Mi'kma'ki*.

Prior to the fur trade with Europeans, the Mi'kmaq diet consisted largely of meat, animal fat, fish, berries and nuts and broth (Miller, 1976; Krieger, 2002). Mi'kmaq undertook seasonal migrations which aligned with food sources: wild berries, tubers, nuts and herbs (also used for medicine). During the summer months Mi'kmaq lived in coastal villages to harvest seafood and berries; during the winter months they dispersed into smaller bands and moved inland to hunt big game and fish in the rivers. In addition to being used as food, Mi'kmaq used plants for cures and prevention for many common



ailments (UINR, 2010). The fur trade brought non-traditional foods to the Mi'kmaq in exchange for fur. Trade would have included dried peas, corn, beans, prunes, and wheat flour among other things (Miller, 1976).

The 1600s and 1700s were marked by a series of wars between the French and British. These wars often included alliances made between the Europeans, the Mi'kmaq and other First Nations. One of the first treaties between the Mi'kmaq and the British was signed in 1725 in Boston, later ratified by many Mi'kmaq and Maliseet communities in Annapolis Royal in 1726. This was the first treaty in what is now known as the "Peace and Friendship Treaties". The Royal Proclamation of 1763 reserved a large portion of land in North America as Indian hunting grounds and set out a process for cession and purchase of Indian grounds.

The Grand Council continues to exist, but its authority to govern has been largely transferred by the *Indian Act, 1951*, to the elected Band Chiefs and Councils. There are thirteen Mi'kmaq Bands in Nova Scotia, four of which are located within close proximity of the three proposed wind farms sites. These communities were identified due their proximity to the proposed wind farm sites and their historical and contemporary use of the project area and its resources. The four communities involved in the Mi'kmaq Ecological Knowledge Study include Indian Brook First Nation, Millbrook First Nation, Acadia First Nation and Glooscap First Nation.

Indian Brook First Nation is one of four reserves of the Shubenacadie Band and is the second largest First Nation community in Nova Scotia. In 1848, an Indian Commissioner settled 14 families at Shubenacadie. Indian Brook is located approximately 26km southeast of the proposed wind farm in Millbrook, NS.

In the late 1700's and early 1800's Millbrook First Nation was originally located along the banks of the Salmon River, but were later moved to a property on King Street in Truro (presently St. Mary's school is located on King Street) to make room for the School of Agriculture (Millbrook, 2013). Millbrook Mi'kmaq refer to the King Street location as Christmas Crossing. In 1873 Millbrook First Nation initiated discussions with the Indian Agent to move their reserve from Christmas Crossing to Millbrook. The original Millbrook reserve had a total of 35 acres. Between 1904 and 1910 an additional 120 acres was purchased by the reserve. Millbrook is located approximately 1.7km west of the proposed wind farm in Millbrook, NS.

Acadia First Nation is comprised of five reserves located throughout Southwestern Nova Scotia. The first reserve, Gold River, was established in 1820, and the Yarmouth reserve was established in 1887. Acadia First Nation gained official status from the Canadian Government in 1971 when the Elders of the region decided to form a united Band (Falls, n.d.). Gold River is located approximately 18km northeast of the proposed wind farm in the Whynott's Settlement, 5km northeast of Bridgewater, in Lunenburg County (Strum, 2011b).



The Glooscap First Nation was formed in the 1800s in conjunction with the Micmac Missionary Society. In 1907, the land of the present day reserve was transferred to his Majesty the King for use as an Indian Reserve (Glooscap, n.d.). Glooscap is located approximately 50km west of the proposed wind farm in Pockwock, NS.

2.2 Environmental Context

The proposed Millbrook wind farm site is located just southwest of the town of Truro, NS, in Colchester County. The Project site is zoned as a resource forest land and is surrounded by forestry lands (Service Nova Scotia, 2011). The site lies within the Windsor Lowlands ecodistrict, located on an undulating to rolling glacial till plain where imperfectly drained, deep, compacted, loam to clay loam till is the dominant surficial material. The tills become thinner and stony and are mostly derived from the underlying shale, sandstone, limestone and gypsum of the Carboniferous period where the site lies (Webb and Marshal, 1999). The vegetation in the region comprised mainly of softwood and mixed wood forests. This provides habitat for a variety of different wildlife species including white-tailed deer, porcupine, red fox and coyote (Webb and Marshall, 1999).

2.3 Mi'kmaq Wildlife Uses

Historically, the Mi'kmaq practiced a nomadic lifestyle, migrating between hunting and fishing grounds throughout their traditional lands (Chute, 1999). These migrations followed the seasonal cycles of the plants and wildlife in region, which formed the basis of a pattern of Mi'kmaq subsistence. Much of this migration was dependent on riverine and coastal transportation, resulting in a heavy dependence on fish and seafood, which represented a significant portion of the Mi'kmaq diet. Large mammals, especially moose, were also particularly important due to annual subsistence pattern of the people. This was linked to the size of the animal, its seasonal availability and the wide variety of uses the people employed from it (food, clothing and various tools).

During the early winter the Mi'kmaq hunted spawning seals in coastal areas and near shore islands. As the winter progressed they moved inland to more sheltered areas and hunted large game, such as moose, which moved slowly in the deep snow. Winter was also the time to hunt deer, beaver, otter, muskrat and caribou (Davis, 1997). In the spring the Mi'kmaq moved closer to the coastal areas and estuaries in order to catch fish runs in the rivers, using weirs to catch smaller fish such as smelt, eel or bass, and leisters for larger fish such as salmon. Migratory birds such as ducks and geese also started to return during this period, and were often hunted at night (Davis, 1997). During the summer the Mi'kmaq were able to take full advantage of coastal areas and various species of shellfish available to them such as mussels, clams, whelk, lobster and crab. A variety of salt water fish species, such as the cod, mackerel and plaice also appeared in coastal waters as the summer worn on. In the autumn southward migrations of birds moved through the area and salmon, eel and other fish species began to move down the rivers. Certain species were hunted year round; while others may have been pursued on



an opportunistic basis. This is likely the case with large marine mammals such as whales, which the Mi'kmaq valued for food, as a source of oil and for tool making (Barsh, 2002; Lockerby, 2004).



2.3.1 Woodland Wildlife

Table 1 describes the various uses for the large mammals and other animals found in the forests of Nova Scotia. While many of these animals provided meat for food, they also offered other uses such as furs for clothing, bones for tools and a variety of medicinal purposes. The arrival of Europeans also opened up the fur trade which created an additional use for certain species such as the beaver, which were highly valued in foreign markets (Davis, 1997). The Mi'kmaq also used certain animal parts, such as porcupine quills, as decoration on clothing or other items.

Table 1: Mi'kmaq Woodland Wildlife Uses

Species	Common Name, *Mi'kmaq Name ⁵	Habitat	Mi'kmaq Traditional Uses	Source
<i>Alces alces</i>	Moose, *Team' *Tiya:m	Young forests, including wet sites near lakes and swamps. Common in highlands of Cape Breton Island.	Moose meat was a principal food source, as was the oil made from fat which was able to be stored for long periods. Moose also provided a variety of tools such as bone hand tools, bladders for storage and hides for clothing and shoes, shelter, canoes and variety of other purposes.	Barsh, 2002; Bridgland et al, 2007; Caplan, 1978; Davis, 1997; Lockerby, 2004; Maxwell, 1993; VanWart, 1948; Wicken, 1994
<i>Anura</i> (generic)	Toad, *Ĕmkókchàjit *Amqogjaji	Found in a variety of areas near a water source including fields, forests and agricultural lands.	Toads were used for medicinal purposes.	VanWart, 1948
<i>Castor canadensis</i>	Beaver, *Kobet *Kopit	Slow-flowing streams, lakes, rivers, marshes, and coastal wetlands, usually in forested areas near aspen stands.	Beaver offered an important seasonal food source, and were also used to in a variety of clothing, tools and medicines. Upon European arrival the beaver would become the most important source of the fur trade.	Barsh, 2002; Caplan, 1978; Davis, 1997; Krieger, 2002; Lockerby, 2004; Maxwell, 1993; McNab, 1998; VanWart, 1948;

⁵ DeBlois, 1997; Rand, 1888



Species	Common Name: *Mi'kmaq Name	Habitat	Mi'kmaq Traditional Uses	Source
<i>Cervus canadensis</i>	Elk, N/A	Historic presence in Nova Scotia	Elk were a food source, and were likely used in the same manner as other large game.	Wallis, 1922; Wicken, 1994 Davis, 1997; Maxwell, 1993
<i>Felis lynx</i>	Canada Lynx, N/A	Young, dense softwood thickets and swamps. Most common on the highlands of Cape Breton Island.	Lynx furs were sold in the fur trade and also used for clothing.	Barsh, 2002; Maxwell, 1993
<i>Lepus americanus</i>	Hare, *Able'gumocch *Aplik'muj	Usually found in conifer thickets and alder swamps	Hare were used as a food source	VanWart, 1948
<i>Lutra canadensis</i>	River Otter, *Niktuk *Kiw'nik	Marine or freshwater environments, wetlands.	Otter were hunted for food and fur. The pelts were sold and also used in clothing.	Barsh, 2002; Davis, 1997; Krieger, 2002; Maxwell, 1993; VanWart, 1948; Wicken, 1994
Generic (<i>Martes</i>)	Marten, *Abistānāooch' *Apistanewj	Usually found in mature coniferous or mixed forest areas.	Marten furs were sold in the fur trade and used in clothing.	Barsh, 2002; Maxwell, 1993
<i>Hystriomorph</i> <i>Hystriidae</i>	Porcupine, *Nābegök *Matuwes	Found in forested areas throughout mainland Nova Scotia, rare in Cape Breton.	Porcupine were used for food and medicine, and the quills were often dyed and used for decoration of clothing.	Davis, 1997; Krieger, 2002; Maxwell, 1993; VanWart, 1948; Wallis, 1922; Wicken, 1994
<i>Mephitis mephitis</i>	Striped Skunk, *Abükcheleo *Aplikjilu	Semi-open forested areas and agricultural lands.	Skunk furs were sold in the fur trade and parts of the animal were used for medicine.	(Barsh, 2002; VanWart, 1948; Wallis, 1922)
<i>Mustela vison</i>	American Mink, *Moochpéché' *mujpej	Variety of wetland habitats, including watercourses, lakes, marshes, and sea coasts.	Archeological evidence of mink at Mi'kmaq campsites demonstrates historical use.	Barsh, 2002



Species	Common Name: <i>*Mi'kmaq Name's</i>	Habitat	Mi'kmaq Traditional Uses	Source
<i>Odocoileus virginianus</i>	White Tailed Deer, <i>*Lúntook'</i> <i>*Léntuk</i>	Edge areas between forests and openings, fields and cut overs close to forest cover areas.	Deer offered a valuable food source, and furs could be used or sold in the fur trade. Parts of deer were also used for medicinal purposes.	Parnaby, 2008; VanWart, 1948; Wallis, 1922
<i>Ondatra zibethica</i>	Muskrat, <i>*Keooásoo</i> <i>*Ki:kwesu</i>	Marshes, lakes, and rivers with roughly equal amounts of open water and above-water vegetation.	Muskrat were trapped for the fur trade; the pelts were also used in clothing.	Maxwell, 1993; McNab, 1998
<i>Procyon lotor</i>	Raccoon, <i>*Amalchoogwéché'</i> <i>*Amaljikwej</i>	Abundant across mainland Nova Scotia and Cape Breton Island. Found in urban areas and edges such as streams, marshes, and field/forest boundaries.	Raccoon furs were sold in the fur trade and parts of the animal were used for medicine.	Barsh, 2002; Wallis, 1922
<i>Rangifer tarandus</i>	Caribou, <i>*Káleboo</i> <i>*Kalipu</i>	Historic presence in Nova Scotia	Caribou offered another large game food and fur source when migrating through Mi'kmaq territory.	Barsh, 2002; Caplan, 1978; Davis, 1997; McNab, 1998; VanWart, 1948; Wicken, 1994
<i>Serpentes</i> (generic)	Snake, <i>*Mtāaskūm</i> <i>*Mteskm</i>	Woodlands, agricultural and rocky areas across the province.	Snakes were used for medicinal purposes.	VanWart, 1948
<i>Tamiasciurus hudsonicus</i>	Red Squirrel, <i>*Adoo'dooguéché</i> <i>*Atu:tuwej</i>	Common throughout mature softwood and mixed wood forests.	Squirrel fur was used in clothing, and parts of the animal were used for medicine.	Maxwell, 1993; Wallis, 1922
<i>Ursus americanus</i>	Black Bear, <i>*Moon</i> <i>*Muwin</i>	Forested or wooded areas and swamps. Also settled areas for easy food sources such as bee hives, agricultural crops, and garbage.	Bear were a food source and the hides could be used or sold.	Barsh, 2002; Caplan, 1978; Davis, 1997; Maxwell, 1993; Parnaby, 2008; VanWart, 1948; Wicken, 1994
<i>Vulpes vulpes</i>	Red Fox, <i>*Wokwis</i> <i>*Wowkwis</i>	Found throughout Nova Scotia, usually in agricultural areas intermixed with woods.	Fox were trapped for their pelts, which were sold in the fur trade.	(Barsh, 2002; McNab, 1998)

2.3.2 Freshwater Species

Table 2 represents the freshwater, anadromous and catadromous species utilized by the Mi'kmaq. The majority of these species were used mainly as food sources, however medicinal or other uses were possible. It is also important to note that many animals hold non-utility value, for example the spiritual and cultural significance of Atlantic Salmon to the people of Listuguj or eels to the people of Paq'tnkek.

Table 2: Mi'kmaq Freshwater Species Use

Species	Common Name, *Mi'kmaq Name ⁶	Habitat	Mi'kmaq Traditional Uses	Source
<i>Anura</i> (generic)	Frog, *Uchkoolch *Sqolj	Various species found in streams, rivers, brooks and lakes throughout the province.	Frogs were used for medicinal purposes	VanWart, 1948
<i>Alosa sapidissima</i>	American Shad, *Umsamoo *Msamu	Anadromous fish species lives in coastal waters, returning to freshwater rivers to spawn.	Shad were a source of food.	Barsh, 2002; Caplan, 1978
<i>Anguilla Rostrata</i>	American Eel, *Kat *Ka:t	Found in the freshwater streams, rivers, lakes and brackish coastal waters.	Eel were a source of food and parts of the animal were used for medicine.	Barsh, 2002; Caplan, 1978; Maxwell, 1993; McNab, 1998; VanWart, 1948; Wicken, 1994
<i>Coregonus huntsmani</i>	Atlantic Whitefish, N/A	Anadromous species found in lakes, rivers and estuaries.	Whitefish were a source of food.	Barsh, 2002
<i>Esox</i> (generic)	Pike, *Mëskilk n'umāāch	Found in lakes rivers streams and brackish waters.	Pike were a source of food.	Barsh, 2002
<i>Perciformes</i> (generic)	Bass, *Chegao *Jikaw	Nova Scotia is home to various species of bass which range from fresh to salt water habitats.	Bass were a source of food.	Barsh, 2002; VanWart, 1948
<i>Salmo/Salvelinus</i> (generi)	Trout,	Various species found in streams, rivers,	Trout were a source of food.	Barsh, 2002;

⁶ DeBlois, 1997; Rand, 1888



Species	Common Name, *Mi'kmaq Name	Habitat	Mi'kmaq Traditional Uses	Source
c)	*Adagwaasoo *Atoqwa:su	brooks and lakes throughout the province.		Caplan, 1978; Maxwell, 1993; VanWart, 1948; Wicken, 1994
<i>Salmo salar</i>	Atlantic Salmon, *Pálámoo *Plamu	Found in the Northern Atlantic ocean, returning to freshwater rivers and streams each year to spawn.	Salmon were an important seasonal food, as well as symbol of cultural identity for Mi'kmaq of Listuguj.	Caplan, 1978; Davis, 1997; Krieger, 2002; Maxwell, 1993; McNab, 1998; VanWart, 1948; Wicken, 1994
<i>Siluriformes</i> (generic)	Catfish, *Útkogwěch'	Shallow muddy lakes or slow moving streams	Catfish were a source of food.	Barsh, 2002
<i>Testudines</i> (generic)	Turtle, *Mikjikj	Various species found in streams, rivers, brooks and lakes throughout the province.	Turtles were a source of food.	Caplan, 1978

2.3.3 Birds

Table 3 depicts the various bird species harvest by the Mi'kmaq. While the majority of the species were used for food purposes (meat or eggs), other uses included feathers for guides on arrows, or for decorative purposes. It is important to note that some of the birds listed refer to generic groups, the uses and species of which were not always specified. For example, references to eagles as food may refer to the collection of eggs, or may encompass a wide variety of birds such as turkey vultures. The migratory nature of many birds would have limited the Mi'kmaq to seasonal harvests, while other woodland or marine species could be found year round.



Table 3: Mi'kmaq Bird Use

Species	Common Name, *Mi'kmaw Name ⁷	Habitat	Mi'kmaq Traditional Uses	Source
<i>Accipitridae</i> (generic)	Eagle, * <i>Kilpoo</i> * <i>Kipuu</i>	Isolated forested areas near large bodies of water.	Large birds offered a food source, and feathers were used as guides on arrows.	Lockerby, 2004; Maxwell, 1993
<i>Anatidae</i> (generic)	Duck, * <i>Apchechk</i>	Wetlands, lakes, rivers, streams and coastal areas.	Ducks were a source of food.	Barsh, 2002; Caplan, 1978; Davis, 1997; Maxwell, 1993; VanWart, 1948; Wicken, 1994)
<i>Anas</i> (generic)	Teal, * <i>Uchügwe'ch'</i>	Wetlands, lakes, rivers, streams and coastal areas.	Teal were a source of food.	VanWart, 1948
<i>Anserini</i> (generic)	Goose, * <i>Senümkw'</i> * <i>Takli:j</i>	Wetlands, lakes, rivers, streams and coastal areas.	Geese were a source of food.	VanWart, 1948
<i>Branta bernicla</i>	Brant Goose, * <i>Mogülaweech</i>	Wetlands, lakes, rivers, streams and coastal areas.	Brant Geese were a source of food.	Lockerby, 2004; Maxwell, 1993
<i>Branta canadensis</i>	Canada Goose, N/A	Wetlands, lakes, rivers, streams and coastal areas.	Canada Geese were a source of food.	Lockerby, 2004
<i>Clangula hyemalis</i>	Oldsquaw, N/A	Wetlands, lakes, rivers, streams and coastal areas.	Oldsquaw were a source of food.	Lockerby, 2004
<i>Columbidae</i> (generic)	Wild Pigeon, * <i>Püles'</i> * <i>Ples</i>	Common throughout the province in farmlands and residential or urban areas.	Wild pigeons were a source of food.	VanWart, 1948
<i>Gallinago gallinago</i>	Common Snipe, * <i>Oonökpüdeëg'isoo</i> * <i>Jijikwatej</i>	Found in coastal areas, particularly wet meadows or bushy swamps.	Snipe were a source of food.	VanWart, 1948
<i>Laridae</i> (generic)	Gull,	Found in coastal areas around the province	Gulls were a source of food.	Lockerby, 2004

⁷ DeBlois, 1997; Rand, 1888



Species	Common Name, *Mi'kmaw Name ⁷	Habitat	Mi'kmaq Traditional Uses	Source
	*Külokündēch'			
<i>Mergus merganser</i>	Merganser, N/A	Wetlands, lakes, rivers, streams and coastal areas.	Mergansers were a source of food.	Lockerby, 2004
<i>Perdix</i> (generic)	Partridge, *Pūlowwēch' *Plawej	Hardwood or mixed forest areas, near streams or openings.	Partridge was a source of food.	Maxwell, 1993; VanWart, 1948
<i>Phalacrocoracidae</i>	Comorant, *Mqatawapu	Coastal areas around the province	Comorants were a source of food.	Lockerby, 2004
<i>Somateria mollissima</i>	Common Eider, N/A	Coastal areas near shellfish beds.	Eider was a source of food.	Lockerby, 2004

2.3.4 Marine Species

Table 4 summarizes Mi'kmaq use of salt water marine species, as well as anadromous species principally found in ocean environments. Similar to freshwater species, many of the fish listed in this table were used primarily as a food source, although large marine mammals such as whales and seals offered multiple uses. A large portion of the Mi'kmaq diet consisted of seafood, and while the study areas are not directly adjacent to the coast it is important to note these uses as seasonal variations and migrations of these species played a large role in determining how and when the people moved across the land.

Table 4: Mi'kmaq Marine Species Use

Species	Common Name, *Mi'kmaw Name ⁸	Habitat	Mi'kmaq Traditional Uses	Source
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon, *Komkūdāmoo *Komkotamu	Anadromous fish found in coastal waters and rivers.	Sturgeon were a source of food.	Barsh, 2002; Caplan, 1978; Davis, 1997; Lockerby, 2004; McNab, 1998;

⁸ DeBlois, 1997; Rand, 1888



Species	Common Name, *Mi'kmaq Name	Habitat	Mi'kmaq Traditional Uses	Source
<i>Alosa pseudoharengus</i>	Alewife, (Gaspereau) *Abit petùbèt' *Segoonùmékw' *Kaspalaw	Anadromous species found in lakes rivers and coastal waters.	Alewife were a source of food.	Wicken, 1994 Caplan, 1978; McNab, 1998; Wicken, 1994
<i>Bivalvia</i> (generic)	Clam, *Āās; Ā'sūk *Ūpkwāāsk *Sebooaās *Boogoonùmowāās *E:sik	Gravel and sand beaches in protected bays.	Clams were a source of food.	Barsh, 2002; Caplan, 1978; VanWart, 1948
<i>Brachyura</i> (generic)	Crab, *Nūmjimegëch' *Jakej	A variety of crab species are found in Nova Scotia's coastal waters.	Crabs were a source of food.	Barsh, 2002; Caplan, 1978; VanWart, 1948
<i>Buccinidae</i> (generic)	Whelk, N/A	Found in coastal waters with muddy or sandy bottoms.	Limpets were a source of food.	Barsh, 2002
<i>Cardiidae</i> (generic)	Cockles N/A	Found in coastal waters on muddy or rocky bottoms.	Cockles were a source of food.	Barsh, 2002
<i>Cetacea</i> (generic)	Whale, *Nábeák' *Put'p	A variety of whales are found in Nova Scotia's coastal waters.	Whales were used as a food source, fat was stored as oil and bones were used for tool making.	Barsh, 2002; Lockerby, 2004
<i>Clupea harengus</i>	Atlantic Herring, *Agoogùmékw' *N'me:ji:j	Migratory species found in coastal waters of Nova Scotia.	Herring were a source of food.	Barsh, 2002; Caplan, 1978; Krieger, 2002
<i>Cottidae</i> (generic)	Sculpin, *Kùlok *Klakw	Demersal fish found in waters along the Atlantic Coast.	Sculpin were a source of food.	Barsh, 2002
<i>Echinoidea</i> (generic)	Sea Urchin, N/A	Coastal areas with shallow rocky bottoms	Urchins were a source of food.	Barsh, 2002; Caplan, 1978
<i>Gadus morhua</i>	Atlantic Cod, *Pëjoo *Peju	Benthopelagic fish found in coastal waters.	Cod were a source of food and medicine.	Barsh, 2002; Caplan, 1978; Davis, 1997; McNab, 1998;

Species	Common Name, *Mi'kmaq Name	Habitat	Mi'kmaq Traditional Uses	Source
<i>Hippoglossus</i> (generic)				VanWart, 1948; Wallis, 1922; Wicken, 1994
<i>Hippoglossoides platessoides</i>	Halibut, * <i>Msâněkw'</i>	Benthic species found in coastal waters	Halibut were a source of food.	Caplan, 1978; Lockerby, 2004
<i>Homarus americanus</i>	Plaice, N/A American Lobster, * <i>Wôlûmkwěch'</i> ; * <i>Chûgěch'</i> * <i>Jakej</i> * <i>Walumkwej</i>	Benthic species found in coastal waters Rocky bottoms in coastal waters.	Plaice were a source of food. Lobsters were a source of food, and the claws were used as pipes.	Caplan, 1978 Barsh, 2002; Caplan, 1978; Maxwell, 1993; VanWart, 1948
<i>Mallotus villosus</i>	Capelin, N/A	Migratory species found in coastal waters. Spawn on rock and sand beaches	Capelin were a source of food.	Caplan, 1978
<i>Microgadus tomcod</i>	Tomcod, * <i>Poonāmoo</i> * <i>Punamu</i>	Found in coastal waters of Nova Scotia.	Tomcod were a source of food.	Davis, 1997; Caplan, 1978; Davis, 1997
<i>Odobenus rosmarus</i>	Atlantic Walrus, N/A	Large areas of shallow, open water with abundant clam community near ice or low, rocky shores with steep subtidal zones.	Walrus were a source of food.	Barsh, 2002; Caplan, 1978
<i>Osmeridae</i> (generic)	Smelt, * <i>Kákpāsow'</i> * <i>kaqpesaw</i>	Anadromous species found in coastal waters, rivers, and streams.	Smelt were a source of food.	Barsh, 2002; Caplan, 1978; Davis, 1997; McNab, 1998; VanWart, 1948
<i>Ostreidae</i> (generic)	Oyster, * <i>Nûmítumoo'</i> * <i>M'ntmu</i>	Marine or brackish intertidal zones	Oysters were a source of food and were also used to polish bows.	Maxwell, 1993; Wicken, 1994
<i>Patello gastropoda</i> (generic)	Limpet, N/A	Found in intertidal rocky zones.	Limpets were a source of food.	Barsh, 2002
<i>Pectinidae</i> (generic)	Scallop, * <i>Sákskalāās</i> * <i>Sasqale:s</i>	Sea scallops live in deep waters with sandy bottoms, while bay scallops live in sandy bays and estuaries.	Scallops were a source of food.	Barsh, 2002; Caplan, 1978; VanWart, 1948

Species	Common Name, *Mi'kmaq Name ³	Habitat	Mi'kmaq Traditional Uses	Source
<i>Pinnipedia</i> (generic)	Seal, *Wöspoo *Waspu	Found in coastal waters, bays, harbours, estuaries and islands.	Seals offered a source of good and oil, and were also used in medicines.	Barsh, 2002; Caplan, 1978; Davis, 1997; Krieger, 2002; Lockerby, 2004; Maxwell, 1993; VanWart, 1948; Wicken, 1994
<i>Pleuronectidae</i> (generic)	Flounder, *Anagwāāch *Anakwe:j	Benthic species found in coastal waters.	Flounder were a source of food.	Barsh, 2002; Caplan, 1978
<i>Pseudopleuronectes americanus</i>	Winter Flounder, N/A	Benthic species found in coastal waters.	Winter flounder were a source of food.	Caplan, 1978
<i>Pteriomorpha</i> (generic)	Mussel, *Sipuwe:s	Found in rocky intertidal zones.	Mussels were a source of food.	Barsh, 2002; Caplan, 1978; VanWart, 1948; Wicken, 1994
<i>Rajidae</i> (generic)	Skate, *Këgūnālooēch' *Na'qum	Found in coastal waters of Nova Scotia.	Skate were a source of food.	Barsh, 2002; Caplan, 1978
<i>Scomber scombrus</i>	Atlantic Mackerel, *Agoogūmēkw' *N'ime:ji:j	Migratory pelagic fish found in coastal waters and estuaries.	Mackerel were a source of food.	Barsh, 2002; Caplan, 1978
<i>Teuthida</i> (generic)	Squid, *Sedaasoo *Seta:su	Found in deep water coastal areas.	Squid were a source of food.	Caplan, 1978
<i>Xiphias gladius</i>	Swordfish, *Keneskoonēch' *Kniskunej	Migratory fish found in coastal waters of Nova Scotia.	Swordfish were a source of food.	Barsh, 2002



2.4 Traditional Plant Uses

Plants, alongside other natural resources, continue to have an intricate role within the Mi'kmaq culture, society and community. The uses of plant species ranged from being major food sources, to providing cures for ailments and providing the raw materials for the construction of tools.

2.4.1 *Food Plant Species*

Since the colonization of the new world Indigenous societies have shared their knowledge of plant species with newcomers. It has been estimated that some fifty plants useful as food have found their way into our diets as a result of earlier cultivation by Indigenous societies (Hamilton, 1974). Indigenous contributions to the modern Western diet include: corn, fiddleheads, potatoes, squash, berries, tobacco and maple syrup. For example, the Mi'kmaq were the first to produce maple syrup by facilitating the sap run using reeds or pieces of bark to collect sap into birch bark containers, which were sealed with pine resin for waterproofing (Hamilton, 1974). Table 5 references plant species that were traditionally consumed for food purposes by the Mi'kmaq.

Table 5: Plant Species Traditionally Consumed for Food by Nova Scotia Mi'kmaq.

Scientific Name	Common Name (*Mi'kmaq Name ⁹)	Habitat	Mi'kmaq Traditional Uses	Source
<i>Abies balsamea</i>	Balsam Fir * <i>Stoqn</i>	Various	Bark used for beverage and medicine	Speck and Dexter, 1951; Lacey, 1977
<i>Acer pensylvanicum</i>	Striped Maple; Moosewood; * <i>Mimkutago'q</i>	Rocky woods, rich deciduous forests, wooded slopes and along streams	Bark used for tea	Speck and Dexter, 1951, 1952; Lacey, 1977; Wallis and Wallis 1955
<i>Acer saccharum</i>	Sugar Maple; * <i>Snawey</i>	Well-drained soils	Sap boiled into syrup, and a beverage tea was made from the bark and twigs, Used as cooking broth	Speck and Dexter, 1951; Stoddard, 1962

⁹ DeBlois, 1996



Scientific Name	Common Name (*Mi'kmaq Name ⁹)	Habitat	Mi'kmaq Traditional Uses	Source
<i>Acorus americana</i>	Sweetflag ¹⁰ ; * <i>kiw'eswa'skul</i>	Wet places and the borders of quiet streams, marshes, the edges of ponds and wet meadows. Coastal marshes just above high tides.	Rootstocks used to make a beverage and medicinal tea. Tubers eaten raw, or more commonly boiled or roasted	Yanovsky, 1936; Speck and Dexter, 1951; Wallis and Wallis 1955; Lacey, 1977
<i>Allium tricoccum</i>	Wild leek	Rich deciduous forests and intervals	Bulbs, fresh and dried	Speck and Dexter, 1952; Stoddard, 1962
<i>Apios americana</i>	Groundnut	Thickets and along rivers in alluvial soils	Groundnuts used	Speck and Dexter, 1951
<i>Aralia nudicaulis</i>	Wild Sarsaparilla; * <i>Wopapa'kjukal</i>	Dry woodlands and old forests	Used to make a beverage.	Speck and Dexter, 1951
<i>Arctostaphylos uva-ursi</i>	Bearberry * <i>Kinnickick</i>	Sandy or gravelly soils	Berries eaten	Speck and Dexter, 1951, 1952
<i>Asclepias syriaca</i>	Common Milkweed	Light soils	The young shoots, stems, flower buds, immature fruits, and even the roots were boiled and eaten as a vegetable. The Mi'kmaq cooked the young pods and flowers with meat	Stoddard, 1962
<i>Betula alleghaniensis</i>	Yellow Birch; * <i>Nimnoqn</i>	Various	Drank sap, rendered it into syrup and sugar, made tea from the twigs	Waugh, 1916; Stoddard, 1962; Lacey, 1977
<i>Chenopodium album</i> and closely related species	Lambsquarters; Pigweed; Goosefoot	A weed of cultivated and waste ground	Leaves and plants eaten as green, edible greens and seeds. The young plants were cooked as a potherb	Speck and Dexter, 1951, 1952
<i>Cornus sericea</i> ssp. <i>sericea</i>	Red Osier Dogwood; Red Willow; * <i>W'juklie'manaqsi</i>	The edges of intervals, brook sides, wet meadows, and ditches along roadsides. Most common in rich, alkaline soils	Mi'kmaq people made a tea from the bark of dogwood probably this species.	Wallis and Wallis, 1955
<i>Corylus cornuta</i>	Beaked Hazelnut; * <i>Malipqwanj</i>	Dry and open woods. Sometimes in climax forests, scattered along roadside	Nuts used	Speck and Dexter, 1951, 1952; Stoddard, 1962

¹⁰ Many references mention Calamus or Sweetflag. *A. calamus*, which does not occur in the Maritime provinces. The species present in this region is actually *A. americana*.



Scientific Name	Common Name (*Mi'kmaq Name ⁹)	Habitat	Mi'kmaq Traditional Uses	Source
<i>Crataegus</i> spp.		thickets, along edges of fields and along margins of woods, Various, depending on species		
	Thornapple; Hawthorn; *kawiksa'qoaqsi		Fruit used fresh and to make beverage	Rousseau, 1945; Speck and Dexter, 1951, 1952; Black, 1980; Speck and Dexter, 1951, 1952; Adney, 1944
<i>Erythronium americanum</i>	Trout Lily; Dogtooth Violet	Upland woods of beech and maple, and along the edges of intervals	Bulbs eaten raw, boiled, or baked in the hot ashes of a fire	Stoddard, 1962
<i>Fagus grandifolia</i>	American Beech	Fertile uplands, rarely in swamps	Nuts used	Speck and Dexter, 1951, 1952
<i>Fragaria virginiana</i> , <i>F. vesca</i>	Virginia and Woodland Strawberries * Atuomkminaqsi	Old fields and road sides	Berries used fresh or preserved, or made into beverage	Speck and Dexter, 1951; 1952; Adney, 1944; Rousseau, 1945
<i>Fraxinus pennsylvanica</i>	Red Ash	Near lakes or ponds, or in other low-lying areas	Sap of ash was added to maple and yellow birch sap	Stoddard, 1962
<i>Gaultheria procumbens</i>	Wintergreen; Teaberry; Checkerberry; * Ka'qaju'mannaqsi	Woods, barrens, pastures	Berries eaten, Mi'kmaq were said to make juice from the berries	Stoddard, 1962; Speck and Dexter, 1952; Lacey, 1977
<i>Gaylussacia</i> sp.	Huckleberry	Barrens and bogs	Berries eaten	Waugh, 1916; Speck and Dexter, 1951, 1952
<i>Hamamelis virginiana</i>	Witch-hazel	Rocky woods or near cliffs where there is underground water	A decoction of this plant, sweetened with maple sugar, was used as a tea. Also ate the "nuts". Twigs used for beverage	Waugh, 1916; Stoddard, 1962; Lacey, 1977
<i>Helianthus tuberosus</i>	Jerusalem Artichoke	Waste ground, intervals, rich soils	Tubers eaten.	Speck and Dexter, 1951
<i>Juglans cinerea</i>	Butternut	NOT IN NS	Nuts used	Speck and Dexter, 1951
<i>Juniperus communis</i>	Low Bush; Common Juniper; *Kini'skwejjjik; kinikwejjfewaqs	Sandy areas, old pastures, heaths and bogs	Boughs, with or without the fruits, were used to make a beverage tea	Wallis and Wallis, 1955; Lacey, 1977
<i>Lathyrus maritimus</i>	Beach Pea; *Alawey	Coastal, along the strand line, mostly in beach gravel. Occasionally a considerable	Pea used	Speck and Dexter, 1951, 1952



Scientific Name	Common Name (*Mi'kmaq Name ⁹)	Habitat	Mi'kmaq Traditional Uses	Source
<i>Matteuccia struthiopteris</i>	Ostrich Fern; * <i>Ma'susi'l</i>	distance from shore Rich, moist soils, often on floodplains. Occasionally in low-lying areas and swamp borders. Often in pure stands	The young vegetative shoots, or "fiddleheads," and sometimes the entire crown, were traditionally eaten, boiled or roasted, as a spring vegetable	
<i>Mitchella repens</i>	Partridge Berry	Moist places, forest ground cover	Berries were eaten fresh or preserved. Used the plant for a beverage tea	Speck, 1917; Speck and Dexter, 1951, 1952,
<i>Picea glauca</i>	White Spruce; Cat Spruce; * <i>Kawatkwi; kawik</i>	Old fields and along the coast	Bark used for beverage and medicine	Speck and Dexter, 1951; Wallis and Wallis, 1955; Stoddard, 1962; Lacey, 1977
<i>Picea mariana</i>	Black Spruce; Bog Spruce; * <i>Kawatkwi</i>	Bogs, swamps and poorly drained areas	The bark of black spruce was used to make a beverage or medicinal tea by the Mi'kmaq of the Maritimes	Speck and Dexter, 1951; Wallis and Wallis, 1955; Lacey, 1977
<i>Pinus strobus</i>	Eastern White Pine	Bogs, swamps and poorly drained areas	Bark used for beverage, inner bark grated and eaten	Speck and Dexter, 1951; Wallis and Wallis, 1955; Lacey, 1977
<i>Prunus americana</i>	American plum	Does not occur in NS, suspected to be received in trade from outside region (Leonard 1996)	Fruit and beverage	Speck and Dexter, 1951, 1952; Leonard, 1996
<i>Prunus</i> spp.	Wild Cherries	Thickets, clearings and open woods	Boiled cherry twigs and bark for tea	Stoddard, 1962; Lacey, 1977; Speck and Dexter, 1951, 1952; Adney, 1944
<i>Quercus</i> sp.	Oak	In light or well drained soils and granitic areas	Nuts used	Speck and Dexter, 1951, 1952
<i>Rhexia virginica</i>	Handsome Harry; Meadow Beauty	Peaty lake margins and swales or wet thickets	Leaves were steeped to produce a sour drink	Speck, 1917; Lacey, 1977
<i>Rhododendron</i> (syn. <i>Ledum</i>) <i>groenlandicum</i>	Labrador Tea; * <i>Apuistekie j'ijit</i>	Bogs, wooded swamps, wet barrens, and poorly-drained clearings and pastures	The leaves, and sometimes the whole leafy twigs and flowers, of both species were used, fresh or dried, for tea	Speck, 1917; Speck and Dexter, 1951, 1952; Wallis and Wallis, 1955; Stoddard, 1962; Lacey, 1977
<i>Ribes americanum</i>	Wild Black Currant	Fertile thickets and slopes	Berries eaten fresh or dried and preserved	Speck and Dexter, 1951, 1952



Scientific Name	Common Name (*Mi'kmaq Name ⁹)	Habitat	Mi'kmaq Traditional Uses	Source
<i>Ribes</i> spp.	Wild Gooseberry; Currant	Various, depending on species	Fruit	Speck and Dexter, 1951, 1952
<i>Rubus canadensis</i>	Canada Blackberry; * <i>Ajioqjominasqi</i>	Clearing, thickets, and the edges of woods.	Berries used fresh or preserved, made into beverage	Waugh, 1916; Gilmore, 1933, Speck and Dexter, 1951, 1952; Arnason et al., 1981
<i>Rubus idaeus</i>	Red Raspberry; * <i>Klitawmanasqik</i>	Roadsides, deforested land, talus slopes, and rocky ground	Berries used fresh or dried, juice made from berries	Speck and Dexter, 1951, 1952; Stoddard, 1962
<i>Rubus</i> sp.	Blackberry	Various, depending on species	Fruit & beverage	Speck and Dexter, 1951, 1952
<i>Sambucus nigra</i>	European Elder; * <i>Pukulu'skwimanasqil</i>	Rich soil, open woods, around old fields and along brooks. On damp ground or wet floodplains	Berries were eaten fresh or dried for winter storage	Speck and Dexter, 1951, 1952; Stoddard, 1962
<i>Sambucus racemosa</i>	Red Elderberry; * <i>Pukulu'skwimanasqil</i>	Meadows, wet places, rocky hillsides and along streams. In rich soils	The juicy, tart berries were eaten fresh or dried for winter storage	Speck and Dexter, 1951, 1952
<i>Taraxacum officinale</i>	Common Dandelion	An aggressive weed in lawns, pastures, and even cultivated soil.	Young leaves eaten raw or cooked	Rousseau, 1945; Speck and Dexter, 1951, 1952
<i>Taxus canadensis</i>	Canada Yew	Cool damp woods, ravines, climax coniferous forest, and wooded swamps.	Twigs made into beverage	Lacey, 1977
<i>Tsuga canadensis</i>	Eastern Hemlock	Lakesides and swamps or old pastures, northern slopes or ravines	The inner bark of was grated and eaten by the Mi'kmaq of the Maritimes, and the bark was also used as a beverage and medicinal tea	Speck and Dexter, 1951; Wallis and Wallis, 1955; Stoddard, 1962; Lacey, 1977
<i>Vaccinium</i> spp.	Blueberries; Bilberries; Cranberries	Various, depending on species	Berries used fresh or dried and also the Mi'kmaq made juice from blueberries and bilberries for drinking, but did not state which species were involved.	Speck and Dexter, 1951, 1952; Adney, 1944; Lacey, 1977
<i>Vaccinium macrocarpon</i>	Large -fruited Cranberry	Bogs	Berries eaten fresh	Waugh, 1916; Speck and Dexter, 1951, 1952; Stoddard, 1962; Black, 1980
<i>Vaccinium. vitis-idaea</i>	Foxberry; Mountain Cranberry;	Cooler regions, such as exposed, coastal headlands	Berries	



Scientific Name	Common Name (*Mi'kmaq Name ⁹)	Habitat	Mi'kmaq Traditional Uses	Source
	* <i>Poqomannaqsi</i> Highbush Cranberry;	and barrens		
<i>Viburnum opulus</i>	* <i>Nipanmaqs'il</i>	Swamps and along streams	Berries used fresh or in preserve	Speck and Dexter, 1951, 1952

2.4.2 Medicinal Plant Species

Diverse healing systems have developed throughout the world. Although these systems differ greatly in their methods, they are based on the common goal of maintaining the human condition in a state of health (Cook, 2005). Throughout history and today, the Mi'kmaq have learned to use various plant species for medicinal purposes and other uses. This knowledge and use of natural resources is informally passed on from generation to generation. The transfer of knowledge between generations is an important cultural component within Indigenous cultures, in particular amongst the Mi'kmaq. Furthermore, this knowledge acts as a mechanism in which Indigenous communities are able to form a spiritual understanding of the balance between people and their local environment.

Early records indicate that the pre-contact Mi'kmaq society did not require drug therapy as used in modern Western medicine, as good health was generally the natural state of the people (Lacey, 1993). The Mi'kmaq had developed an in-depth and intimate knowledge of local plants, and how they could be used for sustenance, and in some cases, to cure illnesses. Shamans treated serious illnesses, while minor external injuries were dressed with medicines derived from plants, trees and animals parts. Many of these remedies were cures, while others were preventive medicines and others, if not used properly, could be poisonous (TEWC, 1999). As the Mi'kmaq began to experience frequent contact with Europeans they were exposed to new illnesses and their general health conditions began to deteriorate. These harsh conditions drew out the resourcefulness of the Mi'kmaq as they gradually acquired remedies to combat ailments, which were unknown a few generations earlier (Lacey, 1993).

The Mi'kmaq have a long history of territorial occupation by immigrant populations, making them one of the most studied people for the use and knowledge of their traditional medicines (Speck, 1917; Wallis and Wallis, 1955). As a result a number of guidebooks have been published on the subject. Table 6 provides a list of plant species known to be used for medicinal purposes by Mi'kmaq, which may be present in the Study Area.

Table 6: Plant Species Traditionally Used for Medicinal Purposes by Nova Scotia Mi'kmaq.

Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Abies balsamea</i>	Balsam Fir; * <i>Stoqn</i>	Various regions including mountains, canyons and valleys	Balsam used as sore and wound dressing	Le Clerc, 1910
			Balsam used to treat broken bones	Dièreville, 1933
			Bark used for beverage and medicine	Speck and Dexter, 1951; Lacey, 1977
			Buds used as a laxative	Chandler et al., 1979
			Buds, cones and inner bark used for diarrhea	Chandler et al., 1979
			Colic: cones used	Wallis, 1922
			Cones used for colic	Chandler et al., 1979
			Gum used for bruises, sores and wounds	Chandler et al., 1979
			Gum used for burns	Chandler et al., 1979
			Gum used for colds	Chandler et al., 1979
<i>Acer alba</i>	White Maple; Silver Maple; River Maple; Swamp Maple; * <i>Snawey</i>	Planted in urban areas, commonly found on stream banks, flood plains and lake edges.	Sores, swelling: boil inner bark	Speck, 1917
			Used to treat asthma, colds, colic, coughs, congestion, cuts, flu, sores, sore throat, tuberculosis, ulcers	Lacey, 1993
			Bark used as a cough remedy	Chandler et al., 1979

¹¹ DeBlois, 1996; Wallis and Wallis, 1955



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Acer pensylvanicum</i>	Moosewood; Striped Maple; Moose Maple; <i>*Mimkutaqo'q; snawey</i>	Minor component in a hardwood forests, tolerant of shade, responds well to increased sunlight	Bark tea used for colds, coughs, influenza	Wallis, 1922
			Bark used for colds	Chandler et al., 1979
			Bark used for coughs	Chandler et al., 1979
			Bark used for medicinal tea	Speck and Dexter, 1951; Lacey, 1977; Wallis and Wallis, 1955
<i>Acer saccharum</i>	Sugar Maple; <i>*Snawey</i>	Grows in rich, mesic sites, but also occurs in drier upland forests. Commonly found near American beech, American basswood, northern red and white oak, birch and yellow poplar	Wood used for kidney trouble	Chandler et al., 1979
			Wood used for spitting blood	Chandler et al., 1979
			Bark used	Speck and Dexter, 1951
<i>Acer sp.</i>	Maple; <i>*Snawey</i>	Found in a variety of diverse regions	Cold, congestion, conjunctivitis, swelling	Lacey, 1993
<i>Acer spicatum</i>	Mountain Maple	Found scattered in the shrub layer of climax forests. Common in upper elevations	Bark used for sore eyes	Chandler et al., 1979
<i>Achillea millefolium</i>	Common Yarrow	Dry or sandy soils as well as damp, salty soils. Pastures, meadows, roadsides, streamsides, and disturbed areas	Bruises, cold, fever, sprain, swelling	Lacey, 1993
			Decoction of plant taken with milk to cause a sweat for colds	Wallis, 1922
			Dried, powdered bark or green leaves rubbed over bruises	Wallis, 1922



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
			Dried, powdered bark or green leaves rubbed over swellings	Wallis, 1922
			Herb used for colds	Chandler et al., 1979
			Sprains	Wallis, 1922
<i>Acorus americanus</i> (*frequently misidentified as <i>A. calamus</i> in many references)	Sweet Flag; Flagroot; Muskkrat Root; Calamus; *Kiw'eswa'skul; ki'kwesu'sk	Growth in marshes, quiet streams and wet meadows	Root used for beverage and medicine	Speck and Dexter, 1951; Wallis and Wallis, 1955
			Root used for colds	Chandler et al., 1979
			Root used for coughs	Chandler et al., 1979
			Use to treat colic, Cholera, Cough, Belching, Cramps, Preventive, Stomach Cramps, Gastrosis, Preventive	Lacey, 1993
<i>Actaea racemosa</i> var. <i>racemosa</i>	Black Bugbane	Grows in a variety of woodland habitats, found in small woodland openings	Root used for kidney trouble	Chandler et al., 1979
<i>Aletris farinosa</i>	White Colicroot	Low growing perennial herb, found in open dry habitats associated with tall-grass prairies	Root used as a stomachic	Chandler et al., 1979
			Root used as an emmenagogue	Chandler et al., 1979
			Stomachic tonic, emmenagogue: root used	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Alnus crispa</i>	Alder; *Tupi; Tupsi	Lakeshores and associated swampy areas	Cathartic, cramps, depurative, diptheria, fever, gastritis, lameness, nephrosis, neuralgia, pain, rheumatism, wounds	Lacey, 1993
<i>Alnus sp.</i>	Alder; *Tupi; Tupsi	Lakeshores and associated swampy areas	Bark and leaves used for festers and bark used for wounds	Chandler et al., 1979
			Bark and leaves used for fevers and festers	Chandler et al., 1979
			Bark used as a physic	Chandler et al., 1979
			Bark used for bleeding	Chandler et al., 1979
			Bark used for cramps	Chandler et al., 1979
			Bark used for retching	Chandler et al., 1979
			Bark used for rheumatism	Chandler et al., 1979
			Bleeding, hemorrhage of lungs, fever, fractures, diptheria,	Chandler et al., 1979
<i>Anaphalis intercedens</i>	Everlasting	Fields, roadsides, and the border of woods	Fumitory, smoked with tobacco	Lacey, 1993
<i>Angelica sylvestris</i>	Woodland Angelica	Tall plants of moist habitats with diluted sheaths. Found in open or woodland habitats	Infusion of roots and spikenard roots used for coughs	Mechling, 1959
			Infusion of roots and spikenard roots used for head colds	Mechling, 1959
			Root used for cough	Chandler et al., 1979
			Root used for head cold	Chandler et al., 1979
<i>Antennaria neodioca</i>	Everlasting	Fields, roadsides, and the border of woods	Fumitory; dried broken into fine pieces and mixed with tobacco or smoked by themselves	Lacey, 1993



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Apocynum cannabinum</i>	Indian Hemp; Worm Root	Found along roadsides, in thickets, fields, waterways, fields and in disturbed regions	Root used as a vermifuge Used internally as a tea to treat worms	Chandler et al., 1979 Lacey, 1993
<i>Aralia nudicaulis</i>	Wild Sarsaparilla; * Wopapa'kjukal	Shady, wooded areas, ranging from moist to dry regions	Cold, cough, flu, wounds Cough: root used Plant used, ailment not provided	Lacey, 1993 Chandler et al., 1979 Speck and Dexter, 1951
<i>Aralia racemosa</i>	American Spikenard	Grows on rocky but highly fertile riverbanks	Root used as a cough medicine Colds: steep roots Colds, sore eyes, wounds: root Infusion of roots and angelica roots used for coughs Infusion of roots and angelica roots used for head colds Root used for colds Root used for coughs Root used for female pains Root used for headaches and female pains Root used for kidney troubles Root used for sore eyes Root used for spitting blood Root used for wounds	Chandler et al., 1979 Lacey, 1977 Wallis, 1922 Mechling, 1959 Mechling, 1959 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979
<i>Arctium lappa</i>	Greater Burdock;	Disturbed sites, roadsides and pastures	Buds and roots used for sores	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
	*Kawiksaw; Kelikwet			
<i>Arctium minus</i>	Lesser Burdock: *Kawiksaw; Kelikwet	Disturbed sites, roadsides and pastures	Depurative, dermatosis, tonic Roots used for boils and abscesses	Lacey, 1993 Chandler et al., 1979
<i>Arctostaphylos uva-ursi</i>	Bearberry *Kinnickick	Gravel type or sandy soils	Fumitory, urinary antiseptic	Lacey, 1993
<i>Arisaema triphyllum</i>	Indian turnip; jack-in-the-pulpit; *Tanaps; Wennju:sukapun	Predominate in loose soils and wet woods	Cold, gastrostis, tuberculosis Parts of plant used for boils and abscesses Stomach: root bulb, tuberculosis: root bulb, method not mentioned	Lacey, 1993 Chandler et al., 1979 Lacey, 1977
<i>Aristolochia serpentaria</i>	Virginia Snakeroot	Found in dry-mesic forests above streams or wetlands	Root used for fits	Chandler et al., 1979
<i>Armoracia rusticiana</i>	Horse Radish, Hot Root, Eplekeway	Old gardens	Digestive, inappetance, stomach	Lacey, 1993
<i>Asarum canadense</i>	Canadian Wildginger	Low growing woodland plants, found in moist, humus rich soils of slowing woodland habitats	Root used for cramps and as a stomachic	Chandler et al., 1979
<i>Asclepias spp.</i>	Milkweeds	Growth in light, sandy soils and an abundant amount of sunlight	Root steeped and used as an emetic	Le Clerc, 1910
<i>Asclepias syriaca</i>	Milkweed	Growth in light, sandy soils and an abundant amount of sunlight	Used to treat poison ivy	Lacey, 1993
<i>Baptisia tinctoria</i>	Horseflyweed	Increases in burnt fields, dry open woods and clearings, sandy acidic soil	Root used for kidney trouble	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Betula alleghaniensis</i>	Yellow Birch; *Nimnoqn; puku;skw	Various regions including mountains, canyons and valleys	Root used for spitting blood Bark tea used for diarrhea Twigs used for tea Used for cramps, diarrhea, dyspepsia, gastrostis, cramps, cramps, rheumatism	Chandler et al., 1979 Lacey, 1977 Lacey, 1977 Lacey, 1993
<i>Betula populifolia</i>	Gray Birch	Found in dry barren uplands, also moist soils, in mixed woodlands	Wood used as hot-water bottle Inner bark used as an emetic Inner bark used as an emetic Inner bark used for infected cuts	Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979
<i>Brassica hirta</i>	White Mustard	Found in openings in mesic forests, but also in riparian floodplains, margins of fens, marshes and streams, and wet meadows, fields and pastures	Tuberculosis of lungs (no part mentioned)	Chandler et al., 1979
<i>Brassica napus</i>	Wild Turnip, Rape; * tanaps; wennju:- sukapun; wennju:s'pekn	Found in fields, vegetable gardens, mills, roadsides, loading areas, and rubbish tips	Bark used for colds	Chandler et al., 1979
			Bark used for coughs Bark used to treat colds, cough, grippe, smallpox	Chandler et al., 1979 Wallis, 1922
<i>Chelone glabra</i>	White Turtlehead	Found in open woodlands in floodplain areas, thickets in floodplain areas, wet prairies, sedge meadows, seeps, springs, marshes and fens	Herb used to prevent pregnancy	Chandler et al., 1979
<i>Chimaphila umbellata</i>	Pipsissewa, Prince's Pine	Found in coniferous and mixed forests with numerous tree species and dry soils.	Herb used as a blood purifier	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
	* <i>Kuwow</i>		Herb used for blisters Herb used for kidney trouble Herb used for kidney trouble and rheumatism Herb used for rheumatism Herb used for stomach trouble Used as stomach medicine and for tuberculosis Used for kidney pains Used for tuberculosis Used for conjunctivitis	Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Lacey, 1977 Rousseau, 1948 Lacey, 1993 Lacey, 1993
<i>Chrysanthemum</i>	Field Daisy	Found in gardens, grassy temperate climate, rainfall and sunlight		
<i>Clintonia borealis</i>	Northern Clintonia	Found in rich coniferous and mixed wood stands, thickets	Root decoction used to treat "gravel" (kidney stones)	Speck, 1917
<i>Comptonia peregrina</i>	Sweet Fern; * <i>masoose</i>	Shrub and brushlands, grasslands, and in open or barren soils	Boils, dermatosis, poison ivy, rheumatism, sore, tonic Leaf tea used as tonic Leaves used for posion ivy Leaves used for sprains, swellings, poison ivy and inflammation	Lacey, 1993 Lacey, 1977 Chandler et al., 1979 Chandler et al., 1979
			Leaves used for swellings and poison ivy	Chandler et al., 1979
			Root used for headache and inflammation	Chandler et al., 1979
<i>Coptis trifolia</i>	Goldthread; * <i>wisowtaqijit</i> ;	Coniferous forests and damp areas such as swamps, hummocks on bogs and	Roots used for sore eyes, root tea uses as stomach medicine	Lacey, 1977



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
	<i>malj:japa:qawey</i>	roadside banks		
			Used for chafing, diabetes, diarrhea, lack of appetite, stomatitis, stomach cancer, also used as a tonic	Lacey, 1993
<i>Cornus canadensis</i>	Bunchberry, Dwarf Dogwood; * <i>űsogomanűl</i>	Various locations; largely in woodlands and scattered throughout bogs	Berries, roots and leaves used for seizures	Chandler et al., 1979
			Leaf tea used for bed wetting and kidney ailments	Lacey, 1977
			Used for enuresis, gastritis, hemorrhage, nephrosis, wounds	Lacey, 1993
<i>Cornus sericea</i> ssp. <i>sericea</i>	Redosier Dogwood; Red Willow; * <i>Wjkułje'manaqsi</i>	Commonly found in sandy areas, moist sandy thickets, shrub swamps, shrubby bogs, sand areas along rivers, marshes and sandy ditches	Herb used for headache	Chandler et al., 1979
			Herb used for sore eyes	Chandler et al., 1979
<i>Cornus</i> sp.	Dogwood; * <i>űchkuolchemoose;</i> <i>oojegűnűmoose</i>	Sunny moist to wet places, often being the first to colonize wet meadows in floodplains	Bark of unidentified species for tea	Wallis and Wallis, 1955
			Fumitory	Lacey, 1993
<i>Cypripedium acaule</i>	Pink Lady Slipper; Moccasin Flower; * <i>űntooűgwűűch;</i> <i>lipkűűűűmooń</i>	Requires acidic soil with a fungus association, but can tolerate a variety of shady and moisture rich areas. Prefers well drained slopes and is usually found in pine and deciduous forests	Nervine, tuberculosis	Lacey, 1993
			Nervousness: root decoction	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Daucus carota</i>	Queen Anne's Lace, Wild Carrot; *enmapet; enmapej	Found in fields, meadows, waste places, roadsides, fence rows, and disturbed habitats	Leaves used as a purgative	Chandler et al., 1979
<i>Dirca palustris</i>	Leatherwood, Moosewood	Rich deciduous or mixed woods in moist situations often on calcareous soils	Purgative: leaves used Bark tea used for Colds, coughs, influenza	Wallis, 1922 Wallis, 1922
<i>Eupatorium perfoliatum</i>	Common Boneset	Low meadows and damp grounds such as swamps, bogs, and along streams and ditches	Seeds steeped and used as Emetic Arthritis, Cold, Insomnia, Gastric ulcers, Pain, Tonic	Le Clerc, 1910 Lacey, 1993
<i>Euphorbia corollata</i>	Flowering Spurge	Found in mesic to dry black soil prairies, sand prairies, gravel prairies and dolomite prairies; openings in upland forests and sandy forests; various kinds of hill prairies	Parts of plant used for kidney trouble Root used as an emetic	Chandler et al., 1979 Chandler et al., 1979
<i>Fagus grandifolia</i>	American Beech; *suwo: musi; munkwaqanemusi	Scattered throughout, mainly in dry forest ridges and atop hills	Used for antiseptic, appetite, enteritis, hepatitis, nephrosis, rheumatism, tonic, tuberculosis	Lacey, 1993
<i>Fragaria virginiana</i>	Virginia Strawberry; *Atuomkrinaqsi; klitaw	Often found in disturbed areas from dry to moist open woodlands and clearings	Parts of plant used for irregular menstruation Plant steeped in water and used for cramps, depurative, dysentery, gastrostis, gingivitis, tonic, urinary antiseptic	Chandler et al., 1979 Lacey, 1993
<i>Fraxinus americana</i>	White Ash; *elikpetamit	Found in moist upland sites	Leaves used for cleansing after childbirth	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Galium aparine</i>	Stickywilly	Found in part shade, shade; moist woods, thickets	Parts of plant used for kidney trouble	Chandler et al., 1979
<i>Gaultheria procumbens</i>	Teaberry; *Ka'qaju'mannaqsi; kakaju:man	Requires acidic or sandy soils, forests, woodlands, old pastures, bogs and road banks	Parts of plant used for persons spitting blood and gonorrhea	Chandler et al., 1979
<i>Geum aleppicum</i>	Yellow Avens	Found in low ground, moist meadows, swamps	Cardiopathy (Heart attack), Preventive (Heart attack), Stroke	Lacey, 1993
<i>Geum rivale</i>	Chocolate Root, Purple Avens; Water Avens	Found in White Cedar fens, bogs, marshes and soggy meadows	Leaves used for tea	Lacey, 1977
			Roots used for coughs and croup	Chandler et al., 1979
			Decoction of root taken, especially by children, for colds	Speck, 1917
			Decoction of root taken, especially by children, for coughs	Speck, 1917
			Decoction of root taken, especially by children, for dysentery	Speck, 1917
			Root used for diarrhea	Chandler et al., 1979
			Root used for diarrhea or dysentery	Chandler et al., 1979
<i>Habenaria dilatata</i>	Tall White Bog Orchid	Found in wet areas, bogs	Root decoction used for kidney stones	Speck, 1917
<i>Hamamelis virginiana</i>	Witch Hazel	Understory of deciduous and mixed forests, rocky woods or near cliffs	Understory of deciduous and mixed forests, rocky woods or near cliffs	Lacey, 1993
			Twigs used for beverage	Lacey, 1977

Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Heracleum lanatum</i>	Cow Parsnip; *wabegpagosi; pagosi	On the sides of brooks in alluvial soil and in wet meadows	Root tea used as general preventative medicine	Lacey, 1977
<i>Heracleum sphondylium</i>	Eltrot; Hogweed; Rough Cow Parsnip	Common in herbaceous places, along roads, in hedges, meadows and woods, especially in mountain areas, prefers rich in nitrogen, moist soils	Used for cold, flu, tuberculosis Green and light color plant used as medicine for women	Lacey, 1993 Wallis, 1922
<i>Hierochloa odorata</i>	Sweet Grass; *Kjmskiku; welim'qewe'i msku	Upper areas of tidal marshes (moist heavy soils)	Lighter colour part of plant used as medicine for women, darker coloured part for men (part not explained)	Wallis, 1922
<i>Hydrastis canadensis</i>	Goldenseal	Typically found in shady, rich, mesic southern forests, occurs in moist microhabitats near vernal pools, along forested streams	Vital spiritual and ceremonial purpose, including smudging, cleansing and purification purposes.	Lacey, 1993
<i>Hylotelephium telephium ssp. telephium</i>	Witch's Moneybags	Found in dry sites with rocky soil: roadsides, railways, old fields, open woods, clearings, shore lines, swamps, forests, waste places	Root used for chapped or cut lips	Chandler et al., 1979
<i>Ilex aquifolium</i>	English Holly	Found in woodland and hedgerows, grows in forests, parks, gardens and in plains and mountain areas	Leaves used for boils and carbuncles	Chandler et al., 1979
<i>Ilex verticillata</i>	Black Alder; *tupi; tupsi	Lakeshores and associated swampy areas	Part of plant used for fevers, root used for consumption Root used for cough Seeds steeped and used as an emetic	Chandler et al., 1979 Le Clerc, 1910



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Impatiens capensis</i>	Jewelweed	Grows in shady ad wet places	Herbs used for jaundice	Chandler et al., 1979
<i>Inula helenium</i>	Elecampane Inula	Found in fields, waysides, waste places, often on moist soils in shade	Root used for colds	Chandler et al., 1979
<i>Iris versicolor</i>	Blue flag; muskrat root; Harlequin Blue flag; *mooskoonamook'	Wet areas along roadsides, in meadows and along streams and wet coastal regions	Root used for headaches	Chandler et al., 1979
			Root used for heart trouble	Chandler et al., 1979
			Root used for wounds and herb used for sore throat	Chandler et al., 1979
<i>Juglans cinerea</i>	Butternut	Commonly found in riparian habitats, found on rich, moist, well-drained loams and well-drained gravels	Root used to treat wounds	Wallis, 1922
			Used as antidote and emetic	Lacey, 1993
			Bark used as a purgative	Chandler et al., 1979
<i>Juniperus communis</i>	Common Juniper; *Kini'skwej'jik; kinikwej'itewaqs'i	Rocky and sandy soil environments, old pastures and heaths	Cones used for rheumatism, ulcers	Chandler et al., 1979
			Decoctions of juniper bark, roots, or needles used to treat a variety of lung-related disorders, from colds to asthma to tuberculosis	Waugh, 1916; Mechling, 1959
			Gum, bark used for sprains, wounds, tuberculosis	Wallis, 1922
			Part of plant used for rheumatism and bark used for tuberculosis	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
			Stems used in hair wash, gum used for wounds and cones used for ulcers	Chandler et al., 1979
			Used for burns, colds, cuts, flu, gastrostis, nephrosis, rheumatism, sore, sprain, tonic, dysuria	Lacey, 1993
<i>Juniperus</i> sp.	Juniper; *Kini'skwejjjik; kinikwejjitewaqsí	Rocky and sandy soil environments, old pastures and heaths	Tips used for beverage	Wallis and Wallis, 1955
<i>Kalmia angustifolia</i>	Lambkill, Sheep Laurel	Bog areas in eastern lowland forests	Coultice of crushed leaves used for headache, leaf decoction used for stomach trouble	Speck, 1917
			Herb used for pain, swellings and sprains	Chandler et al., 1979
			Herb used for swellings, pain and sprains	Chandler et al., 1979
			Plant used as pain killer	Wallis, 1922
			Poultice of crushed leaves bound to head for headache	Speck, 1917
			Used for rheumatism, sore limbs, swelling. Poisonous in large doses	Lacey, 1993
<i>Larix americana</i>	Eastern Larch, Tamarack, Hackmatack	Found in wetlands such as swamps and bogs as well as wet depressions in forests	Bark used for colds	Chandler et al., 1979
			Bark used for suppurating wounds and colds	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
			Boughs brewed into tea and used for sores and swelling, boiled inner bark used as diuretic	Speck, 1917
			Decoction of boughs taken as a diuretic	Speck, 1917
			Poultice of boiled inner bark applied to sores and swellings	Speck, 1917
			Running sores: bark	Chandler et al., 1979
			Used for cold, flu, infections, tuberculosis, wounds	Lacey, 1993
<i>Leved groenlandicum</i>	Labrador Tea	Thrives in bogs, on wet shores, damp barrens, poorly drained pastures and on rocky alpine slopes	Decoction of leaves taken as a diuretic	Speck, 1917
			Leaf tea used for asthma, cold, scurvy	Chandler et al., 1979
			Leaves used for kidney trouble and to make a beverage	Chandler et al., 1979
			Leaves used for tea	Speck and Dexter, 1951, 1952; Wallis and Wallis, 1955; Lacey, 1977
			Leaves used for the common cold	Chandler et al., 1979
			Tea of plant used for nephrosis, tonic	Lacey, 1993
<i>Leonurus cardiaca</i>	Common Motherwort	Found in open disturbed woodlands, areas along woodland paths, woodland borders and thickets, edges of degraded wetlands	Part of plant used for obstetric cases	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Lilium canadense</i>	Canada Lily	Found in open woodlands, wooded slopes, savannas, woodland openings, and moist meadows	Parts of plant used for irregular menstruation	Chandler et al., 1979
<i>Lilium philadelphicum</i>	Wood Lily	Found in part shade, sun, dry woods, meadows, prairies	Roots used for coughs	Chandler et al., 1979
			Roots used for fever	Chandler et al., 1979
			Roots used for swellings and bruises	Chandler et al., 1979
<i>Lobelia inflata</i>	Indian tobacco; *nutmawey	Found growing naturally in dry pastures, barren areas and meadows	Smoke used to treat earache	Lacey, 1977
			Used for asthma, earache, fumitory	Lacey, 1993
<i>Lycopodium</i> sp.	Club Moss	Found in moist, shaded woodlands	Herb used for fever	Chandler et al., 1979
<i>Maianthemum racemosum</i>	Feather Solomon's Seal	Found in deep, humus-rich, acid soils. Prefers moist, deciduous woods, growing in drier, shallower soils or open spaces	Leaves and stems used for rashes and itch	Chandler et al., 1979
<i>Mentha arvensis</i>	Canadian Mint	Found along forest edge, wet meadows and fields, riparian, swamps/marshes, lakeshores	Herb used for children with an upset stomach	Chandler et al., 1979
<i>Mitchella repens</i>	Partridgeberry, Squaw Vine	Moist and damp regions, and along the ground of forest covered areas	Plant used for beverage and medicine	Speck and Dexter, 1951
			Used for parturition, pregnancy	Lacey, 1993
<i>Myrica gale</i>	Sweet Gale	Found in watersides, bogs, edges of lakes and streams	Roots pounded, soaked in hot water and used for inflammation	Wallis, 1922



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Myrica pensylvanica</i>	Northern Bayberry, Waxberry	Coastal headlands and beaches, swamp and boggy forests, dry rocky forest and semi-open rocky ridges	Headaches: plant, snuff; inflammation: root poultice; exhilarant: tea, berries, bark, leaves	Wallis, 1922
<i>Nicotiana tabacum</i>	Cultivated Tobacco; <i>*nutnawey</i>	For adequate growth found in soils without a high level of nitrogen	Used for arthritis, mouthwash, pain, rheumatism, stomatitis	Lacey, 1993
<i>Nuphar advena</i>	Yellow Pond Lily; <i>*pagose</i>	Found in the floating leaved plant community, found in shallow depths, in less than 1 meter of water, in lakes, ponds, and stillwater	Drowning, earache	Lacey, 1993
			Leaves used for bleeding	Chandler et al., 1979
			Leaves used for earache	Chandler et al., 1979
			Poultice of bruised root with flour or meal applied to swellings and bruises	Speck, 1917
			Swellings of the limbs: leaves	Chandler et al., 1979
			Swellings, bruises: root with flour, poultice	Speck, 1917
<i>Nuphar variegatum</i>	Yellow Water Lily, Big One Side, Cow Lily; <i>*pagose</i>	Wetlands ranging from lakes, ponds and stillwaters	Root brewed into tea or worn around neck as general preventative	Lacey, 1977
			Used for swelling	Lacey, 1993
<i>Nymphaea odorata</i>	American White Waterlily, Sweet- Scented Water Lily; <i>*pagose</i>	Slow moving rivers, lakes and mucky ponds	Juice of root taken for coughs	Speck, 1917
			Leaves used for colds	Chandler et al., 1979
			Poultice of boiled root applied to swellings	Speck, 1917



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
			Root decoction used for coughs, swellings	Speck, 1917
			Roots used for colds, grippe, swelling; leaves used for suppurating glands	Chandler et al., 1979
			Roots used for suppurating glands and leaves used for colds	Chandler et al., 1979
			Used as preventive, swelling	Lacey, 1993
<i>Panax quinquefolius</i>	American Ginseng	Found in woodlands	Roots used as a "detergent for the blood"	Chandler et al., 1979
<i>Panicum capillare</i>	Witch Grass	Growth in disturbed areas, along roadsides, headlands and on lakeshores	Tonic	Lacey, 1993
<i>Phytolacca americana</i>	American Pokeweed; Pigeon-berry	Found in thickets, fields, roadsides and clearings	Leaves used for bleeding wounds	Chandler et al., 1979
			Leaves used for bleeding wounds	Wallis, 1922
<i>Picea glauca</i>	White Spruce; * <i>Kawatkw; kawtk</i>	Tolerable of a wide range of moisture conditions, mainly found along the coast and in old fields	Bark used as a cough remedy	Chandler et al., 1979
			Bark used for beverage and medicine	Speck and Dexter, 1951; Wallis and Wallis, 1955
			Bark used to prepare a salve for cuts and wounds	Chandler et al., 1979
			Gum and twigs used for scurvy	Chandler et al., 1979
			Gum used for scabs and sores	Chandler et al., 1979
			Parts of plant used for stomach trouble	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Picea mariana</i>	Black Spruce; * <i>Kawatkw</i>	Primarily found on wet organic soils, peat bogs and swamps	Bark used for beverage or medicine	Speck and Dexter, 1951; Wallis and Wallis, 1955; Lacey, 1977
			Bark, leaves, twigs used for colds, cough, grippie; sap used for hemorrhage; unknown part used for kidney trouble; bark used for wounds	Wallis, 1922
			Colds, cough, grippie, scurvy: bark, leaves, twigs	Chandler et al., 1979
<i>Picea spp.</i>	Spruce; * <i>Kawatkw</i>	Found in boreal regions	Cough remedy: bark	Wallis, 1922
<i>Pinus strobus</i>	Eastern White Pine; * <i>kuwow</i> ; <i>kuwaq</i>	Thrives on dry/fresh, shallow and stony soils	Used for tuberculosis, infections, cold, tonic, laryngitis, scurvy, warts	Lacey, 1993
			Bark used for beverage or medicine	Speck and Dexter, 1951; Wallis and Wallis, 1955; Lacey, 1977
			Bark used for wounds and sap used for hemorrhaging	Chandler et al., 1979
			Bark, leaves and stems used for colds	Chandler et al., 1979
			Bark, leaves and stems used for coughs	Chandler et al., 1979
			Boiled inner bark used for sores and swellings	Speck, 1917
			Plant parts used for kidney trouble	Chandler et al., 1979
			Sap used for hemorrhaging	Chandler et al., 1979
			Used for colds, hemorrhage, nephrosis	Lacey, 1993



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Plantago major</i>	Common Plantain	Found in open, disturbed places such as waste areas, as well as in fields and along roads	Leaf poultice used for infected wounds	Lacey, 1977
			Used for gastrostis, sore, infection, sore, ulcer, wound, infection, sore, wound	Lacey, 1993
<i>Polygala senega</i>	Seneca Snakeroot	Found in upland gravel prairies, hill prairies, savannas, wooded slopes along rivers or lakes and abandoned fields	Root used for colds	Chandler et al., 1979
<i>Polypodium virginianum</i>	Rock Polypody	Grows on boulders, cliffs and rocky slopes and does not need well-developed soil	Infusion of plant used for urine retention	Rousseau, 1948
<i>Pontederia cordata</i>	Pickernelweed	Found in shallow water of marshes, swamps, bogs, ponds and protected areas of rivers where the water is slow-moving	Herbs used to prevent pregnancy	Chandler et al., 1979
<i>Populus balsamifera</i>	Balsam Poplar	Found on sites that are relatively rich in nutrients and less acidic, and in relatively small, localized stands	Barked baked, brewed into tea to treat worms	Chandler et al., 1979
			Buds and other parts of plant used as salve for sores, chancere	Chandler et al., 1979
<i>Populus</i> sp.	Poplar sp.; * <i>miti</i>	A variety of diverse habitats (open disturbed sites to grasslands to floodplain woodlands)	Used for cold, flu	Lacey, 1993
			Worms: bake bark, make tea	Lacey, 1977
<i>Populus tremuloides</i>	Quaking Aspen	Occurring alongside conifer trees, grow best in fertile, moist loams or well-draining silts or clay loams.	Bark used for colds	Chandler et al., 1979
			Bark used to stimulate the appetite	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Prunus cerasus</i>	Red Cherry; Sour Cherry	Found in moist, open woods	Used for cold, cough, hypertension	Lacey, 1993
<i>Prunus pensylvanica</i>	Pin Cherry	Dry to moist open forests and clearings	Wood used for chafed skin and prickly heat	Chandler et al., 1979
<i>Prunus serotina</i>	Black Cherry	Found in deciduous woodlands, open woodlands, woodland borders, fence rows, powerline clearances, vacant lots, and waste areas	Bark used for colds	Chandler et al., 1979
<i>Prunus spp.</i>	Wild Cherry; * maskwesmnaqsi; maskwe:simanagsi	Open woodland areas, thickets and various clearings	Bark used for coughs	Chandler et al., 1979
			Bark used for smallpox	Wallis, 1922
			Cold, cough, depurative, flu, tonic	Lacey, 1993
			Bark steeped for medicine	Lacey, 1977
<i>Prunus virginiana</i>	Bitterberry, Chokecherry	Found along streams, springs and seeps, intolerant of poor drainage, silty or sandy soils	Bark used for beverage and medicine	Speck and Dexter, 1951
<i>Pyrola asarifolia</i>	Liverleaf Wintergreen	Found in calcareous woods, thickets and wetlands	Bark used for diarrhea	Chandler et al., 1979
			Used for cough, diarrhea	Chandler et al., 1979
			Parts of plant used for kidney trouble	Chandler et al., 1979
			Gonorrhoea, kidney trouble, spitting blood: part not mentioned	Chandler et al., 1979
			Parts of plant used for spitting blood	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Quercus alba</i>	White Oak; *nimkwaqanimusi	Found on sandy plains, gravelly ridges, rich uplands, coves and well-drained loamy soils	Bark used to induce thirst; treat bleeding piles	Chandler et al., 1979
			Nuts used to induce thirst	Chandler et al., 1979
			Plant parts used for bleeding piles	Chandler et al., 1979
<i>Quercus rubra</i>	Northern Red Oak *nimkwaqanimusi	Grows on a variety of dry-mesic to mesic sites, occurs in rich, mesic woods, on sandy plains, rock outcrops, stable interdunes, and at the outer edges of floodplains	Bark and roots used for diarrhea	Chandler et al., 1979
<i>Quercus sp.</i>	Oak; *nimkwaqanimusi	Thrive in both lightly and well drained soils and granitic regions	Used for hemorrhage, piles	Lacey, 1993
<i>Ranunculus acris</i>	Tall Buttercup	Found in various locations such as in ponds, along shores and in meadows	Leaves used for headaches	Chandler et al., 1979
			Used as throat treatment	Chandler et al., 1979
			Used to treat cancer, headache, phobia	Lacey, 1993
<i>Rhexia virginica</i>	Meadow Beauty	Lightly shaded, wet regions such as swamps, higher parts of marshes, peaty lake margins and wet meadows and prairies	Leaves and twigs used as throat cleanser	Wallis, 1922
			Leaves steeped to produce a sour drink	Lacey, 1993
<i>Rhinanthus crista-galli</i>	Yellow Rattle	Typically growth in old fields, along roadsides and in places of prevalent waste	Used for epilepsy, seizures	Chandler et al., 1979
<i>Rhus glabra</i>	Smooth Sumac	Found on the edges of moist to dry black soil prairies, upland forests with a history of disturbance; thickets and woodland borders	Earache: part not mentioned	Lacey, 1993



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Rhus typhina</i>	Staghorn Sumac	Typically found in open areas such as fields, grasslands, along roadsides, hillsides and prairies	Used for cough, earache, sore throat Bark and roots used as a physic Berries and roots used for loss of appetite	Chandler et al., 1979 Chandler et al., 1979 Lacey, 1993
<i>Ribes uva-crispa</i> var. <i>sativum</i>	European Gooseberry; *kawaqteik; ka.to:mi:n	Found in rocky hillocks, forest margins, shores	Bark and roots used as a physic.	Chandler et al., 1979
<i>Rubus alleghaniensis</i>	Blackberry; * Ajyoqjimin; kl'muwejimin	Easily grown in well-drained loamy soil in sun and semi shade, specifically dry thickets, clearings and woodland margins, open meadows, roadsides.	Used for canker, diarrhea, sore throat, stomach, stomatosis	Chandler et al., 1979
<i>Rubus chamaemorus</i>	Cloudberry	Found in bogs, wet peaty meadows, and tundra	Roots used for cough	Chandler et al., 1979
<i>Rubus fruticosus</i>	Shrubby Blackberry;	Found in lower rainfall areas	Roots used for fever	Chandler et al., 1979
<i>Rubus hispidus</i>	*Ajyoqjimin Bristly Dewberry	Found in conifer swamps, wet hardwood forests, thickets and usually in an areas that are shaded, live in drainage ditches, low woods and swampy meadows	Bark and roots used for children's diarrhea Roots used for cough	Chandler et al., 1979 Lacey, 1993
<i>Rubus idaeus</i>	Raspberry; *Klitawmanaqsi'k; klitaw	Rocky grounds, along roadsides, and in exposed lands from deforestation	Roots used for fever	Chandler et al., 1979
<i>Rubus pubescens</i>	Dwarf Red Blackberry; *Ajyoqjimin	Grows in shaded environments and is common in the shaded understory beneath glossy buckthorn	Used for canker, diarrhea, sore throat, stomach, stomatosis Parts of plant used for irregular menstruation	Lacey, 1977 Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Rubus</i> sp.	Blackberry, Raspberry; *Ajiyojimin; klitaw	Found in a variety of habitats	Tea from canes used to treat stomach issues, with strawberry runners	Lacey, 1977
<i>Rumex crispus</i>	Curly Dock	Grows as a weed in pastures, hay fields, forages, landscapes, and some crop field areas	Infusion of roots used as a purgative	Mechling, 1959
			Roots used as a purgative	Chandler et al., 1979
			Roots used treat "cold in bladder"	Mechling, 1959
<i>Salix cordata</i>	Heartleaf Willow; Sand Dune Willow; Furry Willow	Found along dunes and lakeshores	Bark used for blisters	Chandler et al., 1979
			Bark used for colds	Chandler et al., 1979
			Bark used to stimulate the appetite	Chandler et al., 1979
<i>Salix discolor</i>	Pussy Willow;	Swamps, stream banks, marsh borders, floodplains and fens	Bruises, cancer, cold, nephrosis	Lacey 1993
<i>Salix lucida</i>	Shining Willow	Found in wetland habitats	Bark used for bleeding	Chandler et al., 1979
			Poultice of bruised leaves used on sprains and bruises	Wallis, 1922
<i>Salix nigra</i>	Black Willow	Found in marsh areas with standing water and most often seen along rivers and small streams, well suited to a riparian habitat	Poultice of scraped root and spirits applied to bruises and sprains	Speck, 1917
<i>Salix</i> sp.	Red Willow	Found in a variety of habitats	Fumitory	Lacey, 1993
<i>Sambucus canadensis</i>	American Elder; *Pukulu'skwimanaqsi'l	Various locations including wet barrens, swamps and open woodland areas	Berries, bark and flower used as a purgative and bark used as a physic	Chandler et al., 1979
			Berries, bark and flower used as a purgative and bark used as an emetic	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
			Emetic	Lacey, 1993
			Soporific, purgative: cones, berries, flowers; emetic, physic: bark	Chandler et al., 1979
			Used as cathartic, emetic	Lacey, 1993
<i>Sambucus racemosa</i>	Scarlet Elderberry;	Grows in riparian environments, woodlands, and other habitat, generally in moist areas	Herbs used as an "emetic (with round wood)"	Chandler et al., 1979
<i>Sanguinaria canadensis</i>	*Pukulu'skwimanaqsi'l Bloodroot	In or at the edge of rich, moist woods, in the shade	Infusion of roots used for colds	Rousseau, 1948
			Roots used for hemorrhages and to prevent bleeding	Chandler et al., 1979
			Roots used for infected cuts	Chandler et al., 1979
			Used as an abortifacient	Rousseau, 1948
			Used as an aphrodisiac	Rousseau, 1948
			Used for hemorrhage, rheumatism, tuberculosis	Lacey, 1993
<i>Sanicula marilandica</i>	Maryland Sanicle	Found in rich woods, meadows and shores	Roots used for irregular menstruation	Chandler et al., 1979
			Roots used for kidney trouble	Chandler et al., 1979
			Roots used for menstrual pain	Chandler et al., 1979
			Roots used for menstrual pain and slow parturition	Chandler et al., 1979
			Roots used for rheumatism	Chandler et al., 1979
<i>Sarracenia purpurea</i>	Northern Pitcher Plant	Bogs	Used to treat dyspepsia, nephrosis, tuberculosis	Lacey, 1993
			Herb used for pain	Chandler et al., 1979
			Herbs used for kidney trouble and consumption	Chandler et al., 1979
			Herbs used for spitting blood	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
			Roots steeped, used for sore throat, spitting blood	Speck, 1917
			Strong decoction of root taken for "spitting blood" and pulmonary complaints	Speck, 1917
			Used for spitting blood	Chandler et al., 1979
<i>Scirpus microcarpus</i>	Panided Bulrush	Found in course, fine, or medium textured saturated soils. Lowland to middle elevations in mountain riparian, marshes and wet meadow zones	Roots used for abscesses	Chandler et al., 1979
<i>Solanum dulcamara</i>	Climbing Nightshade	In open woods, edges of fields, fence lines, roadsides, and occasionally in hedges and gardens	Roots used for nausea	Chandler et al., 1979
<i>Sorbus americana</i>	American Mountain Ash; *aqamoq' wisqoq	Found along hedgerows and in open wooded areas	Bark used for "mother pains"	Chandler et al., 1979
			Bark used for boils	Chandler et al., 1979
			Infusion of root taken for colic	Speck 1917
			Parts of plant used as an emetic	Chandler et al., 1979
			Used for stomachache, witchcraft	Chandler et al., 1979
<i>Streptopus amplexifolius</i>	Ciaspleaf Twistedstalk	Found in wet sub-alpine woods and thickets, rich moist coniferous and deciduous woods at elevations	Parts of plant used for kidney trouble	Chandler et al., 1979
			Parts of plant used for spitting blood	Chandler et al., 1979
<i>Symphoricarpus albus</i>	Waxberry	Commonly found in gardens and surrounding buildings	Used for headache and as tonic	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Symplocarpus foetidus</i>	Skunk Cabbage;	Grows in large, dense stands in wet thickets, woods and swamps	Diabetes, toothache, tuberculosis Herb used for headache Herbs used for headache	Chandler et al., 1979 Lacey, 1993 Lacey, 1993
<i>Tanacetum vulgare</i>	Common Tansy	Found in pastures, hay fields, riparian habitats and wastelands	Herb used for prevention of pregnancy; leaves used for kidney trouble Herbs used to prevent pregnancy Leaves used for kidney trouble Bark used for bowel and internal troubles Leaf tea used for fever Parts of plant used for afterbirth pain and blood clots Parts of plant used for afterbirth pain and clots Parts of plant used for fever Inner bark, bark and stems used for burns Inner bark, bark and stems used for cough Stems used for headaches Twigs used for headache; leaves used for swollen feet and hands	Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Lacey, 1977 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979 Chandler et al., 1979
<i>Taxus canadensis</i>	Canada Yew	Found in forests, thriving in swampy woods, ravines, riverbanks and on lakes shores	Used for swelling Roots used for diarrhea.	Lacey, 1993 Chandler et al., 1979
<i>Thuja occidentalis</i>	Eastern White Cedar; * qaskusi; qaskusi a:qamikt	Found in swampy regions (both fresh and salt water) and near old pastures		
<i>Tiarella cordifolia</i>	Heartleaf Foamflower	Found in rich moist woodlands in the mountains		



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Tilia americana</i>	American Basswood	Found in moist soils along stream banks and pond margins. Also in low woods	Bark used for suppurating wounds	Chandler et al., 1979
<i>Tilia sp.</i>	American Basswood	Found in moist soils along stream banks and pond margins. Also in low woods	Inner bark, bark and stems used for cough	Chandler et al., 1979
<i>Trifolium pratense</i>	Red Clover	Found in open, moist or dry sites like old fields, pastures, roadsides and disturbed areas	Roots used for worms	Chandler et al., 1979
<i>Trifolium sp.</i>	Clover	Found in open, moist or dry sites like old fields, pastures, roadsides and disturbed areas	Used for infections, sores, wounds	Lacey, 1993
<i>Tsuga canadensis</i>	Eastern Hemlock; *Ksu:skw; kastuk; qast'k	Mountains (northern slopes) and valleys	Used as tonic	Lacey, 1993
			Used for fever, insect stings	Lacey, 1993
			Bark and stems used for colds	Chandler et al., 1979
			Bark used as cough medicine and for grippe	Chandler et al., 1979
			Bark used for beverage or medicine	Speck and Dexter, 1951; Wallis and Wallis, 1955; Lacey, 1977
			Bark used for stomach troubles, colds, cough, grippe; inner bark used for scurvy	Chandler et al., 1979
			Bowel and internal troubles, colds cough, grippe, bark	Wallis, 1922
			Inner bark used for chapped skin	Chandler et al., 1979
			Inner bark used for diarrhea	Chandler et al., 1979



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
			Parts of plant used for bowel, stomach and internal troubles	Chandler et al., 1979
			Roots and stems used for "cold in kidney"	Chandler et al., 1979
			Used to treat cold	Lacey, 1993
<i>Typha latifolia</i>	Broadleaf Cattail; *nukwa:luwejkewey; pogomaqan'skw	Found in full sun, wet conditions and soil that is muddy or sandy	Leaves used for sores	Chandler et al., 1979
<i>Ulmus rubra</i>	Slippery Elm; *wikpi	Found in moist, rich to dry, limestone soils	Bark used for suppurating wounds	Chandler et al., 1979
<i>Vaccinium macrocarpon</i>	Large-fruited Cranberry; *Su:n	Bogs and marshes	Tonic to treat urinary and bladder infections	Lacey, 1993
<i>Vaccinium myrtilloides</i> (presumed)	Blueberry; *Pkuman; pkwiman	Common in peat covered barrens, dry soil, headlands and sandy regions	Tonic for rheumatism	Lacey, 1993
<i>Vaccinium</i> spp.	Blueberries, Bilberries, Cranberries; *Pkuman; pkwiman; su:n	Flourish in acidic, sandy soils. Found in wetlands, bogs and meadows	Berry juice used, unknown ailment	Lacey, 1977
<i>Verbascum thapsus</i>	Common Mullein	Found in pastures and in gravel plains as well as along roadsides and in light soils	Used to treat asthma	Lacey, 1993
			Parts of plant used for sores and cuts	Chandler et al., 1979
<i>Viburnum lentago</i>	Nannyberry	Found in moist mixed grassland, aspen parkland and boreal transition	Roots used for irregular menstruation	Chandler et al., 1979
<i>Viburnum prunifolium</i>	Blackhaw	Found in rich mesic woodlands, upland woodlands, thinly wooded bluffs, rocky wooded slopes, limestone glades	Infusion of plant taken before and during parturition	Wallis, 1922



Species	Common Name (*Mi'kmaq name ¹¹)	Habitat	Mi'kmaq Traditional Use	Source
<i>Viburnum trilobum</i>	Highbush Cranberry; * <i>Nippanmaqs'i'l</i>	Predominantly along streams and in swamps	Used to treat adenopathy, swellings	Lacey, 1993
<i>Viola arvensis</i>	Field Pansy	Along roadsides and in fields	Effective in the treatment of sore eyes	Lacey, 1993
<i>Viola sp.</i>	Violet	Found in moist to mesic black soil prairies, open woodlands, wooded slopes along rivers or lakes	Conjunctivitis	Lacey, 1993

2.4.3 Additional Plant Uses

The Mi'kmaq have a long-standing history of utilizing the land for not only food and medicine, but have also harvested resources for aesthetic purposes and/or tool making. Table 7 provides the plant species that were traditionally used by the Mi'kmaq for variety of purposes including tools, construction, clothing, heat, dyes, etc.

Table 7: Plant Species Traditionally Used by Nova Scotia Mi'kmaq

Scientific Name	Common Name (*Mi'kmaq Name ¹²)	Habitat	Mi'kmaq Traditional Uses	Source
<i>Abies balsamea</i>	Balsam Fir; * <i>Stogn</i>	Various regions including mountains, canyons and valleys	Wood used for kindling and fuel; Boughs used to make beds.	Speck and Dexter, 1951; Unama'ki Institute of Natural Resources, 2012
<i>Acer pensylvanicum</i>	Moosewood; Striped Maple; * <i>Mimkutago'q</i>	Rocky woods, rich deciduous forests, wooded slopes and along streams	Thin saplings used in wigwam construction	Nova Scotia Museum factsheet, ND
<i>Acer rubrum</i>	Red Maple	Swamps, alluvial soils, and moist uplands	Used to make basketware.	Speck and Dexter, 1951

¹² DeBlois, 1996; Wallis and Wallis, 1995; Unama'ki Institute of Natural Resources, 2012



Scientific Name	Common Name (*Mi'kmaq Name ¹²)	Habitat	Mi'kmaq Traditional Uses	Source
<i>Acer saccharum</i>	Sugar Maple * <i>Snawey</i>	Well-drained soils	Used to make bows and arrows.	Speck and Dexter, 1951
<i>Acer</i> sp.	Maple	Various	Pins for securing clothing	Wallis and Wallis, 1964
<i>Alnus</i> sp.	Alder * <i>Tupsi</i>	Low ground in alluvial soils	Bark used to make a dye.	Speck and Dexter, 1951
<i>Betula papyrifera</i>	White/Paper Birch * <i>Maskwi</i>	Forests, especially on slopes	Bark used to make baskets; bark used to make boxes, coffins and other containers; bark used to make canoes; bark used to make dishes and cooking utensils; bark used to make house coverings.	Speck and Dexter, 1951; Speck and Dexter, 1951; Rousseau, 1948; Speck and Dexter, 1951; Speck and Dexter, 1951
<i>Betula alleghaniensis</i>	Yellow birch		Branches used as straps and thongs.	Wallis and Wallis, 1960
<i>Betula</i> sp.	Birch	Various depending on species	Bark used to make torches for night fishing. Bark used to make trumpets for calling game. Bark used to construct containers, boxes, and cups Bark sheets used in wigwam construction	Speck and Dexter, 1951; Speck and Dexter, 1951; Wallis and Wallis, 1955; Nova Scotia Museum factsheet, ND.
<i>Corylus cornuta</i>	Hazel root		Basketry	Wallis and Wallis, 1955
<i>Fagus grandifolia</i>	American Beech	Fertile uplands, rarely in swamps	Used to make snowshoe frames.	Speck and Dexter, 1951
<i>Fraxinus americana</i>	White Ash	Intervale forests, low ground, and open woods	Used to make axe and knife handles.	Speck and Dexter, 1951
<i>Fraxinus nigra</i>	Black Ash * <i>Wiskog</i>	Low ground, damp woods and swamps	Used to make basketware.	Speck and Dexter, 1951
<i>Galium tinctorium</i>	Stiff Marsh Bedstraw/ Small Bedstraw	Low-lying areas, brooks, marshes, and bogs	Roots used to make a red dye for porcupine quills.	Speck and Dexter, 1951
<i>Hierochloa odorata</i>	Sweetgrass * <i>Kjirnskiku</i>	Moist heavy soils, generally in the upper reaches of tidal marshes	Used to make baskets. Used to make mats.	Speck and Dexter, 1951
<i>Juniperus</i> sp.	Red Cedar	Various, depending on species	Wood used for kindling and fuel.	Speck and Dexter, 1951
<i>Larix laricina</i>	Eastern Larch/ Tamarack	Bogs and wet depressions in forests	Wood used for kindling and fuel.	Speck and Dexter, 1951



Scientific Name	Common Name (*Mi'kmaw Name ¹²)	Habitat	Mi'kmaq Traditional Uses	Source
	*Apu'tam'kie'jit			
<i>Picea glauca</i>	White Spruce; Cat Spruce; *Kawatkwa	Old fields and along the coast	Boughs used to make beds. Wood used for kindling and fuel.	Speck and Dexter, 1951 Speck and Dexter (1951)
<i>Picea mariana</i>	Black Spruce; Bog Spruce; *Kawatkwa	Bogs, swamps and poorly drained areas	Boughs used to make beds. Roots used as sewing material for canoe birch bark products. Wood used for kindling and fuel.	Speck and Dexter, 1951
<i>Pinus strobus</i>	Eastern White Pine	Bogs, swamps and poorly drained areas	Wood used for kindling and fuel.	Speck and Dexter, 1951
<i>Picea spp.</i>	Spruce	See White and/or Black Spruce	Poles for wigwam construction Root used as twine, for sewing	Nova Scotia Museum factsheet, ND Wallis and Wallis, 1955
<i>Salix sp.</i>	Willow	Various, depending on species	Leaves used as tobacco.	Speck and Dexter, 1951
<i>Taxus canadensis</i>	Canada Yew	Cool damp woods, ravines, climax coniferous, and wooded swamps.	Leaves used to make a green dye.	Speck, 1917
<i>Thuja occidentalis</i>	Eastern White Cedar	Lakesides and swamps or old pastures	Used to make arrow shafts; used to make canoe slats; wood used for kindling and fuel; woven into bags and mats; inner bark used as twine, for sewing	Speck and Dexter, 1951 Nova Scotia Museum factsheet, ND Wallis and Wallis, 1955
<i>Tilia spp.</i> ¹³	Basswood	Not native to NS	Bark woven into bags and mats	Nova Scotia Museum factsheet, ND
<i>Tsuga canadensis</i>	Eastern Hemlock	Northern slopes or ravines	Bark used to make a dye. Wood used for kindling and fuel.	Speck and Dexter, 1951
<i>Typha spp.</i>	Cattails	Marshes, wet depressions	Woven into bags and mats	Nova Scotia Museum factsheet, ND

¹³ There may be confusion over this common name, as basswood (*Tilia* species, or Linden) is not native to NS or NB.



2.5 Traditional Mi'kmaq Place Names

An investigation of the traditional place names of *Mi'kma'ki* (Figure 1) reveals much about the unique relationship held between the Mi'kmaq and the land and resources on which they depend. The names are versatile and dynamic; they describe where to find resources, features of the landscape or where events took place. The names were descriptive of place but also represent the imagination and interpretation of a people moving through a dynamic and changing landscape. Evidence of this can be found in the language, history and myths of the Mi'kmaq people.

Language is one way cultures structure, give meaning to, and interact with the world around them. This is especially true for indigenous peoples with longstanding connections to a place. “Language is the principal instrument by which culture is transmitted from one generation to another, by which members of a culture communicate meaning and make sense of their shared experience. Because language defines the world and experience in cultural terms, it literally shapes our way of perceiving — our world view” (Canada, 1996). The Mi'kmaq language emerged from the sustained presence of the people in their territory for over 10 000 years. This ancient relationship has resulted in a distinct worldview which is inherently place based due to the cumulative experience of the people interacting with the landscape. The place names that were developed through this process give insight into the changing nature of the landscape, but also the cultural nuances of the people.

Before the arrival of European settlers the Mi'kmaq were a nomadic people, migrating seasonally throughout *Mi'kma'ki*. This freedom from a single dwelling place played a role in the way the Mi'kmaq conceptualized both the physical geography of their territory, and understood their place within it. While the Mi'kmaq frequented certain locations, their interaction with the landscape and conceptualization of space was based on movement through an area, rather than the identification of a single point or location. Unlike European languages, the Mi'kmaq language is verb oriented. Many place names are verbs rather than nouns, describing a sense of ‘being from’ or ‘going to’ a given place (Sable and Francis, 2012). The Mi'kmaq relationship to place was more important than any one location; the people interacted with the land through a dynamic interpretation of the landscape as they moved through it. While many names may appear to describe a single location, these names represented cultural indicators which the people interpreted in relation to the surrounding area and the collective memory of the people.

Place names also give insight into the character of the Mi'kmaq and their traditional beliefs and way of life. This is evident in the role that oral history played in the interpretation of landscape and underlying lessons on how they ought to interact with it. Although many names appear to describe a physical characteristic of the landscape, many of these names are tied into cultural practices, concepts or myths (Hornborg, 2008). This is common in many indigenous cultures with oral traditions where place names act as mnemonic devices, providing a framework for cultural identity and memory

(Sable & Francis, 2012). An example of this are the connection between myth and the explanation of place, such as the relationship between the Glooscap myths and many place names along the shores of the Bay of Fundy (Sable and Francis, 2012). These myths and legends held many moral lessons, but also acted as oral maps of the territory.

The Mi'kmaq conceptualization of place is a complex and holistic subject that intertwines the language, culture, myth and territory of the Mi'kmaq people. Unfortunately during the colonial period many aspects of this Mi'kmaq tradition were lost or forgotten. The following tables offer an incomplete account of the place names within a 10km radius of the study area, as well as other prominent places names from within the region. Some of the place names included here occur in multiple instances across the province and are marked with an asterisk. For example, the name Partridge Island most likely refers to Partridge Island in the Bay of Fundy, as described in the Glooscap myths.

Millbrook place names (Table 8) and corresponding distance markers (Appendix A).

Table 8: Millbrook Place Names

Place Name	Mi'kmaq Name	Meaning	Source
Andrew Brook	<i>Kēgulugojooitk'</i>	The water tumbles and dashes in all directions	Rand, 1919
Black Rock*	<i>Maktāwopskek</i>	The black rock	Rand, 1919
Brookfield	<i>Bankwenopskw</i>	We hunt him amongst rocks	Rand, 1919
Eagles Nest Point	<i>Kitpoo-aykaddy</i>	A place of eagles	Frame, 1892
Higgins Brook*	<i>Kēskedeēmesaak;</i> <i>Keskēdē-emēsaak</i>	A Rocky Ridge	Rand, 1875; Rand, 1919
Onslow/North River	<i>Pogopskegek</i>	N/A	Rand, 1919
Salmon River*	<i>Pālamooā Seboo</i>	Salmon River	Frame, 1892
Shubenacadie	<i>Agekade;</i>	N/A	Rand, 1919
	<i>Wolnīpkookoogwak</i> (River mouth)	Swan hunt	Rand, 1919
	<i>Sāsooguloomin</i> (The place above Shubenacadie River)	Abounding in quartz crystals	Rand, 1919
Cobequid Bay	<i>Wāgōbāgitk'</i>	The bay runs far up	Rand, 1919
	<i>Wāgōbāgitk</i>	The end of the flowing current	Rand, 1919
	<i>Wāgobagitk</i>	The end of the water's flow	Rand, 1919
	<i>Wagobagitk</i>	End of rushing water	Rand, 1919
	<i>Maycobegilk</i>	'end of the flowing' meaning the bound of the rushing water, the tide or bore); Cobequid, Truro, now Salmon River.	Frame, 1892

*Multiple instances retrieved from database



3 METHODOLOGY

The project methodology was developed in accordance with the MEKs Protocol adopted by the Assembly of Nova Scotia Chiefs, through the Kwilmu'kw Maw-klusuagn (KMK). The KMK MEKs Protocol provides a number of key guidelines and standards on suggested practices and procedures relevant to the planning, design, development, implementation and reporting of a MEKs.

The methodology for the MEK Study for the proposed wind farms consisted of three main elements. The NEXUS Team conducted a desktop review to gather all relevant information pertaining to the project study areas, historical Mi'kmaq knowledge and Mi'kmaq resource use. Workshops with local Mi'kmaq knowledge holders enabled the collection of local site-specific knowledge of historical and current Mi'kmaq use of natural resources in the area¹⁴. Field surveys updated the available knowledge of the study areas.

3.1 Literature Review

Archival documents and published works were reviewed for information regarding the past and present Mi'kmaq occupation and use of the Study Areas. The NEXUS Team utilized a range of data sources including historical documents, journal articles, published books, Nova Scotia Public Archives and Records, microfiche scans and local archives. A thorough literature review on existing knowledge and mapped data facilitates the preparation of a concise and accurate MEKs report.

3.2 Mi'kmaq Ecological Knowledge Workshop Preparation and Protocol

NEXUS has adopted the workshop format for conducting MEKs. The process for collecting TEK has moved away from the individual informant interview process to one that brings small groups of community members together in a workshop format. This process enables researchers an opportunity to observe and collect information from a variety of sources (such as youth, elders, women, hunters, community leaders, etc.) during focus group sessions.

The workshop format provides the opportunity to assess the validity of information collected. A participant who is knowledgeable about historical activity or environmental matters is just as concerned about the accuracy of information as any researcher. However, there remains the temptation to embellish certain facts to ensure the final decisions favor the participant's community or agenda (Johannes, 1993). In addition, there is also the risk of having non- MEK experts participating in the study as a means of receiving outside recognition (these individuals have been referred to in Mi'kmaq communities as 'glory seekers'). These individuals do not intend to compromise the reliability of the information gathered in MEKs, however, it does identify the need to integrate a process whereby the information collected is verified.

¹⁴ Workshops are scheduled for mid-April.



This workshop format provides a number of benefits to ascertain the validity of information collected. First, the group dynamic created in a workshop format provides the opportunity to dampen embellishment of stories and information. Second, groups can provide multiple perspectives on past community experience and stories passed down from generation to generation within the community. Third, group sessions allow the opportunity for conversations amongst community members, which may trigger old memories. Fourth, groups can provide greater understanding on the 'systems' used in the community to pass information between community members and between generations. Finally, workshops are a more cost and time effective means to conduct MEK surveys. These benefits are not present in 'one on one' interviews between a researcher and participant.

The workshop format requires engagement of Mi'kmaq knowledge holders at the community level. NEXUS worked with individuals from local Mi'kmaq communities in acquiring information on current use and interest of the Study Areas as well as preparing the workshops.

3.3 Surveys of the Study Areas

In addition to the evidence of Mi'kmaq knowledge of the Study Areas, information on the general area encompassing the site was achieved through the workshop maps, field surveys and habitat modeling exercise.

3.3.1 *Mi'kmaq Knowledge Workshop Maps*

NEXUS collected Mi'kmaq Ecological Knowledge from workshop participants in relation to the three Study Areas. NEXUS digitized the aggregated data on the maps produced in the workshops. The final MEKs maps were entered into a Geographic Information System (GIS) using ArcGIS to create user-generated maps. Copies of these maps are included in this report.

3.3.2 *Field Survey for General Habitats and Plant Species*

[This section will be revised upon completion of field survey in June]

Field surveys of the Study Areas will be completed to identify and locate plants and other related resources that may be of importance. Field surveys identified plants used by the Mi'kmaq located within the Study Areas.

A vegetation survey will be conducted. The vegetation survey was used to verify the presence of plant species identified during the desktop review stage in the Study Areas. The survey will consist of optically controlled meanders through habitat polygons identified to potentially contain plants of significance to Mi'kmaq. General locations of significant plants will be identified in the field using GPS and photographs recorded with a digital camera.



3.3.3 *Wildlife Habitat Modeling Exercise*

Wildlife species potentially located in the Study Area were determined through an analysis of available information. The analysis included information obtained on the historical and contemporary use of wildlife and fish resources by Mi'kmaq (from the literature review and workshop) combined with known wildlife habitat preferences and the results of the habitat surveys.

Information obtained from the literature review, field surveys and workshop were compiled and a habitat modeling exercise conducted. The likelihood of each species' presence on the Study Areas was determined by comparing habitat preferences of NS wildlife species with the habitats known to occur on the Study Areas.

3.4 Analysis of Primary Data

This report includes an analysis of data achieved through workshop, surveys and the collation of supplementary data. The analysis provides a comprehensive and accurate account of the Mi'kmaq Ecological Knowledge, as well as the Mi'kmaq practices, interests and uses within the Study Areas.



4 RESULTS

4.1 Mi'kmaq Ecological Knowledge Workshops

A workshop was held with members of Millbrook First Nation in order to discuss current land and resource uses within the four Study Areas. The workshop occurred on Thursday April 11, 2013 at the Glooscap Heritage Centre. Hunters, fishers and harvesters attended the meeting. These participants provided information on the Study Areas (Truro Heights, Millbrook and Whynott's Settlement) and provided considerable insight into the current state of use and knowledge associated to the areas near the Millbrook reserve. While some participants were familiar with the Whynott's Settlement and Pockwock Study Areas, the vast majority of input focused on the Truro Heights and Millbrook Study Areas.

Insightful conversations with the Glooscap First Nation provided information that due to the long distance to the four Study Areas that the majority of hunters, fishers and harvesters in the community were not currently frequenting the Study Areas on a regular basis. Although members of Glooscap First Nation have traditionally travelled to these areas and hold interest in the areas, no community members attended the workshop.

Conversations with individuals from the Acadia First Nation led to the understanding that there has been little recent harvesting activity in the area near the Study Areas, thus participation in a workshop would be unnecessary. Active hunters from the Acadia Band travel to Sheet Harbour, NS and Musquodobit NS to hunt. It is important acknowledge the long-standing relationship the Mi'kmaq have with *Mi'kma'ki* and locally, the Study Areas. This intimate relationship is not defined solely by the current use and occupation of a geographical area but by the extensive awareness and interests the Mi'kmaq hold of regions resources. Therefore, the current absence of Mi'kmaq from an area should not be mistaken for an absence of interest (current and future) of the area and resources located within the Study Areas.

The general attitude towards the potential wind farm developments was positive; many participants supported development of non-carbon based or 'green' energy sources. Some concern was expressed over the benefits from the project to the local community. Another issue raised was the potential impacts of the turbines on local wildlife migratory patterns, particularly winged species such as birds, bats and insects. Potential impacts on the Millbrook community (ex. noise) were perceived to be minimal due to the distance from the nearest houses to the proposed turbine location and the density of the forested area between these locations.

4.1.1 *Millbrook Study Area*

During the workshop, participants provided considerable information about current Mi'kmaq uses and knowledge of the areas in and around the project Study Areas: Millbrook and Truro Heights. Observations on land and resources use by the meeting participants are illustrated in Figure 3 and Figure 4. The primary activities cited by meeting participants were hunting, fishing, gathering, ATV trekking and hiking.

Millbrook Study Area

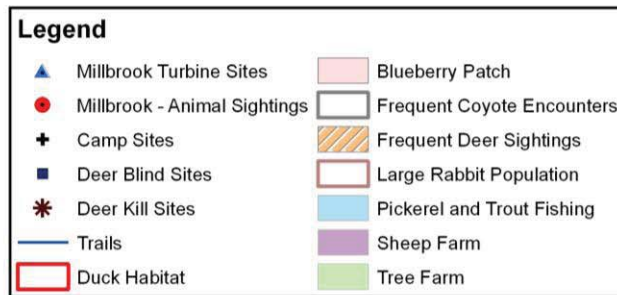
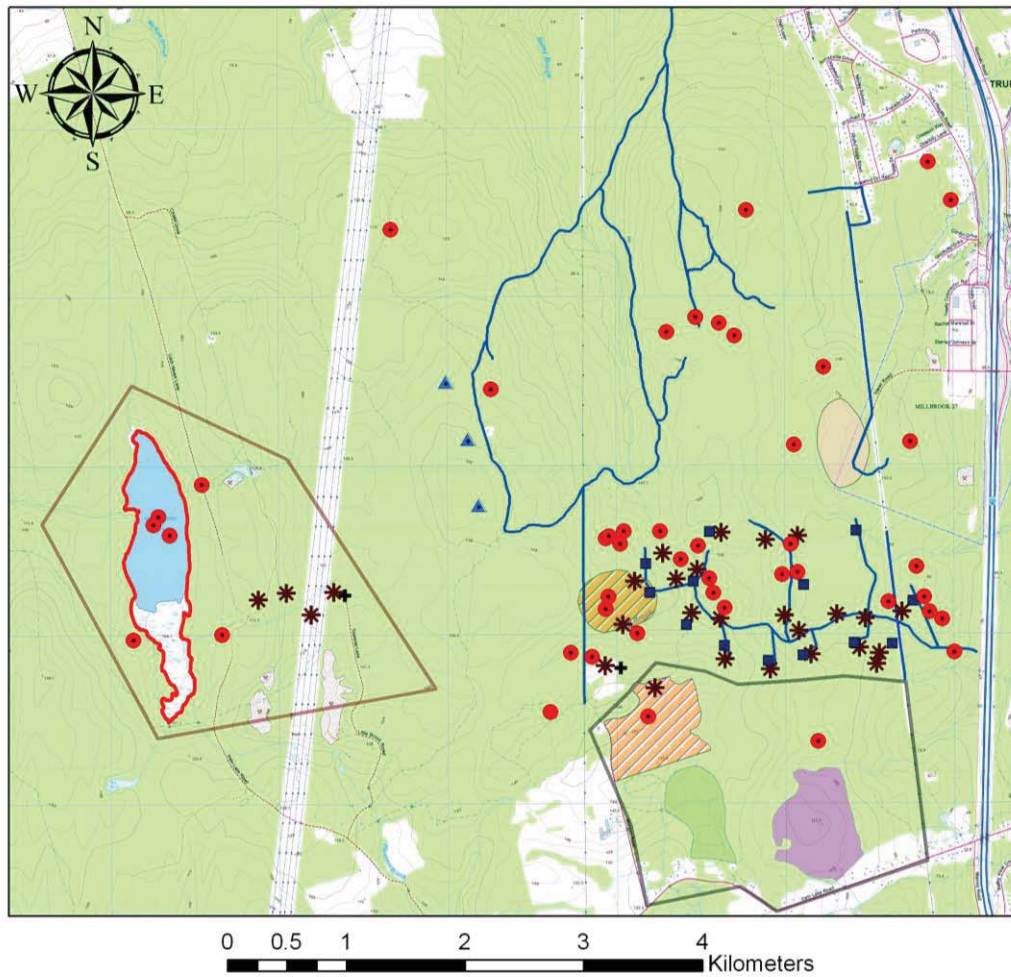


Figure 3: Millbrook Study Areas Use

Millbrook Study Area

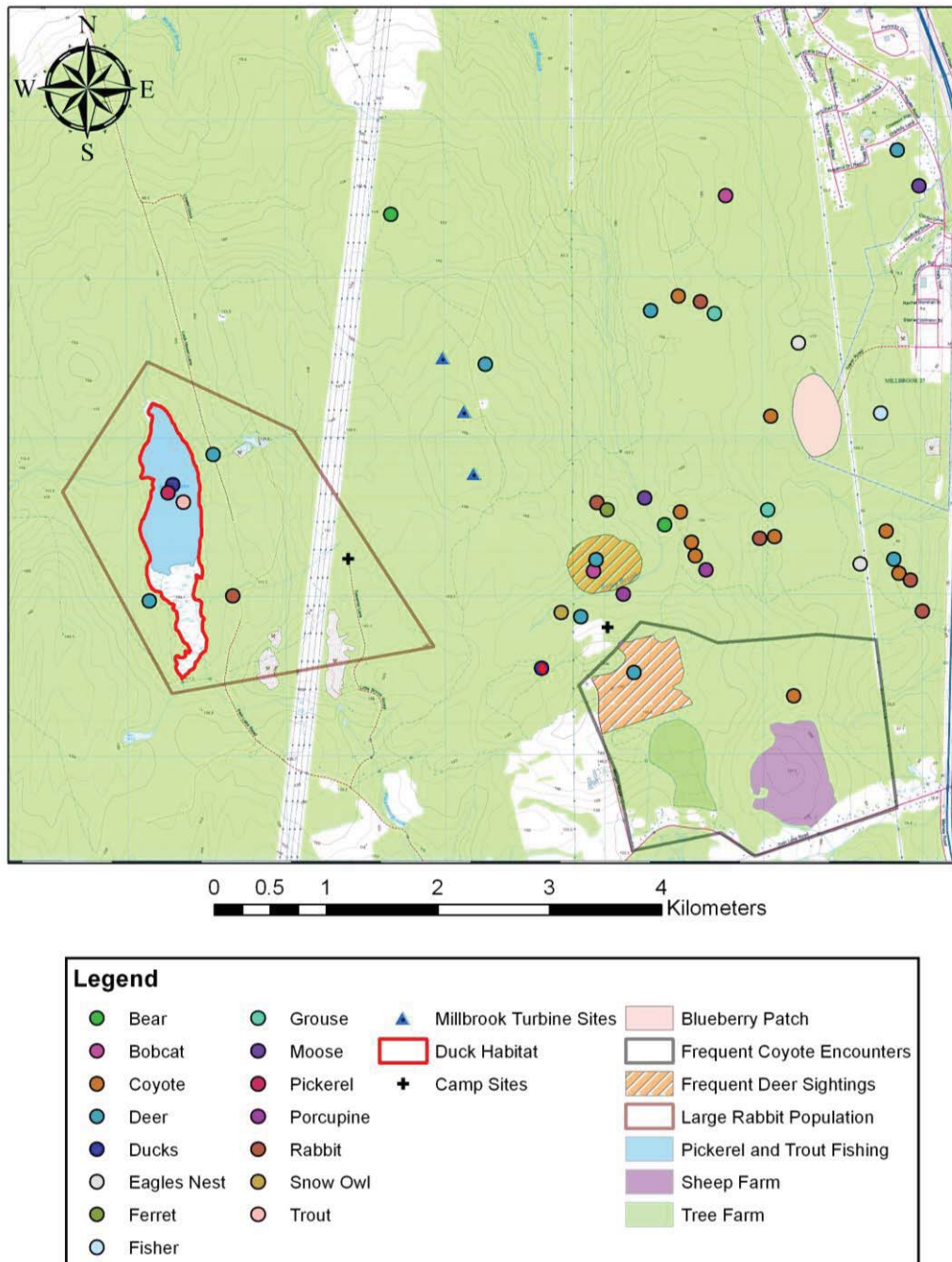


Figure 4: Millbrook Study Area Animal Sightings and Areas of Interest

Deer hunting was the most common resource activity cited by workshop participants. This is both a common activity and important source of food for community members. Various deer sightings and kill sites were identified Figure 5. The area directly adjacent to the reserve and to the east of the Study Area was the most commonly utilized zone for deer hunting within the broader study area. Participants explained that access to this area was easiest due to the close proximity of the community and the density of roads,

trails and footpaths. The population of deer was described as quite high, and although deer hunting is undertaken across the region, participants explained that they did not have to travel far to find deer, often preferring to stay in the easily accessible area adjacent to the reserve. Deer were often sighted in areas with clearings, such as along back roads, near the power lines and clear-cut grassy areas.

Millbrook Study Area

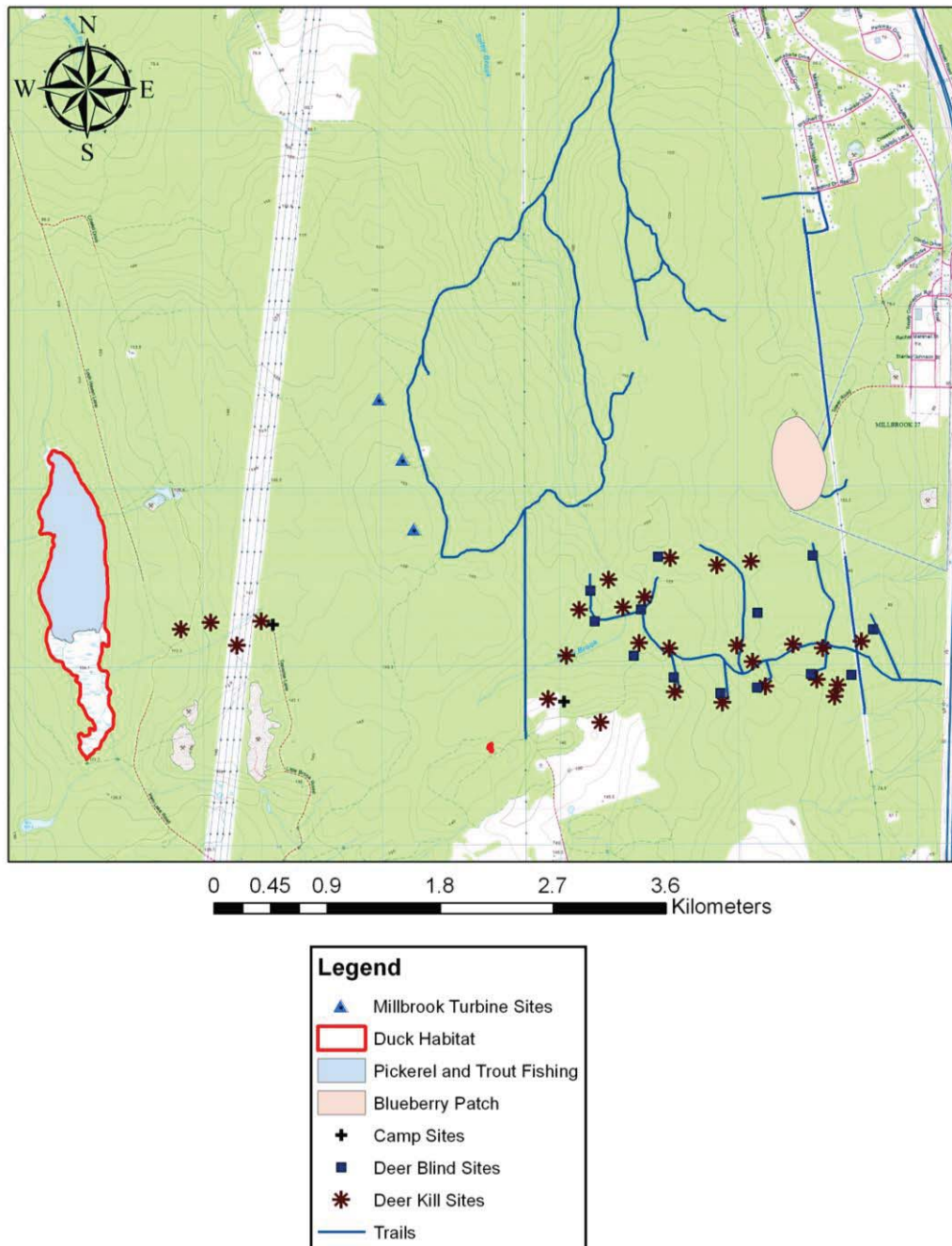


Figure 5: Study Area Resource Harvest



Workshop participants also described hunting for rabbits, bear, grouse and ducks. These animals, along with deer, are mobile and their distribution in the area was considered to be relatively even. Ducks and geese migrate through the area, but due to the relatively few water bodies in the region they were not as common as compared with other regions with higher densities of lakes, rivers and streams.

Many workshop participants also described fishing in streams, brooks, ponds and Irwin's Lake. The most commonly caught species were trout, pickerel and to a lesser extent eel. Concern was raised by several members about the increasing abundance of pickerel in the lake. Pickerel was introduced to the area and was said to be taking over the lake, threatening native and fish used for food. Although fishing is common activity in the area, participants described the need to move further away from the community to more productive fishing grounds to fish for a particular species.

The Study Area was also said to hold many valuable plant species. A popular blueberry patch was noted, and participants described collecting sweet grass, wild cherries and goldenrod near Irwin's lake and along watercourses. The location of medicinal species was not provided due to the high level of cultural and spiritual importance associated to them. The participants explained that there were many medicinal plants in and around the Study. The request to exclude specific locations and species was respected.

Many participants frequented the Study Area for recreational purposes including ATV trekking, hiking, sightseeing and swimming. The participants demonstrated intimate knowledge of the network of roads, trails and footpaths, which created an access network throughout the region. Many species in addition to those hunted were noted inhabiting the area. These include large cats such as bobcats, moose, coyotes, beavers, otters, ferrets, porcupine, fishers, eagles, owls and numerous species of small birds. Coyotes were said to be increasing in numbers in the region and were particularly common in the southern region of the study area due to the presence of a sheep farm. Participants also noted that eagles were nesting in the area, identifying locations near the community.

4.2 Results of General Habitats and Plant Species Survey

A site assessment was completed to identify and locate potential medicinal plants and other related resources located in the Study Areas.

[This section will be updated upon completion of field survey in June]

4.3 Wildlife Habitat Modeling Exercise

Wildlife species potentially occurring in the Study Areas were determined from an analysis of the historical use of wildlife and fish resource by Mi'kmaq (Section 2.3), combined with known wildlife habitat preferences and the habitat surveys.

[This section will be updated upon completion of field survey in June]



5 DISCUSSION & CONCLUSION

The MEKS demonstrates that there has been a long-standing relationship and interest with the regions in and around the Study area.

The meeting held with Mi'kmaq participants from the Millbrook First Nation highlights the vested interest the Mi'kmaq have with their traditional territory. Many users described learning about the lands, resources, skills and knowledge from their relatives, friends and family members. Elders and the fathers of hunters were often cited as the source of knowledge about a particular region or hunting technique. The knowledge of the study areas demonstrated by meeting participants suggest that the Mi'kmaq ecological and traditional knowledge associated to these areas is still accessible in the communities and is being utilized by a wide range of community sectors, from youth to elders. While some activities and areas are more commonly cited than others, the level of community interest in the lands and resources remains active and relevant.

In keeping with the principles and statements of the United Nations Declaration of the Rights of Indigenous Peoples, future planning and collaboration between the project proponent and Mi'kmaq should be implemented and maintained through the application of Mi'kmaq Ecological Knowledge.

[This section will be updated upon completion of field survey in June]



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Appendix A: Millbrook Place Names Radius Table

Centre Point: Irwins Lake 45° 19' 10" N, 63° 21' 58" W

Place Name	Feature Type	Distance (km)
Alder Brook	River	11
Andrew Brook	River	8
Anthony's Nose	Cape	10
Baird Brook	River	5
Beaver Brook	River	5
Beaver Brook	Unincorporated area	5
Beech Hill	Mountain	7
Bible Hill	Village	11
Black Rock	Unincorporated area	9
Brookfield	Unincorporated area	10
Brookside	Unincorporated area	11
Carter Creek	River	6
Central Onslow	Unincorporated area	7
Chiganois River	River	6
Clifton	Unincorporated area	7
Colchester	Geographical area	9
Colchester	Major municipal/district area - major agglomeration	9
Crowe Mills ** ‡	Unincorporated area	9
Crowes Brook	River	8
Crowes Mills	Unincorporated area	9
Debert Game Sanctuary ** ‡	Conservation area	10
Debert Wildlife Management Area	Conservation area	10
Eagles Nest Point	Cape	10
Farnham Brook	River	9
Fisher Creek	River	9
Five Mile River	River	11
Fivemile River ** ‡	River	11
Fort Belcher	Unincorporated area	6
Foundry Hill **	Mountain	9
Galloping Brook	River	9
Green Creek	Unincorporated area	9



Place Name	Feature Type	Distance (km)
Green Oaks	Unincorporated area	9
Greens Creek	Bay	10
Greens Creek ** ‡	River	10
Higgins Brook	River	6
Higgins Pond	Lake	9
Hilden	Unincorporated area	6
Irwin Lake ** ‡	Lake	0
Irwins Lake	Lake	0
Lake Brook	River	10
Lepper Brook	River	9
Lightbody Brook	River	10
Lockherds Point	Cape	9
Lower Onslow	Unincorporated area	7
Lower Pleasant Valley	Unincorporated area	6
Lower Truro	Unincorporated area	6
Lyons Head	Cape	6
MacElmons Pond	Lake	10
MacElmons Pond Provincial Park	Conservation area	9
Masstown	Unincorporated area	12
Maynard Brook	River	7
McClures Brook	River	6
McClures Mills **	Unincorporated area	6
McCurdy **	Unincorporated area	8
McCurdy Brook	River	9
McCurdys Corner	Unincorporated area	9
McLure Brook ** ‡	River	7
McNutt Brook	River	5
Mill Brook	River	4
Mill Brook	River	5
Millbrook	Unincorporated area	5
Millbrook 27	Indian Reserve	5
North River	River	9
Old Barns	Unincorporated area	4
Oliver Brook	River	10
Onslow	Unincorporated area	9



Place Name	Feature Type	Distance (km)
Pitch Brook	River	8
Plaster Brook	River	7
Pleasant Brook	River	7
Pleasant Valley	Unincorporated area	9
Princeport	Unincorporated area	9
Princeport Road	Unincorporated area	6
Salmon River	River	5
Salmon River	Unincorporated area	11
Shubenacadie River	River	9
Sibleys Pond	Lake	11
Smith Island	Island	6
Soley Brook	River	6
South Brook	River	9
South Maitland	Unincorporated area	11
Staples Brook	River	10
Trenholms Lake	Lake	10
Truro	Town	8
Truro 27A	Indian Reserve	6
Truro 27B	Indian Reserve	6
Truro 27C	Indian Reserve	6
Truro Heights	Unincorporated area	5
Upper Brookfield	Unincorporated area	11
Upper Onslow	Unincorporated area	10
Upper Pleasant Valley **	Unincorporated area	8
Wilson Brook	River	10
Withrows Lake	Lake	12
Yuill Island **	Island	5
Legend		
**	Indicates a former name	
‡	Indicates that the official name is available	
†	Indicates that this name is available in another language	
◇	Indicates a Pan-Canadian feature	

APPENDIX J

SHADOW FLICKER MODELING RESULTS

Receptor ID	Easting (n)	Northing (n)	Predicted Shadow Hours/Year	Predicted Max Shadow Hours on Worst Day
R1	473775	5016000	0:00	0:00
R2	471604	5019761	9:33	0:19
R3	472499	5017583	0:00	0:00
R4	474225	5016471	0:00	0:00
R5	472428	5016997	0:00	0:00
R6	472543	5017353	0:00	0:00
R7	474045	5017415	0:00	0:00
R8	474352	5016574	0:00	0:00
R9	471614	5019760	9:49	0:19
R10	474363	5016638	0:00	0:00
R11	474359	5016620	0:00	0:00
R12	472929	5016882	0:00	0:00
R13	474314	5016568	0:00	0:00
R14	473838	5016099	0:00	0:00
R15	473830	5020409	0:00	0:00
R16	474685	5016573	0:00	0:00
R17	472551	5017331	0:00	0:00
R18	472411	5016993	0:00	0:00
R19	474180	5016427	0:00	0:00
R20	474727	5016551	0:00	0:00
R21	473762	5016018	0:00	0:00
R22	474618	5016575	0:00	0:00
R23	474134	5016628	0:00	0:00
R24	472471	5016611	0:00	0:00
R25	473960	5016937	0:00	0:00
R26	472207	5016928	0:00	0:00
R27	472411	5017283	0:00	0:00
R28	474398	5016593	0:00	0:00
R29	473955	5016912	0:00	0:00
R30	472970	5016893	0:00	0:00
R31	474748	5016539	0:00	0:00
R32	474448	5016606	0:00	0:00
R33	473888	5017451	0:00	0:00
R34	473865	5016138	0:00	0:00
R35	474015	5016870	0:00	0:00
R37	472480	5016886	0:00	0:00
R38	472391	5017299	0:00	0:00
R40	473443	5015971	0:00	0:00
R41	474170	5016589	0:00	0:00
R42	474100	5016704	0:00	0:00
R43	473683	5015969	0:00	0:00
R44	471881	5017668	0:00	0:00
R45	474251	5016491	0:00	0:00
R46	474298	5016537	0:00	0:00
R47	472365	5016888	0:00	0:00
R48	474175	5016448	0:00	0:00
R49	473631	5015959	0:00	0:00
R50	473475	5015980	0:00	0:00
R51	473696	5015989	0:00	0:00
R52	473993	5016908	0:00	0:00
R53	474681	5016617	0:00	0:00
R54	474120	5016709	0:00	0:00
R55	474357	5016656	0:00	0:00
R56	473404	5015962	0:00	0:00
R57	474156	5016646	0:00	0:00
R58	472485	5017083	0:00	0:00
R59	472571	5017438	0:00	0:00
R60	472575	5017447	0:00	0:00
R61	472692	5017609	0:00	0:00
R62	471777	5017978	4:07	0:17
R63	471776	5017966	9:32	0:17

Receptor ID	Easting (n)	Northing (n)	Predicted Shadow Hours/Year	Predicted Max Shadow Hours on Worst Day
R64	471767	5017960	9:24	0:17
R65	471748	5017979	9:01	0:17
R66	471736	5017969	8:52	0:17
R67	471966	5018988	0:00	0:00
R68	471476	5018827	0:00	0:00
R69	471485	5018758	0:00	0:00
R70	471511	5018546	0:00	0:00
R71	474646	5017031	0:00	0:00
R72	474607	5017073	0:00	0:00

*R36 removed from model after field truthing confirmed that there was no structure at this location

*R39 removed from model as it is considered a participating receptor

APPENDIX K
ELECTROMAGNETIC INTERFERENCE STUDY
CORRESPONDENCE



May 3, 2013

Mr. Danny Splettstosser
Truro-Millbrook Wind Limited Partnership
4845 Pearl East Circle, Suite 200
Boulder, CO 80301

Dear Mr. Splettstosser,

RE: Summary Report – Electromagnetic Interference Study (EMI)
Proposed Millbrook/Truro Heights Community Wind Project

INTRODUCTION

Strum Consulting have been mandated by JUWI to verify the impact of the deployment of a 5 turbine proposed windfarm on the telecommunication systems operating within the region. This report presents the preliminary results of the impact study, identifying telecommunication systems in the proposed windfarm area that might be affected by interference due to the operation of the wind turbine generators. The study aims to identify radar and navigation systems, broadcast systems and point to point communications susceptible to be affected by windfarm interference. Consultation zones related to broadcast TV, Radio and TV Reception points have been provided on Figure 2 (attached).

The methodologies used in this study are in accordance with the RABC/CanWEA published guidelines.

This assessment has been completed using the coordinates listed in Table A, below, as placement and elevation of the wind turbines.

Turbine ID	X	Y	Ground Elevation (meters)	Nacelle Height (meters)	Rotor Diameter (meters)	Total Height (meters)
WTG1	473179	5018760	154.94	100	122	316
WTG2	473139	5019140	150.58	100	122	312
WTG3	473153	5019590	141.19	100	122	303
WTG4	473382	5018400	148.73	100	122	310
WTG5	473454	5018060	144.52	100	122	306

Coordinates – UTM Zone 20 North

Engineering • Surveying • Environmental

Head Office
Railside, 1355 Bedford Hwy.
Bedford, NS B4A 1C5
t. 902.835.5560 (24/7)
f. 902.835.5574

Antigonish Office
3-A Vincent's Way
Antigonish, NS B2G 2X3
t. 902.863.1465
f. 902.863.1389

Deer Lake Office
101 Nicholasville Road
Deer Lake, NL A8A 1V5
t. 855.770.5560
f. 902.835.5574

TELEVISION BROADCAST SYSTEMS

Of the telecommunication systems susceptible to interference from the wind turbine operation, analog television reception is most likely to be affected. Analog television interference from wind turbine generally occurs as video distortion taking the form of a movement of the picture synchronized with the blades passage frequency. It should also be noted that analog signal transmission has been predominantly replaced the majority of TV broadcast operators have converted their analog NTSC TV stations to the ATSC North American digital standard. As required by a decision of the CRTC (Public Notice CRTC 2007-53),

In the case of the Truro-Millbrook site, three analog television broadcast stations were found to be located within the 2 kilometer consultation zone.

Based on the equation $R=0.051*B*\sqrt{T}$, where B is equal to the length of one of wind turbines blades in meters, and T is equal to the number of proposed turbines it has been calculated that receivers of analogue over the air broadcasts within a 14 kilometer radius from the geographical centre of the proposed wind turbine farm would in all likelihood experience some level of static and ghosting on local analog over the air reception; however, most broadcasting and receivers now employ the new digital signal standard as required by a decision of the CRTC (Public Notice CRTC 2007-53) So any negative overall impact to the area should be limited at best.

CBC Radio-Canada

CBC Radio-Canada has introduced specific criteria for assessing the interference of wind turbine generators in relation to its broadcast infrastructure. (*Document: CBC Radio-Canada Involvement and Requirements Concerning Wind Energy*). This document mandates that an inventory of all CBC/Radio-Canada's existing television broadcasting transmitters within 89 kilometres of the project be looked at for potential inference concerns.

CBC Radio-Canada has one television transmitter located within the specially requested 89 kilometre consultation zone.

FM BROADCAST STATIONS

Previous studies and simulations in laboratories have shown that FM broadcast reception is generally not affected by the wind turbine operation, as long as a minimum distance of a few hundred meters from the wind turbine is maintained. Perception of FM reception degradation would take the shape of a background "hissing noise" synchronised with the blades rotation.

In the case of the Truro-Millbrook site, no privately owned FM broadcast stations were found to be located within the 2 kilometer consultation zone.

CBC Radio-Canada

CBC Radio-Canada has introduced specific criteria for assessing the interference of wind turbine generators in relation to its broadcast infrastructure. (*Document: CBC Radio-Canada Involvement and Requirements Concerning Wind Energy*). This document mandates that an inventory of all

CBC/Radio-Canada's existing FM broadcasting transmitters within 5 kilometres of the project be looked at for potential inference concerns.

There are no CBC Radio-Canada FM radio transmitters identified within 5 kilometers of the proposed site.

AM BROADCAST STATION

Just like television signals, AM broadcast signals are amplitude modulated and as such could experience interference from wind turbine operation. However, the AM broadcast systems operate at very low frequency (0.535 – 1.705 MHz) with wavelength much longer than TV signals and thus are not reflected by wind turbine components. The reception of AM broadcast signals will not be affected, unless the receiver is very close to the wind turbine itself (less than a few meters). One should note that the construction of any metallic vertical structure near an AM antenna system (within a few wavelengths) would modify the radiation pattern of the antenna system, as the new structure will react as a secondary radiator. Considering the lightning protection cables within the wind turbine blades, the placement of a wind turbine within proximity of an AM station array might cause serious service disruption. A 5 km consultation zone is required for AM-Omnidirectional antenna where as a 15 km consultation zone is required for AM-Directional antenna.

In the case of the Truro-Millbrook site, there are no AM broadcast stations within the proposed windfarm area.

CBC Radio-Canada

CBC Radio-Canada has introduced specific criteria for assessing the interference of wind turbine generators in relation to its broadcast infrastructure. (*Document: CBC Radio-Canada Involvement and Requirements Concerning Wind Energy*). This document mandates that an inventory of all CBC/Radio-Canada's existing AM broadcasting transmitters within 5 kilometres of the project be looked at for potential inference concerns.

There are no CBC Radio-Canada AM radio transmitters identified within 5 kilometers of the proposed Truro-Millbrook site.

RADAR SYSTEMS

Radar systems generally operate in the microwave frequencies from 1 GHz to 10 GHz or more, and use the radio wave reflection to locate and identify any eventual target. Military and civil usage of radar systems is mainly related to air traffic control and meteorology to name a few applications. Any fixed structure in the radar station line of sight will reflect a part of the signal transmitted by the radar back to the radar receiver which will process it. The echo from the structure will be similar to the echo from an aircraft, but will show different particularities designated as its radar signature and processing can differentiate between a structure signature and an aircraft signature, even between two different types of aircraft.

When the structure is fixed, filtration and processing can generally eliminate the structure signature from the radar display, reducing the impact for the radar operator. The navigational radar, especially the long range radar, typically have a slight positive antenna elevation angle, such that structures far enough from the radar station are not visible from the radar station position and generally do not cause any significant radar response. Moving structures like wind turbine cause important disturbance to radar operation, since the signature is continuously changing according to rotor speed and wind direction. Especially when many wind turbines are clustered in relatively large wind farms, the filtration and processing of these radar echoes become virtually impossible.

The meteorological radars operate in the same way and attempt to measure the cloud density and precipitation as close as possible to the earth surface. In order to achieve a larger coverage area, they are usually installed on higher platforms and their antenna elevation angles are generally close to the horizon and sometime negative, depending on local topography. The presence of fix structures can be dealt with in the same way as for the navigational radar, however since the radar beam is grazing the earth surface, echo from structure even over the horizon are often seen. Attempts to develop filtration and complex processing to cancel the responses from moving structures like wind turbine have been made with disappointing results.

Based on the RABC/CANWEA guidelines, a consultation zone of 80 km radius is required around the Air Traffic Control (ATC) radar stations (PSR), 10 km (SSR) and a 60 km around Canadian Coast Guard (CCG) radar station, while an 80 km radius consultation zone is required around the meteorological radar stations. Similarly, the Department of National Defence (DND) requires a 100 km consultation zone around the defence radar stations.

DND AIR DEFENCE AND AIR CONTROL RADAR SYSTEMS

The role of the Canadian Air Defence System is to provide aerospace surveillance, thereby contributing to the defence of North America, through radar systems located throughout Canada's arctic, coastal and inland regions. The Department of National Defence was contacted to evaluate if potential interference with their installations would be caused by the proposed windfarm.

DND has no objections to the proposed windfarm (see attached).

DND Radio Communications

DND was also contacted to inquire about potential interference to their radio communications network. A response was received on from Mario Lavoie, Spectrum Engineering Technician stated:

"I have reviewed your proposal in respect to DND's radio communication systems, and I have no objections or concerns."

Canadian Coast Guard

The Canadian Coast Guard was contacted to evaluate the project for potential interference in regard to their vessel traffic system radars. A response was received from DFO which indicated no objections to the windfarm as proposed (see attached).

Royal Canadian Mounted Police (RCMP)

A request has been forwarded to the RCMP in regard to potential interference with their communication systems.

To date no response has been received.

VOR AND PRIMARY AIR TRAFFIC CONTROL (ATC) SURVEILLANCE RADAR

The VOR (VHF Omnidirectional Range) use frequencies in the 108-118 MHz band and a combination of amplitude and frequency modulation to facilitate aircraft short-range navigation. The VOR ground stations are generally located within the boundaries of airports but are sometimes located along main navigation corridors for en-route navigation. A clear area of approximately five hundred meters around ground stations should be maintained for proper operation and precision of the airborne receiver. Tall buildings or structures should be avoided at larger distance from the station to avoid distortion of the variable azimuth signal. Previous investigation has shown that wind turbine structures can be considered as static structures regard to VOR operation and the Transport Canada Aeronautical Obstruction Clearance should be obtained as for any other tall structure.

A request has been submitted to NavCanada to assess the potential impact of the proposed wind farm on the Halifax (YHZ) airport VOR and primary surveillance radar.

NAVCanada has no objections to the project as proposed (see attached).

ENVIRONMENT CANADA

A request has been made to Environment Canada (EC) to assess for potential interference with their weather radar installations. A response was received from Environment Canada which indicated no objections to the windfarm as proposed (see attached).

NATURAL RESOURCES CANADA

Natural Resources Canada operates a network of seismic monitoring stations throughout Canada. A request has been send to Natural Resources to determine if any potential interference from the proposed windfarm exists.

To date no response has been received.

Point to Point Systems

The CanWEA/RABC Guidelines recommend a consultation zone within a 1 km radius around the transmit and receive sites for point to point type radio systems, and a cylinder around the transmission path, with a diameter determined as a function of the Fresnel zone.

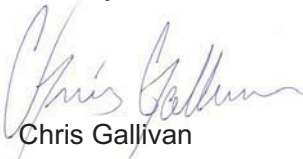
A total of 348 search results were identified as point to point radio systems. These results were paired using the call sign field, where call signs were not available pairing was completed based on Owner and TX/RX frequency pairing. One tower was identified to be within the 1 km consultation zone. This tower has a call sign of VFW529 and is owned by the local Fire Department. Figure 1 (attached) provides the locations of all towers identified within a 10 km radius of the proposed site centre.

CLOSURE

Should additional information become available, Strum requests that this information be brought to our attention immediately so that we can re-assess the conclusions presented in this report. This report was prepared by Chris Gallivan, Environmental Specialist and reviewed by Shawn Duncan, Vice President.

If you have any questions, please do not hesitate to contact us.

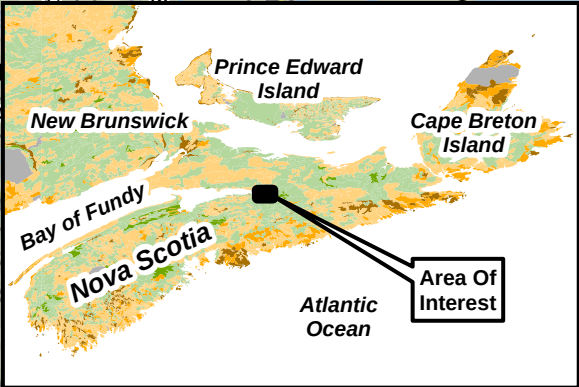
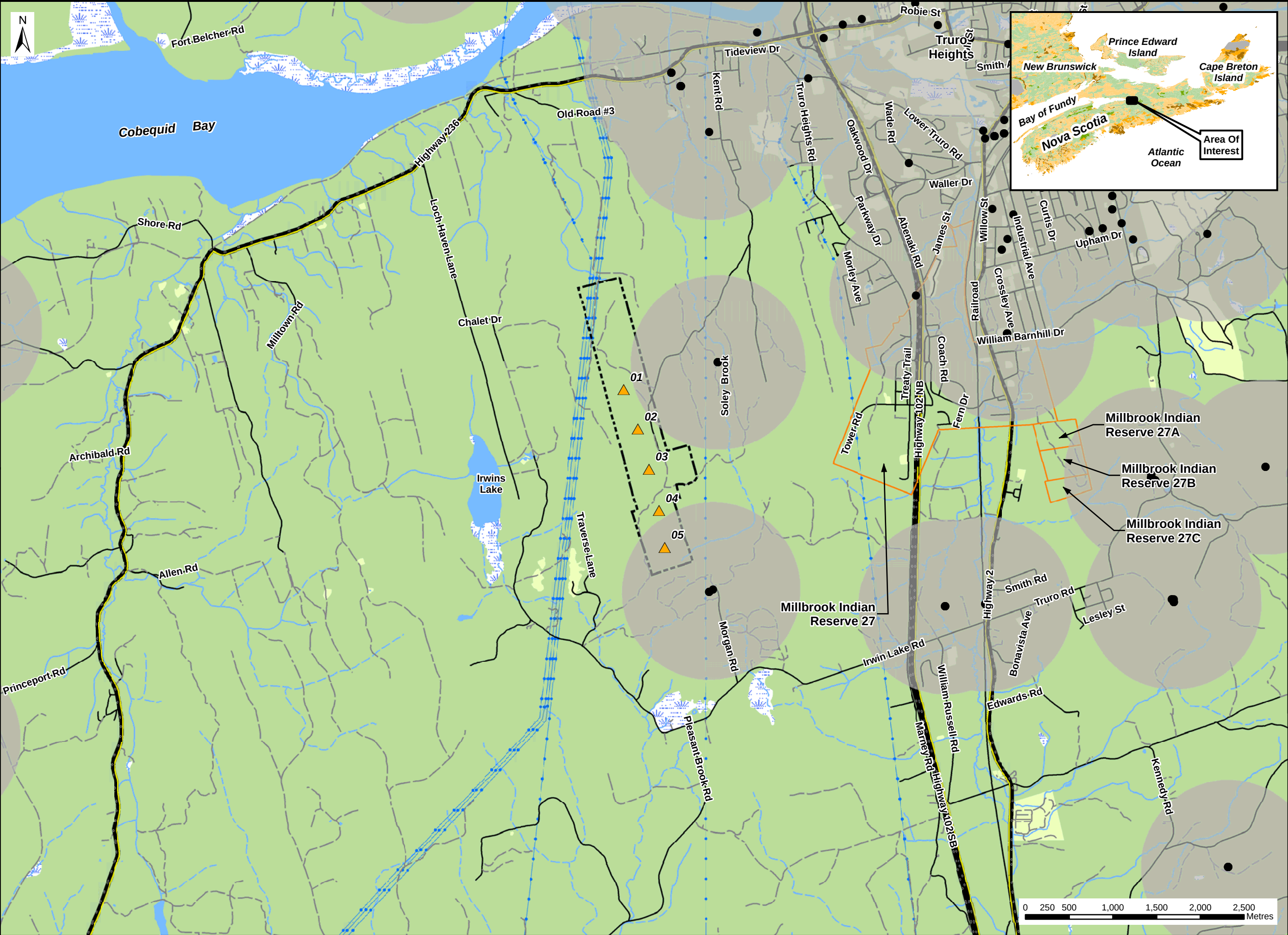
Thank you,



Chris Gallivan
Environmental Specialist
cgallivan@strum.com



Shawn Duncan
Vice President
sduncan@strum.com



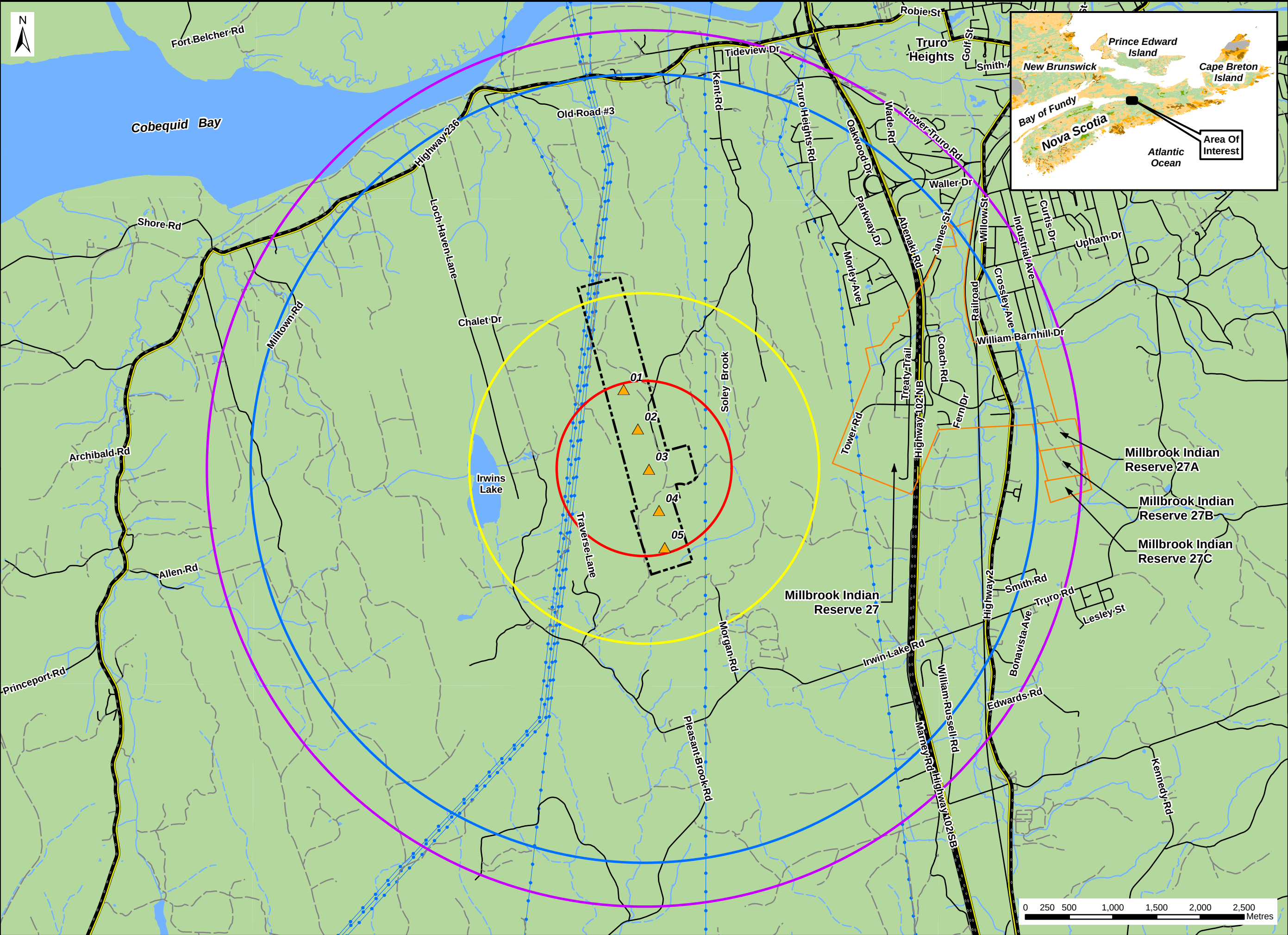
- Notes:**
- Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre. Radio Tower Locations Obtained Through Industry Canada Website (<http://sd.ic.gc.ca/>).
 - Projection: NAD83(CSRS), UTM Zone 20 North.

- Legend:**
- Proposed Turbine
 - Point-To-Point Radio Tower
 - 1 km Consultation Zone
 - Project Site Boundary
 - Major Roads and Highways
 - Roads
 - Access Roads / Trails
 - Existing Transmission Lines
 - Mapped Stream
 - Indefinite Stream
 - Water Bodies
 - Mapped Wet Area
 - Cleared Area

Point-To-Point Transmission Locations



Date:	April 2013	Project #:	12-4328
Scale:	1:40,000	Drawing #:	1
Drawn By:	H. Serhan		
Checked By:	C. Gallivan		



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

- Legend:**
- Proposed Turbine
 - Consultation Zones**
 - Private TV (1km)
 - FM Radio (2km)
 - Analog TV (4.5km)
 - AM & FM Radio - CBC Radio (5km)
 - Project Site Boundary
 - Major Roads and Highways
 - Roads
 - Access Roads / Trails
 - Existing Transmission Lines
 - Mapped Stream
 - Indefinite Stream
 - Water Bodies

Consultation Zones



Date: April 2013	Project #: 12-4328
Scale: 1:40,000	Drawing #: 2
Drawn By: H. Serhan	
Checked By: M. Smith	

From: XNCR, Windfarm Coordinator <Windfarm.Coordinator@DFO-MPO.GC.CA>
Sent: October-23-12 12:10 PM
To: Chris Gallivan
Subject: RE: [12-4328] Review of Proposed 5 Wind Turbine Farm Installation - Millbrook - Truro Heights, Nova Scotia

Hello,

There is no CCG communication or radar site in the vicinity of the proposed wind farm (Millbrook). Therefore, we do not anticipate any interference problems.

Regards,

Martin Grégoire, P. Eng
Canadian Coast Guard

From: Chris Gallivan [<mailto:CGallivan@strum.com>]
Sent: October 23, 2012 8:28 AM
To: XNCR, Windfarm Coordinator
Subject: [12-4328] Review of Proposed 5 Wind Turbine Farm Installation - Millbrook - Truro Heights, Nova Scotia

I am conducting an initial investigation into the placement of a potential 5 wind turbine farm in near Millbrook – Truro Heights Nova Scotia. We are looking only to see if there would be potential inference with your operations and the proposed wind turbine installation.

The turbine specifications are as follows:

1. 100 meter high tower with a 3 blade rotor (diameter of 122 metres)

I have included the requested excel file which include the proposed turbine locations, with coordinates and elevations. A map showing the turbines proposed locations has also been included.

If you have any questions or require additional information please do hesitate to contact me directly.

Chris Gallivan
Environmental Specialist



Bedford • Antigonish • Deer Lake

Head Office:
Raiside, 1355 Bedford Highway
Bedford, NS B4A 1C5

Tel: 902.835.5560 (24/7)

From: MARIO.LAVOIE2@forces.gc.ca
Sent: October-23-12 9:47 AM
To: Chris Gallivan
Cc: +WindTurbines@forces.gc.ca
Subject: FW: [12-4328] Review of Proposed 5 Wind Turbine Farm Installation - Millbrook - Truro Heights, Nova Scotia
Attachments: Drawing 1 - Millbrook Topo Mapping - 4328.pdf.pdf.pdf; WEB2010-BP8A04-01 12-4328 Millbrook - Truro Heights, Nova Scotia.xls.xls

I have reviewed your proposal in respect to DND's radio communication systems, and I have no objections or concerns.

Thank you for coordinating with DND.

Have a good Day.

Mr. Mario Lavoie
Spectrum Engineering Technician
National Defence | Défense nationale
Ottawa, Canada K1A 0K2
mario.lavoie2@forces.gc.ca
Telephone | Téléphone 613-992-3479
Facsimile | Télécopieur 613-991-3961
Government of Canada | Gouvernement du Canada

From: Chris Gallivan [<mailto:CGallivan@strum.com>]
Sent: Tuesday, 23, October, 2012 08:24 AM
To: Lavoie MJ@ADM(IM) J6 Coord@Ottawa-Hull
Subject: [12-4328] Review of Proposed 5 Wind Turbine Farm Installation - Millbrook - Truro Heights, Nova Scotia

I am conducting an initial investigation into the placement of a potential 5 wind turbine farm in near Millbrook – Truro Heights Nova Scotia. We are looking only to see if there would be potential inference with your operations and the proposed wind turbine installation.

The turbine specifications are as follows:

1. 100 meter high tower with a 3 blade rotor (diameter of 122 metres)

I have included the requested excel file which include the proposed turbine locations, with coordinates and elevations. A map showing the turbines proposed locations has also been included.

If you have any questions or require additional information please do hesitate to contact me directly.

Chris Gallivan
Environmental Specialist

Bedford • Antigonish • Deer Lake

Head Office:

From: Weather Radars Contact,National Radar Program [Ontario] <weatherradars@ec.gc.ca>
Sent: October-26-12 10:54 AM
To: Chris Gallivan; Weather Radars Contact,National Radar Program [Ontario]
Subject: RE: [12-4328] Review of Proposed 5 Wind Turbine Farm Installation - Millbrook - Truro Heights, Nova Scotia

Dear Mr. Chris Gallivan,

Thank you for contacting the Meteorological Service of Canada, a branch of Environment Canada, regarding your wind energy intentions.

Our preliminary assessment of the information provided to us via e-mail on October 23, 2012 indicates that any potential interference that may be created by the Millbrook Wind Farm near Truro, Nova Scotia will not be severe. Although we would prefer our radar view to be interference free, this is not always reasonable. As a consequence, we do not have strong objections to the current proposal.

If your plans are modified in any manner (e.g. number of turbines, height, placement or materials) this analysis would no longer be valid. An updated analysis must be conducted.

Please contact us at: weatherradars@ec.gc.ca.

Thank you for your ongoing cooperation and we wish you success.

Best Regards,

Carolyn Rennie
National Radar Program
Meteorological Service of Canada
Environment Canada
4905 Dufferin Street
Toronto, Ontario M3H 5T4
Office : 3N-WS12
Carolyn.Rennie@ec.gc.ca
Phone : 416-739-4931

Carolyn Rennie
Le Programme Nationale de Radar
Service météorologique du Canada
Environnement Canada
4905, rue Dufferin
Toronto, Ontario M3H 5T4
Bureau : 3N-WS12
Carolyn.Rennie@ec.gc.ca
Téléphone : 416-739-4931

From: Chris Gallivan [<mailto:CGallivan@strum.com>]
Sent: Tuesday, October 23, 2012 8:16 AM
To: Weather Radars Contact,National Radar Program [Ontario]
Subject: [12-4328] Review of Proposed 5 Wind Turbine Farm Installation - Millbrook - Truro Heights, Nova Scotia

I am conducting an initial investigation into the placement of a potential 5 wind turbine farm in near Millbrook – Truro Heights Nova Scotia. We are looking only to see if there would be potential inference with your operations and the proposed wind turbine installation.

The turbine specifications are as follows:

1. 100 meter high tower with a 3 blade rotor (diameter of 122 metres)

I have included the requested excel file which include the proposed turbine locations, with coordinates and elevations. A map showing the turbines proposed locations has also been included.

If you have any questions or require additional information please do hesitate to contact me directly.

Chris Gallivan
Environmental Specialist



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Cell: 902.233.6569
www.strum.com

CONFIDENTIALITY NOTICE

This e-mail, and any files sent with it, is confidential, and is for the use of the intended recipient only. If you have received this e-mail in error, please telephone 902.835.5560 or e-mail the sender, and delete the original. Thank you.

From: ADIN.SWITZER@forces.gc.ca
Sent: October-30-12 9:34 AM
To: Chris Gallivan
Cc: JOCELYN.BELAND@forces.gc.ca
Subject: Detailed Analysis - No Interference - Millbrook Wind Turbine Farm, Millbrook-Trouro Heights, NS - WTA-2123
Attachments: WEB2010-BP8A04-01 12-4328 Millbrook - Truro Heights, Nova Scotia.xls

Chris,

We have completed the detailed analysis of your proposed site, Millbrook Wind Turbine Farm, located near Millbrook-Trouro Heights, NS (WTA-2123). The results of our detailed analysis have shown that there is likely to be no interference with DND radar and flight operations.

Therefore, as a result of these findings we have no objections with your project as submitted (attached).

If however, the layout were to change/move, please re-submit that proposal for another assessment using the assigned WTA number listed above. The concurrence for this site is valid for 24 months from date of this email. If the project should be cancelled or delayed during this timeframe please advise this office accordingly.

It should be noted that our office looks at each submission on a case by case basis and as such, concurrence on this submission in no way constitutes a concurrence for similar projects in the same area, nor does it indicate that similar concurrence might be offered in another region.

Finally, the concurrence offered in this email extends only to the subject projects and current proponent. Should the project or any part of it be altered, or be sold to another developer, this office must be notified and we reserve the right to reassess the project.

Thank you for your patience on this matter and for considering DND radar and airport facilities in your project development process.

If you have any questions feel free to contact me.

Thank you.

<<WEB2010-BP8A04-01 12-4328 Millbrook - Truro Heights, Nova Scotia.xls>> Adin Switzer Capt AEC Liaison Officer
CCISF/ESICC ATESS/ESTTMA Défense nationale | National Defence

8 Wing Trenton, Astra, ON K0K 3W0

TEL: 613 392-2811 Ext4834 (CSN: 827-4834)

FAX: 613 965-3200

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Wind turbine submission form

12-4328 Millbrook - Truro Heights Turbine information

Turbine Number	LAT dd mm ss.ss	LONG -ddd mm ss.ss	Ground Elevation (meters)	Nacelle Height (meters)	Rotor Diameter (meters)	Total Height (meters)
WTG1	45 19 18.6024	-63 20 32.003	154.97	100	122	316
WTG2	45 19 30.9108	-63 20 33.914	150.58	100	122	312
WTG3	45 19 45.4944	-63 20 33.36	141.19	100	122	303
WTG4	45 19 6.9636	-63 20 22.61	148.73	100	122	310
WTG5	45 18 55.9548	-63 20 19.237	144.52	100	122	306



January 22, 2013

Your file
Project #12-4328
Our file
12-4663

Mr. Chris Gallivan
Strum Environmental
Raiside, 1355 Bedford Highway
Bedford, NS
B4A 1C5

RE: Wind Farm: 5 Wind Turbines - Truro, NS
(See attached spreadsheet)

Mr. Gallivan,

We have evaluated the captioned proposal and NAV CANADA has no objection to the project as submitted.

The nature and magnitude of electronic interference to NAV CANADA ground-based navigation aids, including RADAR, due to wind turbines depends on the location, configuration, number, and size of turbines; all turbines must be considered together for analysis. The interference of wind turbines to certain navigation aids is cumulative and while initial turbines may be approved, continued development may not always be possible.

In the interest of aviation safety, it is incumbent on NAV CANADA to maintain up-to-date aeronautical publications and issue NOTAM as required. To assist us in that end, we ask that you notify us at least 10 business days prior to the erection of the turbines. This notification requirement can be satisfactorily met by returning a completed, signed copy of the attached form by e-mail at landuse@navcanada.ca or fax at 613-248-4094. In the event that you should decide not to proceed with this project or if the structure is dismantled, please advise us accordingly so that we may formally close the file.

If you have any questions, contact the Land Use Department by telephone at 1-866-577-0247 or e-mail at landuse@navcanada.ca.

NAV CANADA's land use evaluation is valid for a period of 12 months. Our assessment is limited to the impact of the proposed physical structure on the air navigation system and installations; it neither constitutes nor replaces any approvals or permits required by Transport Canada, Industry Canada, other Federal Government departments, Provincial or Municipal land use authorities or any other agency from which approval is required. Industry Canada addresses any spectrum management issues that may arise from your proposal and consults with NAV CANADA engineering as deemed necessary.

Yours truly,

A handwritten signature in black ink, appearing to read "A. English", written over a light blue rectangular background.

Scott English
for
David Legault
Manager, Data Collection
Aeronautical Information Services

cc ATLR - Atlantic Region, Transport Canada

APPENDIX L
SOUND MONITORING AND MODELING RESULTS



April 26, 2013

Mr. Judd Rogers

juwi Wind, LLC

4845 Pearl East Circle, Suite 200

Boulder, CO 80301

USA

Dear Mr. Rogers,

Re: Existing Sound Levels

Millbrook/Truro Heights Community Wind Projects, Truro Heights, NS

Strum Consulting was retained by juwi Wind to document existing sound levels in the area of two proposed projects; Millbrook Community Wind Project and Truro-Heights Community Wind Project, near Truro, NS. The two Projects are expected to share common infrastructure (e.g. shared access from Tower Road and shared utility right of way) and will be constructed on similar timelines. Therefore, for the purposes of the sound assessment, the two Projects are presented together as one Project site, incorporating turbines 1 to 3 on PID 20215711 (Millbrook Community Wind), turbines 4 and 5 situated on PID 20206330 (Truro Heights Community Wind), and all associated access roads within those boundaries.

Results indicate that the average sound levels over the sampling period were 50.2 and 49.3 dBA at the monitoring locations.

This report provides a brief understanding of the scope, methodology and findings of the assessment.

BACKGROUND

The Project consists of a combined 10 MW wind power development approximately 5 km southwest of the town of Truro, Nova Scotia. This sound assessment was completed to establish pre-construction sound levels at two locations near the Project site boundaries.

MONITORING LOCATIONS

Monitoring locations were selected near the Project site boundaries, in areas that are close to receptors (Drawing 1, attached). Efforts were also made to locate the monitoring equipment in open locations where sound attenuation from vegetation and topography would be minimal. Table 1 provides basic information for each monitoring location.

Engineering • Surveying • Environmental

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Antigonish, NS B2G 2X3
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Deer Lake Office
101 Nicholasville Road
Deer Lake, NL A8A 1V5
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Table 1. Monitoring Locations

Monitoring Location ID	Location Near Project Site	Location Relative to Nearest Receptor	GPS Location	
			UTM Easting	UTM Northing
Millbrook/Truro Heights Northeast	Near the northeastern Project site boundary.	2.1 km west of the nearest receptor	473340 m	5020046 m
Millbrook/Truro Heights Southwest	On the southwestern Project site boundary.	0.5 km Northeast of the nearest receptor	473127 m	5017812 m

METHODOLOGY

The assessment was completed using Casella CEL-490 real time noise monitor with data logging capability. At each location, the monitor was kept in a locked weatherproof case, with the microphone supported by tripods at a height of 1.5 m above the ground. The microphone was mounted inside an acoustically transparent weather resistant cage, designed to minimize the effects of environmental noise interferences such as wind and rain.

Each noise monitor was deployed for five days in November or December, 2012. The two monitors were initially deployed together in their respective locations November 13th, 2012, and collected November 17th. However, the monitor deployed at the Millbrook/Truro Heights Southwest location only recorded approximately twelve hours of data. This location was successfully re-assessed over a six day period from December 5th to 11th. The data from the initial November run for the Millbrook/Truro Heights Southwest monitoring location was not used in this assessment. Care was taken to locate the equipment in areas where sources of noise contamination (i.e. near a stream or power lines) would be minimized.

Each data logger was configured to collect:

- A-Weighting Frequencies (frequency range);
- Slow (S) Time Weighting (response); and
- A sample frequency of 1 minute (sample frequency).

The frequency range for the data runs was 0-140 dB and each logger was calibrated at 114.0 dB at 1 kHz. Each measurement represents the attenuated sound pressure levels collected over 1 minute. These readings were logged every minute over the sampling period at each monitoring location. The data was analyzed to determine a number of parameters, including daytime, evening, and night sound levels. Descriptions of all parameters are attached.

The data are representative of the acoustical environment at the monitoring locations during the monitoring period including all natural and anthropogenic sources of sound, such as wind, wildlife, and traffic.

RESULTS AND DISCUSSION

Results of the assessment are summarized in Table 2.

Table 2. Sound Level Assessment Results

Receptor ID / Parameter (Measured in dBA)	Millbrook/Truro Heights Northeast	Millbrook/Truro Heights Southwest
LAS _{eq}	50.2	49.3
LAS _D	51.6	44.6
LAS _E	36.7	54.0
LAS _N	50.7	47.8
LAS _{mx}	82.4	81.2
LAS _{mn}	22.4	20.6
LAS ₉₅	27.0	23.0

Average Sound Levels (LAS_{eq})

The average sound levels (LAS_{eq}) at both monitoring locations (50.2 dBA and 49.3 dBA) were higher than expected for a rural/sub-urban area. This is likely attributed to the proximity to Highway 102, located approximately 3 km east of these receptors.

Daytime vs. Evening vs. Night-time Sound Levels

For the Millbrook/Truro Heights Northeast location, the average daytime sound levels (LAS_D) were higher than both the average evening and night-time sound levels (LAS_E and LAS_N), which is to be expected for a rural / sub-urban area. However, the average night time sound levels (LAS_N) for this location (50.7dBA) were un-expectedly high, and nearly as high as the LAS_D for this location (51.6dBA). This is most likely the result of a weather event that blew through the region beginning the night of November 13th, 2012, and lasting until the following afternoon. This event drove the sound levels up for the duration of the wind storm, causing the average night-time sound levels calculated for the entire run to be skewed atypically high. While the monitor deployed at the Millbrook/Truro Heights Southwest location only recorded 12 hours of data during its first deployment on November 13th, 2012, it did record the increased sound levels that were associated with this isolated wind storm before it shut down. This supports the theory that the increased sound levels were caused by an isolated weather event that affected the general area of the Project site.

The LAS_D for the Millbrook/Truro Heights Southwest receptor (44.6 dBA), as they were recorded during the monitor's second deployment at this location from December 5th to 11th, was lower than both the LAS_E and LAS_N (54.0 dBA and 47.8 dBA respectively). This is unusual for a location that receives noise input from anthropogenic sources, which are usually much lower during evening and night-time hours. Again, the best explanation for this anomaly is an increase in noise levels due to wind storms that blew through the area during evening and night-time hours. However, Environment Canada's Debert weather station did not register high wind speeds (e.g. hourly averages over 20 km/h for over four consecutive hours) during evening or night-time hours (Environment Canada 2012). It is possible that since it is located on a plateau at the top of a hill, the Project site was exposed to more wind input than the location of the Debert weather station.

Minimum and Maximum Sound Levels (LAS_{mn} and LAS_{mx})

The lowest recorded sound level (LAS_{mn}) occurred early in the morning (between 3:30 am and 6:30 am) at both monitoring locations. At this time, wind levels (Environment Canada 2012) and, presumably, traffic levels were low.

The highest recorded sound level (LAS_{mx}) at both monitoring locations, occurred at times when the sound levels had been at a sustained high for several hours (e.g. over 50 dBA for three hours or more). Again, the most likely explanation for these peaks is that they occurred during wind storms, most likely as a result of a particularly strong gust in the area of the receptor.

Background Sound Levels (LAS_{95})

The LAS_{95} represents the sound level threshold that is exceeded 95% of the time. This measurement is an objective indicator of background sound levels of an area that are always present. The LAS_{95} calculated at both monitoring locations were 27.0 dBA at Millbrook/Truro Heights Northeast, and 23.0 dBA at Millbrook/Truro Heights Southwest. These background sound levels are normal for a sub-urban/rural environment.

Predicted Sound Level Exposure vs. Existing Sound Levels

Predictive sound modeling was completed for the Project as part of the Environmental Assessment (EA). Average existing sound levels (LAS_{eq}) recorded at the two monitoring locations exceed the predicted Project sound levels at nearby receptors. These results indicate that the sound of the turbines will be largely masked by the existing sound levels in the area

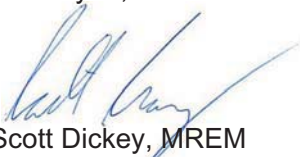
SUMMARY

Sound monitoring was completed at two locations to establish pre-construction sound levels near the perimeter of the Project site. Average sound levels were recorded at 50.2 and 49.3 dBA, which are higher than is typical for rural/sub-urban areas, likely because of the Project site's proximity to major transportation roadways. The results indicate that the major influence on sound levels is from the wind and weather conditions in the area, and to a lesser extent, from anthropogenic sources of noise (e.g. noise pollution from Highway 102).

Furthermore, the average sound levels recorded exceed the predicted sound levels at nearby receptors, indicating that the sound of the turbines will be largely masked by the existing sound levels present in the area.

If you have any questions, please contact us.

Thank you,


Scott Dickey, MREM
Environmental Specialist
sdickey@strum.com


Shawn Duncan, BSc
Vice President
sduncan@strum.com

REFERENCES

Environment Canada. (2012). National Climate Data Information Archive. Accessed January 2013
from: http://www.climate.weatheroffice.gc.ca/climateData/canada_e.html

Notes:

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

Legend:

- Proposed Turbine
- Sound Monitor
- Millbrook Proposed Road
- Truro Heights Proposed Road
- Tower Road Extension
- Project Site Boundary
- Building
- Major Roads and Highways
- Roads
- Access Roads / Trails
- Existing Transmission Lines
- Mapped Stream
- Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area

Sound Monitoring Locations

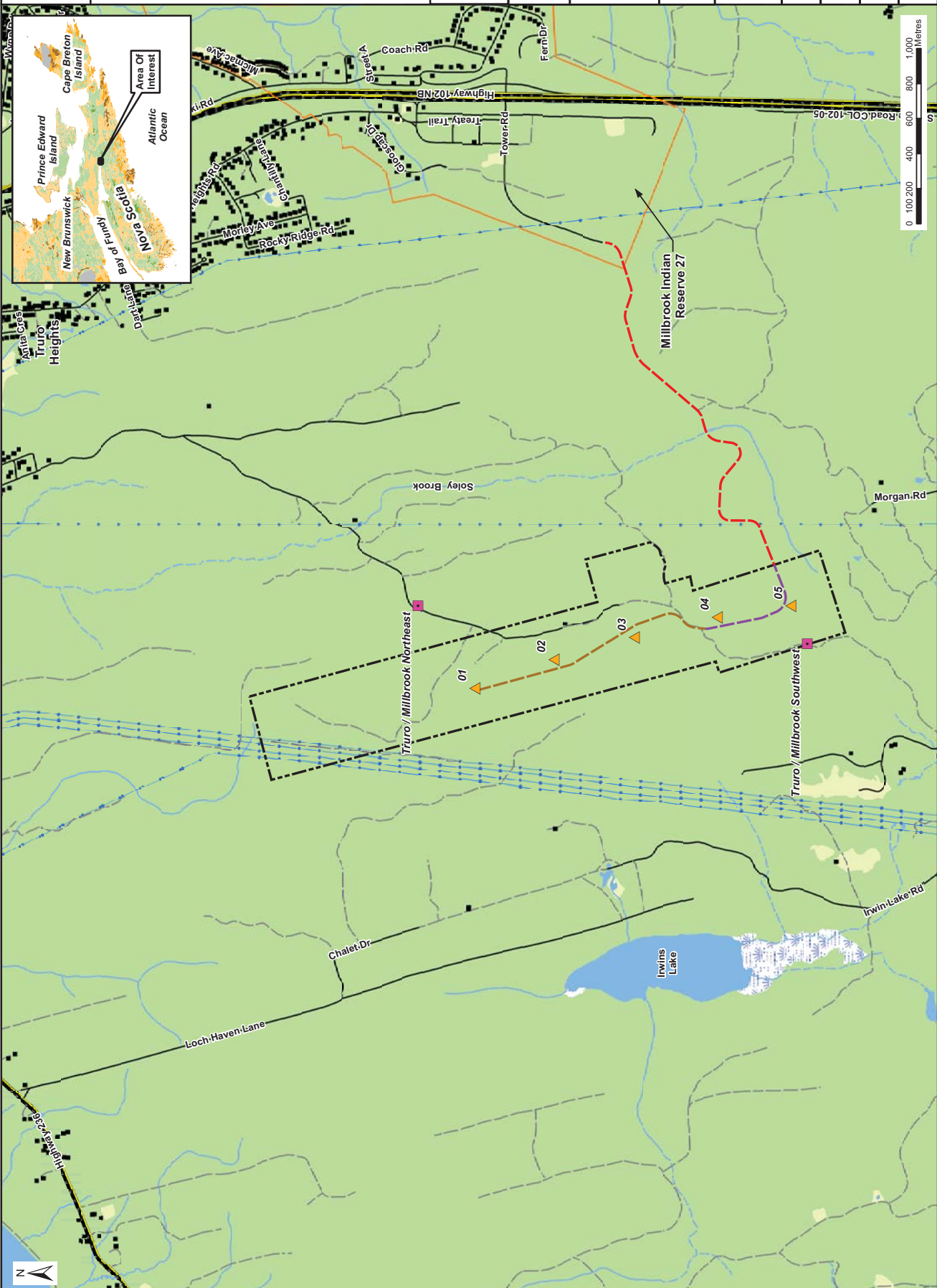


Date: April 2013
Project #: 12-4328

Scale: 1:20,000
Drawing #:

Drawn By: H. Serhan
Checked By: M. Smith

1



- **The LAS_{eq}** – This is the average noise level that contains the same amount of sound energy as the actual fluctuating sound level during the sample period. This represents the average sound level over the duration of the sampling period.
- **The LAS_D** – This is the LA_{eq} of the daytime sound levels between the hours of 07:00 and 19:00. This represents the average sound level during the day over the sampling period.
- **The LAS_E** – This is the LA_{eq} of the evening sound levels between the hours of 19:00 and 23:00. This represents the average sound level during the evening over the sampling period.
- **The LAS_N** – This is the LA_{eq} of the nighttime sound levels between the hours of 23:00 and 07:00. This represents the average sound level during the night over the sampling period.
- **The LAS_{mx}** – This represents the highest ‘slow’ time weighted sound pressure level expressed in decibels. This represents the highest sound level attenuated over 1 second recorded during the sampling period.
- **The LAS_{mn}** – This represents the lowest ‘slow’ time weighted sound pressure level expressed in decibels. This represents the lowest sound level attenuated over 1 second recorded during the sampling period.
- **The LTM_5** – This is a time average value calculated every 5 seconds that takes the highest level occurring during the preceding five seconds and assumes that it was present for the whole of the 5 second interval. Comparing the LTM_5 with the LA_{eq} gives an objective measure of how erratic the sound level was throughout the sampling period.
- **The LAS_{95}** – This is the sound level in decibels that is exceeded 95% of the time. This parameter is an objective measurement of the average background sound level measured throughout the sampling period.

Table L1: Sound Modeling Results, Millbrook/Truro Heights Community Wind Projects

Project # 12-4328/12-4544

<u>Receptor ID</u>	<u>Easting (m)</u>	<u>Northing (m)</u>	<u>Predicted Sound Levels (dBA)</u>
R1	473775	5016000	27.3
R2	471604	5019761	32.6
R3	472499	5017583	36
R4	474225	5016471	28.8
R5	472428	5016997	32
R6	472543	5017353	34.9
R7	474045	5017415	35.4
R8	474352	5016574	29
R9	471614	5019760	32.7
R10	474363	5016638	29.3
R11	474359	5016620	29.2
R12	472929	5016882	33
R13	474314	5016568	29.1
R14	473838	5016099	27.7
R15	473830	5020409	33.3
R16	474685	5016573	27.8
R17	472551	5017331	34.8
R18	472411	5016993	31.9
R19	474180	5016427	28.7
R20	474727	5016551	27.6
R21	473762	5016018	27.4
R22	474618	5016575	28.1
R23	474134	5016628	30
R24	472471	5016611	30
R25	473960	5016937	32.5
R26	472207	5016928	30.8
R27	472411	5017283	33.6
R28	474398	5016593	28.9
R29	473955	5016912	32.4
R30	472970	5016893	33.2
R31	474748	5016539	27.5
R32	474448	5016606	28.8
R33	473888	5017451	37
R34	473865	5016138	27.9
R35	474015	5016870	31.8
R37	472480	5016886	31.6
R38	472391	5017299	33.6
R40	473443	5015971	27.4
R41	474170	5016589	29.6
R42	474100	5016704	30.5
R43	473683	5015969	27.2
R44	471881	5017668	32.3
R45	474251	5016491	28.9
R46	474298	5016537	29
R47	472365	5016888	31.2
R48	474175	5016448	28.9
R49	473631	5015959	27.2
R50	473475	5015980	27.4
R51	473696	5015989	27.3
R52	473993	5016908	32.2

<u>Receptor ID</u>	<u>Easting (m)</u>	<u>Northing (m)</u>	<u>Predicted Sound Levels (dBA)</u>
R53	474681	5016617	28
R54	474120	5016709	30.5
R55	474357	5016656	29.4
R56	473404	5015962	27.3
R57	474156	5016646	30
R58	472485	5017083	32.8
R59	472571	5017438	35.6
R60	472575	5017447	35.7
R61	472692	5017609	37.8
R62	471777	5017978	32.5
R63	471776	5017966	32.5
R64	471767	5017960	32.4
R65	471748	5017979	32.4
R66	471736	5017969	32.3
R67	471966	5018988	35.7
R68	471476	5018827	32.1
R69	471485	5018758	32.1
R70	471511	5018546	32
R71	474646	5017031	29.9
R72	474607	5017073	30.3

*R36 removed from model after field truthing confirmed that there was no structure at this location

*R39 removed from model as it is considered a participating receptor