Affinity Renewables Inc.

RMS energy

Figure 6.13

Kemptown Wind Farm

Visual Simulation 2

As viewed from Hioghway 104

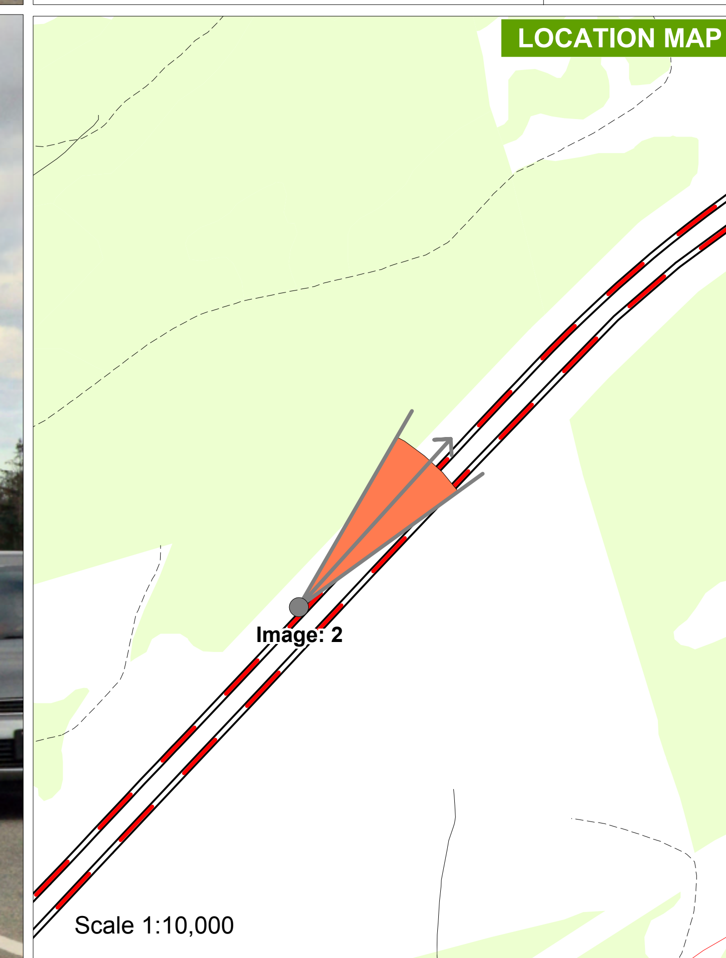
Image

Easting: 488,712
Northing: 5,030,421
Photograph Date: October 28, 2013
View Angle: 42 Degrees

Turbine

Manufacturer: General Electric
Model: GE 1.6 82.5
Hub Height: 80 m
Rotor Diameter: 82 m
Rated Power: 1680 kW

Coordinate System	UTM, NAD83, Zone 20	November 13, 2013
Analysis By: AL-PRO Wind Energy Consulting Canada Inc.		AL-PRO



Affinity Renewables Inc.

RMS energy

Figure 6.14

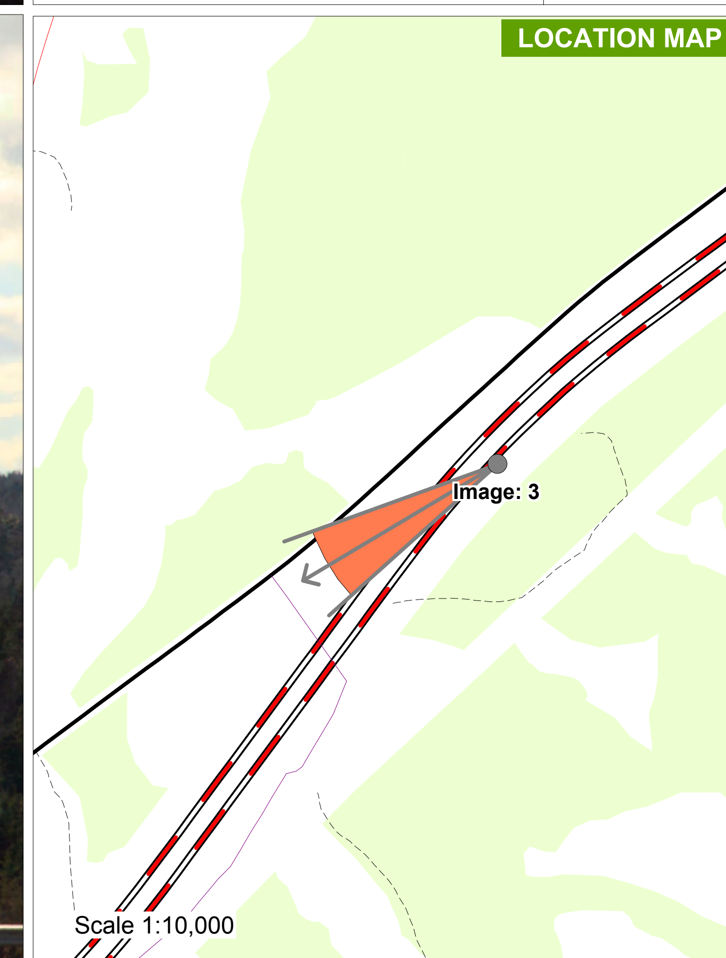
Kemptown Wind Farm

Visual Simulation 3

As viewed from Hioghway 104

Image	Easting: 494,935 Northing: 5,034,821 Photograph Date: October 28, 2013 View Angle: 21 Degrees
Turbine	Manufacturer: General Electric Model: GE 1.6 82.5 Hub Height: 80 m Rotor Diameter: 82 m Rated Power: 1680 kW

Coordinate System	UTM, NAD83, Zone 20	November 13, 2013
Analysis By: AL-PRO Wind Energy Consulting Canada Inc.		AL-PRO



6.2.1.6 Shadow Flicker

Shadow flicker caused by wind turbines is defined as alternating changes in light intensity due to the moving blade shadows cast on the ground and objects (including through windows of residences). It has the potential to cause health concerns resulting from repeated exposures.

The effects of shadow flicker are more prevalent when the sun is low in the sky at either sunrise or sunset. Therefore it is also more likely to occur during the summer and winter solstices (June 21 and December 21) than during the spring and fall equinoxes (March 21 and Sept 21) when the sun is higher in the sky.

The shadow flicker frequency is related to both the rotor speed and the number of blades on the rotor. In this report shadow flicker was modeled based on the GE 1.6 MW 3 blade wind turbine that has a rotor diameter of 82.5 m and a hub height of 80 m.

The modeling software that Nortek used in this analysis is produced by EMD International (Denmark) and is part of the WindPro 2.8.579 suite of modeling software. The following inputs were used by the software to predict shadow flicker:

- Turbine locations;
- Receptor locations (residences and buildings within the model's analysis extent);
- Topographic elevation within analysis extent (5 m linear contours);
- Turbine details (Rotor diameter and hub height); and
- A 1 x 1 m receptor window is used, with the bottom edge 1 m above ground.

The sun's path calculated from the turbine was predicted based on geographic position of the Project. It should be noted that the model intentionally over predicts shadow flicker effects. The results represents "worse case" scenarios regardless of natural minimizing effects that may occur. These minimizing effects include:

- The reduction of the effects of shadow flicker due to overcast weather (the model assumes that the sun is shining during all daylight hours);
- Wind direction may cause the rotor to rotate parallel to receptor, casting no shadow on that receptor (the model assumes that the wind always comes for the same direction as the sun);
- Natural obstacles (trees, buildings, terrain, etc) occurring between the rotor and the receptor which would block the effects of shadow flicker on that receptor (the model assumes that no such objects exist within the analysis extent area); and
- The model presumes that all turbines are operating continually during daylight hours.

The province of Nova Scotia has no set regulatory limits for exposure to shadow flicker. However the industry commonly uses a combination of 30 hours per year and 30 minutes per day as a limit to reduce nuisance complaints. Calculations of shadow flicker for all nearby residences, given a worst-case scenario as described above, determined that no receptors could experience shadow flicker for up to 30 hours per year or up to 30 minutes per day (Figure 6.15 and 6.16). Shadow flicker modeling was conducted for three turbines. Based on a site visit to the receptors following modeling results, it is believed that the model has overestimated visual exposure of the turbines to the receptors. Nevertheless, if shadow flicker becomes an issue (>30 hours/year) the Proponent has agreed to implement mitigation which may include shutdown of applicable turbines during times and conditions where shadow flicker may peak.

In summary, considering the “worst-case scenario” model, actual conditions are extremely unlikely to exceed recommended shadow flicker limits. The shadow flicker from turbine blades will only extend as far as the sun and angles will allow. The model demonstrates that it will not be possible to experience shadow flicker at homes in the project surroundings.

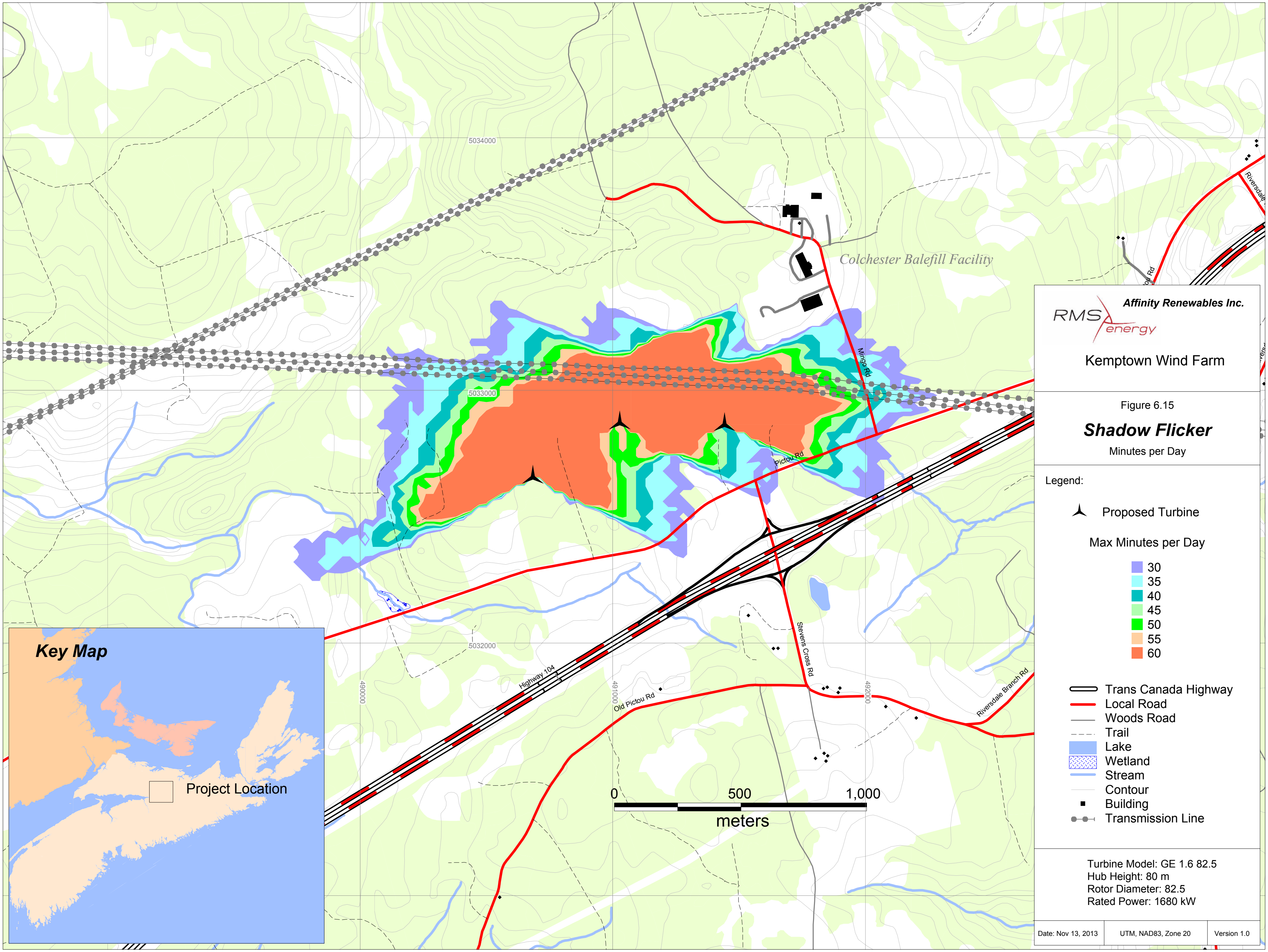
A registry will be created to document complaints of possible shadow flicker. If a complaint or complaints of shadow flicker are received from a receptor, shadow flicker will be reassessed from that receptor. Information collected from the shadow flicker monitoring (if applicable) will be used will be used to develop further mitigation.

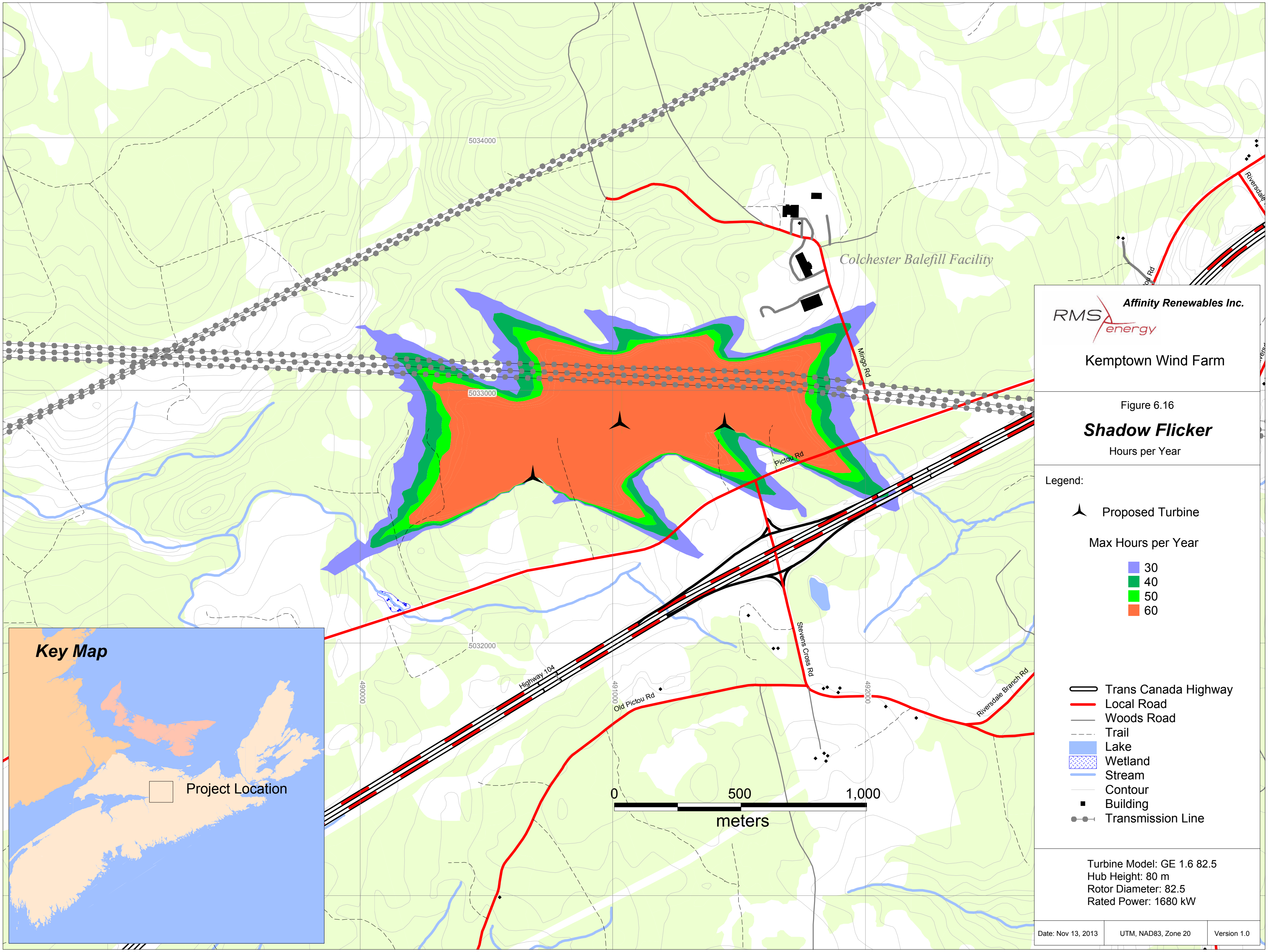
No mitigation measures are required for the residential receptors evaluated for the visual impact assessment. The residual effect of the Project on the area’s visual aesthetics is considered to be **low** but **not significant**.

6.2.1.7 Sound Impacts

Noise can be simply defined as "unwanted sound". Sound level limits are identified on an A-weighted decibel scale (abbreviated as dBA), which is generally accepted to reflect how humans perceive sound. Conversation in close quarters is usually at a sound level of 50 to 60 dBA and an alarm clock may emit sound to levels of approximately 80 dBA. Currently, the province of Nova Scotia does not have set sound level limits specific to wind turbine operations however Nova Scotia Environment considers anything above 40 dBA to be unacceptable. The municipality of Colchester revised their wind turbine bylaw in October 2013 to include a stipulation of sound not exceeding 36 dBA outside of a residence. This guidance was considered during the development of a sound impact assessment for the Kemptown Project, completed by Nortek Resources (see Appendix D).

Wind turbine generators produce sound through a number of different mechanisms which can be categorized into mechanical and aerodynamic sound sources. The major mechanical components, including the gearbox, generator and yaw motors, each produce their own characteristic sounds, including sound with tonal components. Other mechanical systems such as fans and hydraulic motors can also contribute to the overall sound emissions. Mechanical sound is radiated at the surfaces of the turbine, and by openings in the nacelle casing. Mechanical issues involving yaw motor supports or power train design can result in anomalous


Colchester Balefill Facility
5034000
5033000
5032000
490000
491000
492000
Mingo Rd
Pictou Rd
Highway 104
Old Pictou Rd
Stevens Cross Rd
Riversdale Branch Rd
0
500
1,000
meters
Key Map
Project Location
Affinity Renewables Inc.
RMS energy
Kemptown Wind Farm
Figure 6.15
Shadow Flicker
Minutes per Day
Legend:
Proposed Turbine
Max Minutes per Day
30
35
40
45
50
55
60
Trans Canada Highway
Local Road
Woods Road
Trail
Lake
Wetland
Stream
Contour
Building
Transmission Line
Turbine Model: GE 1.6 82.5
Hub Height: 80 m
Rotor Diameter: 82.5
Rated Power: 1680 kW
Date: Nov 13, 2013
UTM, NAD83, Zone 20
Version 1.0



Affinity Renewables Inc.
RMS energy
Kemptown Wind Farm
Figure 6.16
Shadow Flicker
Hours per Year
Legend:
Proposed Turbine
Max Hours per Year
30
40
50
60
Trans Canada Highway
Local Road
Woods Road
Trail
Lake
Wetland
Stream
Contour
Building
Transmission Line
Turbine Model: GE 1.6 82.5
Hub Height: 80 m
Rotor Diameter: 82.5
Rated Power: 1680 kW
Date: Nov 13, 2013
UTM, NAD83, Zone 20
Version 1.0
Key Map
Project Location
Colchester Balefill Facility
Mingo Rd
Pictou Rd
Highway 104
Old Pictou Rd
Stevens Cross Rd
Riverside Branch Rd
0
500
1,000
meters
5034000
5033000
5032000
490000
491000
492000

sounds such as periodic booming or tonal sounds.

The interaction of air and the turbine blades produces aerodynamic sound through a variety of processes as air passes over and past the blades. The sound produced by air interacting with the turbine blades tends to be broadband sound, but its amplitude is modulated as the blades pass the tower, resulting in a characteristic ‘swoosh’. Generally, wind turbines radiate more sound as the wind speed increases.

The predicted sound levels resulting from the proposed Project are an accurate representation of the potential sound levels at the selected receptor locations. Sound modelling was conducted using Wind Pro 2.8.579 which includes the calculation methodology of the International Organization for Standardization (ISO) *Standard 9613-2 – Attenuation of Sound during Propagation Outdoors Part 2*. This international standard provides a conservative estimate of sound propagation and subsequent environmental attenuation as a result of ground porosity, atmospheric attenuation and geometric spreading. Local terrain was considered in modelling. Sound power level data provided by the manufacturer were used to model operational sound at the selected receptors.

The study results presented in Appendix D show that the predicted sound levels at the receptor locations are below the guidance adopted for this Project (36 dBA) (Figure 6.17). It is not expected that the Project will have a significant impact, with respect to sound, on nearby receptors.

Ground attenuation is considered and uses the alternative case described in the ISO-9613-2 standard. This method uses the surface shape of the terrain to determine the sound dampening characteristic between the turbine hub and the receiver. The terrain is considered to be a bare earth model with no forest, vegetation or buildings. The terrain model was developed from 5 m contour data obtained from the Nova Scotia Geomatics Center and originated from stereo interpretation of 1:10,000 aerial photography.

The A-weighted sound pressure levels are modeled and represent the range of frequencies that are audible to the human ear. Noise emission data were obtained from the turbine manufacturer specifications and are based on calculated sound pressure levels for a variety of wind speeds. The following turbine models and hub heights were modeled:

Table 6.10-a: Turbine Specifications Used for Sound Modeling.

Description	Specification
Manufacturer	General Electric
Model	GE 1.6, 82.5
Hub Height	80 m
Rotor Diameter	82.5 m
Rated Power Output	1,600 kW
Maximum Sound Level (nacelle)	106.0 dBA

A conservative and standardized approach has been incorporated into the analysis which is based on modeling the representative sound levels at the mean wind speed of 7.0 m/s at hub height. The sound pressure levels where calculated and mapped to determine the impacts of the turbines on surrounding receptors. The threshold levels are currently used buy the Ontario Ministry of the Environment and specified in *"Noise Guidelines for Wind Farms – Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities, October 2008"* and are summarized in Table 6.10-b.

T**able 6.10-b: Sound Level Thresholds for Wind Turbines for Class 3 Areas (Rural)**

Wind Speed (m/s) at 10 m height	Sound Level Limits (dBA)
4	40
5	40
6	40
7	43
8	45
9	49
10	51

The results presented in Figure 6.17 show that the sound pressure threshold levels for the range of wind speeds analyzed meet the current MOE standards. Existing dwellings on adjacent properties are located below the threshold limits shown in Table 6.10-b. In addition to this, the sound modeling includes the 36 dBA threshold imposed by the Municipality of Colchester. Existing dwellings on adjacent properties are located below the threshold limit of 36 dBA.

The nearest receptor (outside of Project properties) is no closer than 1100m from the nearest turbine. In addition, routine maintenance of the wind turbines and associated equipment will be conducted as recommended by the manufacturer to ensure the turbines operate efficiently and do not produce additional noise.

In response to noise complaints, if any occur, the Municipality of Colchester Wind Turbine Bylaw and the Proponent would measure ambient sound levels and wind speed at selected residential receptors. The sound and wind data will then be combined to produce a plot of background ambient sound pressure levels versus wind speed. If the ambient sound levels at any residential receptors are higher than permitted noise levels, a report shall be filed with NSE with the particulars of the concern, the suspected source, and any remedial actions taken or to be taken to resolve the concern. In addition to this, a contravention of enacted bylaw pursuant to Section 172 of the *Municipal Government Act,* SNS, 1998 is punishable pursuant to clause 10.3 in the 'Wind Turbine Development Bylaw.

Up to date data for the GE 1.6 MW series 1.85m machine is used for the sound modelling, as well as assumptions that there is no tree cover/ obstructions. The loudest output on the 1.6 MW turbine occurs at 7.0 m/sec: this wind speed sound rating is used for the modelling.

Provided these mitigation measures are followed, the potential residual effect of the Project on noise is considered to be **not significant**.

6.2.1.8 Recreation and Tourism

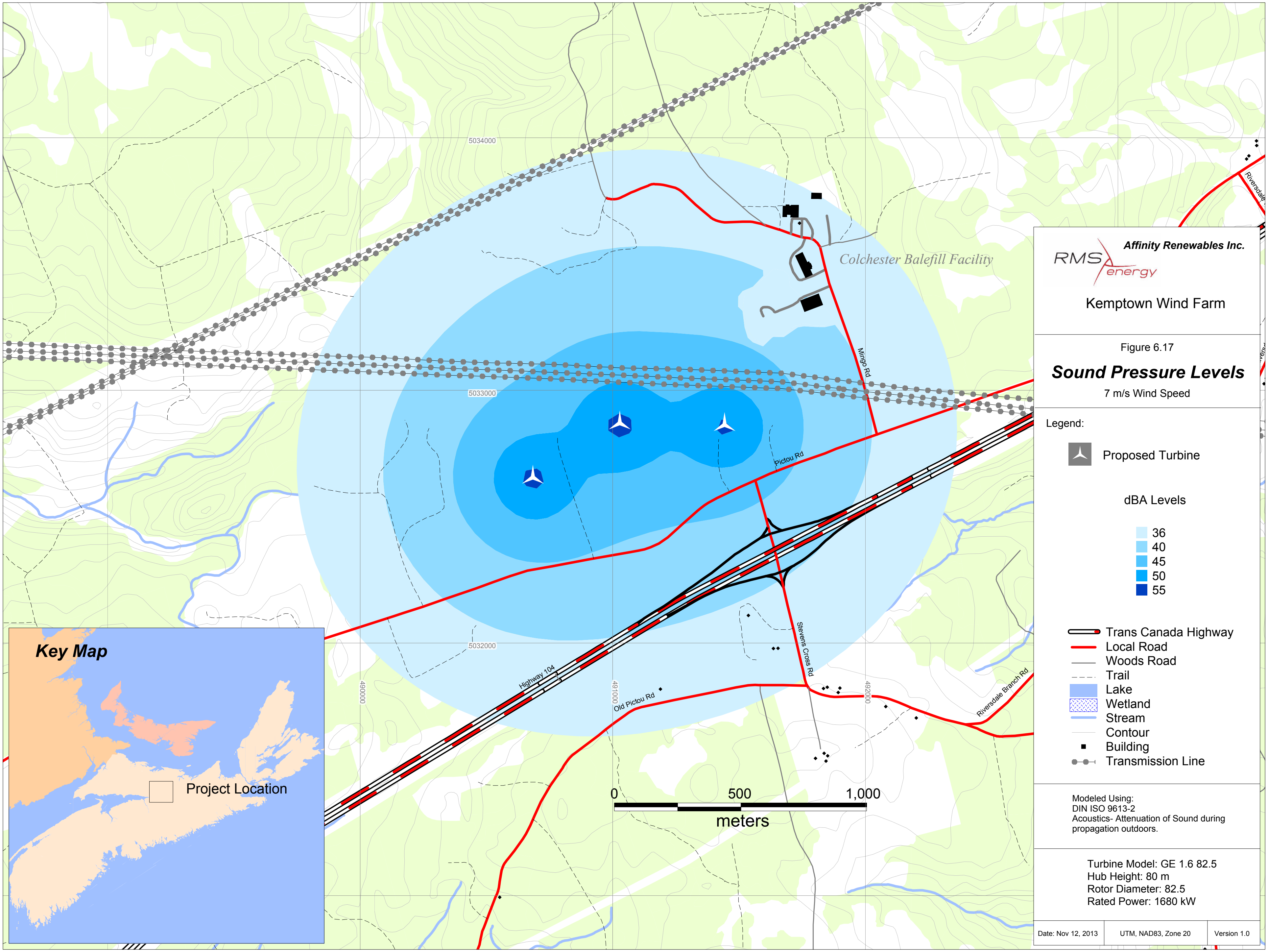
As indicated in Section 5, the Project is located in rural industrial/ rural residential setting. The Kemptown Project is not anticipated to have any adverse effects on the tourism industry in the area. There is not any perceived tourism industry in the area.

Located approximately 6km to the west of the Project is Mountain Golf and Country Club. The turbines will not be visible from the majority of the course. Where they will be visible, only the top portion of the swept area will be visible.

The existing road entrance to the site is for equipment used by the landowner (forestry equipment). The landfill facility for the Municipality is located 1km east of the turbines and is therefore, a deterent from establishing any potential tourism activity within close proximity of the Project. As well, three major transmission lines run north of the Project Area.

Visual and sound effects that could be experienced by tourists and recreational users in the area are discussed Sections 6.2.1.5 and 6.2.1.7, respectively.

The potential residual effect of the Project on recreation and tourism is considered to be **minimal** and **not significant**.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Kemptown Wind Farm
Figure 6.17
Sound Pressure Levels
7 m/s Wind Speed
Legend:
Proposed Turbine
dBA Levels
36
40
45
50
55
Trans Canada Highway
Local Road
Woods Road
Trail
Lake
Wetland
Stream
Contour
Building
Transmission Line
Modeled Using:
DIN ISO 9613-2
Acoustics- Attenuation of Sound during propagation outdoors.
Turbine Model: GE 1.6 82.5
Hub Height: 80 m
Rotor Diameter: 82.5
Rated Power: 1680 kW
Date: Nov 12, 2013
UTM, NAD83, Zone 20
Version 1.0
Colchester Balefill Facility
Mingo Rd
Pictou Rd
Stevens Cross Rd
Highway 104
Old Pictou Rd
Riversdale Branch Rd
5034000
5033000
5032000
490000
491000
492000
0
500
1,000
meters
Key Map
Project Location

6.2.1.9 Health and Safety Issues

In recent years there has been considerable interest in potential health issues associated with the operation of wind farms. Public interest groups, government stakeholders, and industry have commissioned various studies to explore alleged health effects associated with a variety of issues, of which the most commonly discussed include turbine noise, shadow flicker, and electromagnetic fields (EMFs). Additional safety concerns include potential turbine blade and structural failure, and icing issues.

The debate over potential health issues has been waged in scientific, peer-reviewed studies published in scientific journals and popular literature and internet. Popular literature and internet sources are often based on anecdotal evidence, yet they are usually the most accessible sources to the general public. In many cases, this type of literature has been generated to support or oppose wind development. Knopper and Ollson (2011) reviewed both types of literature (peer-reviewed and popular) and found that both agree that wind turbines can be a source of annoyance for some people, although the difference between both types of literature is the reason for annoyance. In general, peer-reviewed literature finds that reported health effects are attributable to a number of environmental stressors that result in an annoyed/stressed state, but popular literature attributes reported health effects directly to turbine-specific variables like audible noise, infrasound or EMF (Knopper and Ollson 2011).

To address real and perceived health and safety issues, minimum setback distances and exposure levels have been established to reduce or avoid potential effects for people living in proximity to wind turbines. As referenced in Section 3.3, the Municipality of the County of Colchester established wind development bylaws in 2009 with setback distances from residences of 700m. In 2013, the updated bylaw is now 1000m setback from residences. At a provincial level, there are no legislated setback distances although based on recent experience from the latest reviewed wind farms in the province and discussions with NSE staff, it would appear that the minimum setback distance should be in the range of 550 m and/or a received sound level 40 dBA. The Colchester municipal bylaw limits the sound level to 36 dBA outside at night, the provincial recommendation is exceeded and therefore, the Proponent will not exceed 36 dBA sound level at any residence. See Appendix D – Sound Modeling Study and as discussed below, these setback distances should effectively address any potential concerns associated with health and safety issues associated with wind farm operations. It may be necessary to retain both minima to account for the fact that the setback distance itself does not prevent the situation where multiple turbines are at or near the setback, all contributing to the received sound level. The added criterion of sound level allows for this.

6.2.1.9.1 Sound (Audible, Low Frequency, and Infrasound)

Section 6.2.1.7 discusses the predicted sound levels from the operation of the three windmills.

Several studies have been undertaken to explore the possible relationship between proximity to wind turbines and health effects. A review of peer-reviewed literature indicates that some people living near wind turbines experience annoyance and that some people are also disturbed in their sleep by wind turbines. Scientific literature does not dispute that health effects may occur due to stress associated with annoyance and sleep deprivation and suggests that most anecdotal reports of health effects attributed to wind turbines are likely associated with these stressors.

In April 2012, Health Canada announced that it would be conducting an assessment of all available data to address complaints of health issues and their relation to exposure to wind turbine noise. The results of this research will support decision makers by contributing to the evidence base of peer-reviewed scientific research that ultimately supports decisions, advice and policies regarding wind power development proposals, installations and operations. *The data obtained will contribute to the global knowledge of the relationship between wind turbine noise and health. It is important to note that this research is being conducted to provide additional insight into an emerging issue; however, the results will not provide a definitive answer on their own* (Health Canada 2012). Health Canada goes on to state that *there is currently insufficient scientific evidence to conclude whether there is a relationship between exposure to wind turbine noise and harm to human health. However, the most rigorous studies available to date do not show a link between exposure to wind turbine noise and harm to human health. Health Canada continues to review emerging scientific evidence. Should new evidence become available that supports a direct link between wind turbine noise and adverse health effects, the Department will review the research and, if necessary, work with the responsible authorities to address these emerging concerns* (Health Canada, 2012).

The World Health Organization (WHO) Europe recommends a night-time noise guideline (not specifically for wind) of 40 dBA for the protection of public health from community noise (WHO 2009). According to WHO, this guideline is below the level at which effects on sleep and health occurs. This value of 40 dBA is considered to be the lowest observed adverse effect level for night noise based on expert evaluation of scientific evidence in Europe. This guideline is intended to protect the public including the most vulnerable groups such as children, the chronically ill and the elderly (WHO 2009). The United States Environmental Protection Agency (EPA) document titled Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (1974) recommends that indoor-day-night-level (DNL) not exceed 45 dBA. DNL is a 24-hour average that gives 10 dB extra weight to sounds occurring between 10 pm and 7 am, assuming that during these sleep hours, levels above 35 dBA indoors may be disruptive. Based on the proposed setbacks and predicted noise modeling, there are no receptors who will be exposed to sound levels greater than 40 dBA (outdoor noise level). Indoor sound levels are about 10 to 20 dBA lower than those outdoor, depending on the structure of the home.

Various studies have explored the relationship amongst annoyance and wind turbine noise (Pederson and Persson Waye 2004, 2007, 2008; Pederson 2010). Knopper and Ollsen (2011) synopsize these studies into three key conclusions:

1. people tend to notice sound from wind turbines almost linearly with increasing sound pressure level;

2. a proportion of people that notice sound from wind turbine find it annoying; and

3. annoyance is not only related to wind turbine noise but also to subjective factors like attitude to visual impact, attitude to wind turbines and sensitivity to noise (refer to citations above for details on individual studies).

Recognizing that annoyance can result in a heightened sense of anxiety and potentially affect the physical, mental and social well-being of individuals, the mitigation to reduce potential effects is implemented to establish appropriate setback distances and sound level limits. Based on peer-reviewed literature, the limits proposed for this Project are considered appropriate mitigation.

The Proponent lives within 200m of a GE 1.5 MW turbine, with 33 others at various distances from the home. This has been the primary place of residence since March 2013. At no time has one of the family of 4 been unable to sleep due to noise, EMF, infrasound, vibrations or anything that could possibly be attributed to the wind turbines (*pers. Obs.). (*Figure 6.18)

Low frequency sound is generally defined as sound at a frequency of less than 200 Hz. Infrasound is considered to be sound frequencies below human's audible range (less than 20 Hz) and is usually measured in terms of dB or dBG instead of A-weighted decibels (dBA). The A-weighting network is commonly used to adjust sound levels to approximate the sensitivity of human hearing whereas the G-weighting network was defined specifically by the International Standards Organization to deal with infrasound (HGC Engineering 2006). In the 1980s, low frequency sound was considered an associated problem with wind turbines. However, this has been attributed to earlier designs of turbines where turbine blades were placed downwind of the tower resulting in a sound output that generated high levels of energy in the infrasound range. Since then, turbine design has progressed, resulting in modern turbines with blades placed upwind of the tower, generally negating the problem (National Research Council 2007; Leventhall 2004). Research on low frequency sound and modern turbines confirms that levels of low frequency sound have been below accepted thresholds and therefore should not be considered a problem (BWEA 2005; Leventhall 2004).

Infrasound is produced by physiological processes like respiration, heartbeat and coughing, as well as man-made sources like air conditioning systems, vehicles, some industrial process and wind turbines (Knopper and Ollsen 2011). Although infrasound cannot be "heard", there is some degree of auditory perception below frequencies of 20 Hz (*e.g.*, stimulation of outer hair cells of the cochlea) and there are non-auditory mechanisms such as the vestibular balance system and resonant excitation of body cavities by which humans can sense infrasound (HGC Engineering 2006; Salt and Hullar 2010).

Infrasonic levels created by wind turbines are often similar to the ambient levels prevalent in the natural environment due to wind. Under many conditions, low frequency sound below 40 Hz from wind turbines cannot be distinguished from environmental background noise from the wind itself (Leventhall 2006; Colby *et al* 2009, cited in CMOH 2010). There is no evidence of adverse of adverse health effects caused by infrasound below the sound pressure level of 90 dB (Leventhall *et al.* 2003).

In 2013, the Environment Protection Authority of Australia presented the findings of a study into the level 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 turbines. Through various controlled measurements at homes located both near and far from wind turbines. The study concluded that the level of infrasound at houses near the wind turbines assessed is no greater than that experienced in other urban and rural environments, and that the contribution of wind turbines to the measured infrasound levels is insignificant in comparison with the background level of infrasound in the environment (Evans *et al, 2013).* Infrasound that

Figure 6.18 View from Second Floor Window of Proponent's Home, Turbine #15 is at a distance of 175m, Dalhousie Mountain Wind Farm, 2013

was detected at houses near wind turbines had the turbines shut down completely and measurements were taken again. The results were the same indicating that the infrasound that was detected was not produced by the wind turbines. Furthermore, the levels are significantly below the human perception threshold (Evans *et al, 2013).*

International standards have been established to define acceptable thresholds for infrasound exposure based on human sensitivity at 85 dBG. Therefore it is reasonable to assume that someone may be annoyed if they can perceive infrasound in the range of 85 dBG. O'Neal *et al*. (2011; cited in Knopper and Ollson 2011) conducted a study to measure wind turbine noise outside and within nearby residences of turbines (nearest turbines 305 m and 467 m from residences) at a wind farm in Texas and measured low frequency sound and infrasound at both distances. The turbine models included in the study were the GE 1.5sle (1.5 MW) and Siemens SWT-2.3-93 (2.3 MW) wind turbines. The authors concluded that the results of their study suggest there should be no adverse public health effects from infrasound or low frequency noise at distances greater than 305 m from the two wind turbine types measured (O'Neal *et al*. 2011). There is no evidence for direct physiological effects from either infrasound or low frequency sound at the levels generated from wind turbines (indoors or outside) (Colby *et al*. 2009).

6.2.1.9.2 Shadow Flicker

A shadow flicker study of Kemptown demonstrates that shadow flicker cannot and will not extend to homes therefore; no residences will receive shadow flicker effects from the turbines in Kemptown.

Concerns have been raised about the potential for wind turbines to cause epileptic seizures as a result of shadow flicker. As discussed in Section 6.2.1, shadow flicker is caused by the rotating blades of the turbines interrupting sunlight causing flicker. Individuals diagnosed with photosensitive epilepsy (approximately 0.03% of the population) are at risk for seizures caused by flickering light at certain frequencies. Photosensitive epileptic patients are most sensitive to flickering light at 5-30 Hz, although some report sensitivity as low as 3 Hz or as high as 60 Hz (Epilepsy Action 2007). At 3 Hz or below, the cumulative risk of inducing a seizure is about 1.7 per 100,000 of the photosensitive population (Harding *et al.* 2008). At maximum rotational speeds, most turbines flicker at a frequency below 3 Hz. It is therefore concluded that shadow flicker effects would represent, at worst, a visual annoyance, rather than a health impact (refer to Section 6.2.1.6 for a discussion of shadow flicker visual effects).

6.2.1.9.3 Electromagnetic Fields

An electromagnetic field (EMF) is a physical field containing electric and magnetic aspects which is caused due to the movement of an electrical charge. All electronic devices, powerlines and generating stations produce EMFs (Sierra Club Canada 2011).

Wind turbines are not considered a significant course of EMF exposure since emission levels around wind farms are low (CMOH 2010). Previous studies have shown that magnetic field levels as a result of the cable distribution system are a fraction of those found in the vicinity of household appliances such as hairdryers, blenders or televisions (National Institute of Environmental Health Sciences 2002). At present, there are no Canadian government guidelines for exposure to EMFs at ELF. Health Canada does not consider guidelines for the Canadian public necessary because the scientific evidence is not strong enough to conclude that exposures cause health problems for the public (Health Canada 2010).

EMFs created by the operating wind farm will be localized and become weaker with distance. The strength of the EMF from equipment within the substation, such as transformers, decreases rapidly with increasing distance. Beyond the substation, the EMF produced by this equipment is typically indistinguishable from background levels. Similarly, the EMF produced by the equipment within the turbines will be very weak, reduced not just by distance, but also by objects such as trees and other objects that conduct electricity. As a result, there is no evidence that the proposed Project will present any human health effects related to EMFs.

6.2.1.9.4 Additional Safety Issues

Additional safety issues that have been raised include potential turbine blade and structural failure, and icing issues.

Turbine Blade and Structural Failure

Wind turbine safety standards have improved considerably since they were first introduced on a commercial scale, with wind turbine safety standards meeting wind strengths equivalent to hurricane forces (Chatham-Kent 2008). The probability of a tower collapse and/or blade detachment from the turbine structure is highly improbable. However, should either of these events occur there is potential that the collapse zone and/or landing area would be damaged by the impact. The structural integrity of the turbines is designed to withstand wind speeds of about 200 km/hour (equivalent to a Level 2 tornado). However, during high wind events (>25 m/s or 90 km/h) the turbines will cease operations. The blade of a turbine weighs several tonnes, therefore in the unlikely event where a blade detaches from the rotor, it would drop to the ground rather than be flung a large distance. Maintenance technicians who work on the Proponent's existing Dalhousie Mountain Wind Farm will also maintain the three GE turbines at Kemptown. The redundancy mechanisms in place for this type of failure include a factory installed alignment indicator (checked and calibrated minimum two times per year), as well as after-market installation of vibration sensors. Visual blade inspections are done officially during semi-annual maintenance, and also with each visit to the individual turbines. Given the built-in safety features as well as ongoing maintenance of equipment, the likelihood of tower collapse and/or blade detachment is extremely remote and is not predicted to result in a significant adverse residual effect on public health and safety.

Icing Issues

Under certain weather conditions (*e.g.*, based on the right combination of air temperature, wind speed and moisture in the air), ice can form on the turbine blades. Falling ice and the throwing of ice therefore present a hazard to on-site personnel during maintenance and operation of the wind turbines.

Falling ice from an immobile turbine does not differ from other tall structures. Ice throw distance depends on a variety of factors including turbine specifications, wind speed and geometry and mass of the ice fragment itself. Several studies conducted under the Wind Energy in Cold Climates (WECO) project in Europe have analyzed the risk to public health associated with turbine icing. Morgan *et al.* (1998) report results of a survey of turbine operators on the occurrence of icing including mass and location of any observed ice debris flung off the rotor. Results showed most fragments on the ground were estimated to be in the range of 0.1 to 1 kg in mass and were found approximately 15 to 100 m from the turbines. Simulations and risk assessments have been developed to project ice throw trajectories and predict probability of events and risk to public safety. Initial work on risk assessment methodology demonstrates 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).

Monitoring at an existing Tacke TW600 wind turbine near Kincardine, Ontario between its installation in December 1995 until March 2011 revealed ice build-up on the wind turbine on 13 occasions out of 1000 inspections conducted during this time. In most cases, only a few pieces of ice were found on the ground. During one monitoring event in February 1996, about 1 tonne of ice in approximately 1000 pieces was estimated on the ground, with the largest pieces 5 inches long, 2 inches thick and 2 inches wide (12.5x5x5 cm). The pieces were scattered up to 100 m from the base of the turbine in the same direction as the blade arms were pointing. Most pieces were found within 50 m of the tower base. There was no event recorded by the operator in which the ice that was thrown from the turbine struck any property or person (LeBlanc 2007).

A computer modeling study used to estimate the number of potential residential, vehicle and person ice strikes within a typical wind farm in Southern Ontario calculated that, assuming a building setback of 300 m, the potential number of ice strikes to buildings would be one in every 500,000 years. Predicted number of ice strikes to vehicles, with a setback of 200 m would be one in every 260,000 years and number of ice strikes to individuals on the ground (assuming a setback of 300 m) would be one in every 137,500,000 years (LeBlanc 2007). Given the setbacks used for this Project, the risk to the public from ice drop or ice throw is very small in comparison with average risk levels. The impact of turbine icing would be greatest for construction or maintenance workers when the blade is at rest and not rotating.

There are no trail systems or paths used by ATVs, snowmobiles or recreational hiking on or around the lands used for the Kemptown Project. During construction and operation activities, access to the wind turbine facilities will be restricted to authorized personnel wearing proper personal protective equipment and who have had appropriate safety training.

6.2.2 Maintenance Activities

The wind turbines will be visited for routine servicing and inspections. Furthermore, the facility will include a sophisticated wind energy oriented Supervisory Control and Data Acquisition (SCADA) data analysis program, as well as alarm and notification protocols. With such a system, faults can be instantly detected and addressed, operations can be monitored, equipment performance can be analyzed, trend analyses can be performed and long-term records maintained. For service-oriented visits the site will be accessed via light trucks. Although sensory disturbance to wildlife is possible, it will be short in duration, infrequent, in a small geographic area and will not be noticeable above the existing disturbance created by existing and ongoing forestry activities.

6.3 DECOMMISSIONING ACTIVITIES

Well-designed and constructed wind energy facilities may be operated for decades. Affinity Renewables expects individual wind turbines to perform for up to 25 years without significant repair or replacement. Transformer facilities, electrical cabling and substation facilities are designed for at least a 50 year life span. Individual wind turbines may be replaced or repaired as their useful life comes to an end, or if more efficient and cost-effective technology becomes available. Affinity Renewables makes commitments regarding decommissioning to the landowners on whose land the equipment is placed.

6.3.1 Removal of Turbine and Ancillary Equipment

Upon a decision to decommission a single wind turbine or the entire wind farm, all equipment above ground, including towers, nacelles, transformers and controllers will be removed. Wind turbines that are operational and have market value would be carefully removed using a crane, essentially in a reverse process to assembly and installation. The resale value of such equipment would cover the cost of removal in such a case. A market for good, used wind turbines has developed in North America, and a number of wind turbines installed in Alberta in the early 1990s originated from the U.S. used wind turbine market.

Wind turbines that are no longer operational may also be removed by crane, but with less attention to preserving individual components, labelling them and storing them. Inoperative wind turbines have high salvage value. Steel and copper components are easily recycled, and there is a ready market for such materials. The remaining materials are primarily fibreglass and plastic. These may be sold to recycling facilities, or crushed and deposited in landfill sites.

Figure 6.19 Wind Turbine Recycled into a Children's Playground

Other above-ground equipment in the wind farm, including transformers and wiring, has a ready market in either used equipment sales or in salvage. Transformers will be simply removed and sold. Wiring will be removed and sold to metal salvage companies.

Environmental components that potentially could be impacted as a result of turbine and ancillary equipment removal include soils, water quality/aquatic environment, birds and other wildlife, land use, and noise. Table 6.11 summarizes the potential environmental effects of activities associated with removal of turbine and ancillary equipment.

Table 6.11 Potential Effects of Turbine and Ancillary Equipment Removal

Potential Interaction	Potential Effect	Mitigation	Significance Criteria for Adverse Effect[1]					Residual Effect
			Geographic Extent	Magnitude	Duration/ Frequency	Reversibility	Ecological Context	
Birds and Other Wildlife	Sensory disturbance	• Overall disturbance will be limited to designated workspaces, and performed in compliance with the *Migratory Birds*	2	1	1/2	R	2	Sensory disturbance may cause habitat avoidance but it is likely to be temporary in nature, small in magnitude and restricted to the Project footprint.

Table 6.11 Potential Effects of Turbine and Ancillary Equipment Removal

Potential Interaction	Potential Effect	Mitigation	Significance Criteria for Adverse Effect[1]					Residual Effect
			Geographic Extent	Magnitude	Duration/ Frequency	Reversibility	Ecological Context	
		Convention Act. • Train onsite personnel regarding how to identify and properly deal with any wood turtles that may enter a work site						
Soils	Soil disturbance and erosion	• Soils around the excavation will be disturbed but will be managed to minimize erosion and runoff.	1	1	1/2	R	2	By implementing these standard mitigation measures, the residual effect on soils will not be significant and will have a minimal level of impact.
Wetlands/Water Quality/ Aquatic Environment	Surface water contamination	• Wetlands and watercourses will be avoided to the extent possible. • All activities, including equipment maintenance and refueling, will be controlled, or will be done off-site, to prevent entry of petroleum products or other deleterious substances, including any debris, waste, rubble or concrete material, into a watercourse or wetland. • Construction material, excess material, construction debris, and empty containers will be stored away from watercourses and watercourse banks or wetlands. • A contingency plan for accidental spills will be developed for the Project.	1	1	1/1	R	2	No residual effects are predicted.

Table 6.11 Potential Effects of Turbine and Ancillary Equipment Removal

Potential Interaction	Potential Effect	Mitigation	Significance Criteria for Adverse Effect[1]					Residual Effect
			Geographic Extent	Magnitude	Duration/ Frequency	Reversibility	Ecological Context	
	Sediment Loading	• General mitigation measures from the NSE Erosion and Sediment Control Handbook and other applicable guidelines will be utilized to control water, reduce erosion and limit sedimentation. • Construction/ decommissioning will not take place in the immediate vicinity of a watercourse. • Temporary erosion and sediment control measures, silt fence, straw bales (etc.) will be used and maintained until 100% of all work within or near a watercourse has been completed and stabilized. • Temporary sediment control measures will be removed at the completion of the work but not until permanent erosion control measures, if required, have been established.	1	1	1/1	R	2	No residual effects are predicted.
Land Use	Remediation of land	• The small footprint will be disturbed but remediated in accordance with landowner agreements.	1	2	1/2	R	2	Due to the small proportion of land to be directly impacted by foundation construction/ decommissioning and its reversibility after decommissioning, the residual effect is expected to be minimal.

Table 6.11 Potential Effects of Turbine and Ancillary Equipment Removal

Potential Interaction	Potential Effect	Mitigation	Significance Criteria for Adverse Effect[1]					Residual Effect
			Geographic Extent	Magnitude	Duration/ Frequency	Reversibility	Ecological Context	
Sound	Increases to sound levels due to operation of equipment	• All internal combustion engines will be fitted with appropriate muffler systems. • Noise abatement equipment, in good working order, will be used on all heavy machinery used on the Project.	1	2	1/2	R	2	Increased sound levels caused by foundation construction will be temporary in nature and will be conducted during working, daylight hours. Due to the short nature of this disturbance, the residual effect is considered negligible and the level of impact will be minimal.

1 Note	Geographic Extent	1 = <500 m^2, 2 = 500 m^2 – 1 km^2, 3 = 1 –10 km^2, 4 = 11 – 100 km^2, 5 = 101 – 1000 km^2, 6 = >1000 km^2
	Magnitude	1 = Low: *e.g.,* specific group or habitat, localized one generation or less, within natural variation, 2 = Medium: *e.g.,* portion of a population or habitat, one or two generations, rapid and unpredictable change, temporarily outside range of natural variability, 3 = High: *e.g.,* affecting a whole stock, population or habitat outside the range of natural variation.
	Duration	1 = <1 month, 2 = 1-12 months, 3 = 13-36 months, 4 = 37-72 months, 5 = >72 months.
	Frequency	1 = <11 events/year, 2 = 11-50 events/year, 3 = 51-100 events/year, 4 = 101-200 events/year, 5 = >200 events/year, 6 = continuous.
	Reversibility	R = reversible, I = irreversible.
	Ecological Context	1 = Pristine area or area not adversely affected by human activity, 2 = evidence of adverse effects.

6.3.2 Removal of Power Line

Power poles and cabling will be removed and recycled/disposed of as required. Environmental components that potentially could be impacted as a result include soils, water quality/aquatic environment, birds and other wildlife, land use, and noise. Refer to Table 6.11 for a summary of the potential environmental effects of activities.

6.3.3 Site Remediation/Reclamation

Wind energy facilities do not use or produce harmful waste products. There is no need for concern about residual toxic chemicals or exhaust products. Aside from normal recovery of lubricants from the gearbox and yaw mechanism, decommissioning activities do not produce waste. Lubricants will not contain any PCBs. Site remediation/reclamation will be conducted in accordance with landowner agreements and in accordance with the applicable regulations at the time. Environmental components that potentially could be impacted as a result include soils, water quality/aquatic environment, birds and other wildlife, land use, and noise. Refer to Table 6.11 for a summary of the potential environmental effects of activities.

6.4 ACCIDENTS AND MALFUNCTIONS

The largest risks associated with all phases of any operations involving vehicles and machinery in forested areas include contamination by petroleum products and waste, if spilled, migrating into the surroundings; and in extreme situations a risk of fire, causing damage if not controlled immediately.

A spill of hydrocarbons associated with equipment involved in construction and maintenance of the Project could cause a variety of adverse effects on the environment, in particular to the watercourses within the Project Study Area. Spill prevention is the most important step in preventing these potential effects; prevention is based on effective and well-planned procedures and maintenance of equipment. These strategies will be outlined in a Project-specific EPP, which will be developed prior to the commencement of construction activities. Spills that could reasonably be expected to occur would be limited to relatively small quantities.

The Valley/ Kemptown Fire Department will be provided with a procedure upon commissioning to deal with logistics of fires and spills would outline the appropriate measures for responding. A site map will be provided to the chief and to Affinity Renewables employees. Setbacks from sensitive areas will be in place as will radio communications to the control center to provide lockout confirmation and procedures for safe contact with electrical components. NSE will be notified at the time of any applicable emergencies. Notification will be given to the department upon making the decision to decommission and any necessary amendments to the existing emergency measures will be added.

The plans described below are expected to mitigate any potential accidents and malfunctions that may occur. Therefore, the level of impact is considered **low** and **not significant**.

6.4.1 Corporate Environmental, Safety & Health Management Plan

An Environmental, Safety & Health (ESH) Management Plan has been developed and implemented for the existing Dalhousie Mountain Wind Farm and will be expanded and updated where necessary to include activities and operations at the Kemptown Project to ensure that environmental, safety and health requirements are consistently met throughout the Project, specifically throughout the construction and operating phases. The ESH Management Plan will be developed in conjunction with Project contractors, and shall be at all times in strict compliance with all applicable Provincial and local requirements.

The Proponent will ensure that the construction and operation contractors will be duly certified by the appropriate safety associations. As part of the ESH Management Plan, the elements of an Environmental, Safety & Health Management System (ESH-MS) for the Project will include:

- Safety Management Statement, which shall clearly articulate the health and safety objectives and commitment to continually improve the effectiveness of the ESH-MS;
- Safety System Manual, which shall define the scope of the ESH-MS and describe the structure of the ESH-MS;
- Safety Project Plans, which shall explain the strategy and approach to be used in managing activities critical to delivery of work, containing as a minimum
  - Worksite Hazard Assessment Plan;
  - Fall Protection Plan;
  - Safety Emergency Response Plan, and
  - Safety Orientation and Education Plan;
- Safety Project Procedures, which shall contain where necessary documented procedures to ensure specific tasks will be successfully completed to a consistent level satisfying all the requirements of the agreements;
- Safety Records, which will be established and maintained to provide evidence of conformity to agreements, applicable certification requirements and ESH-MS requirements;
- Accident and Incident Investigation, which shall contain a documented process to investigate, document and report all accidents and incidents, to be carried out by suitably trained personnel, and where corrective or preventative action is required, such action will be fully documented and completed;
- Joint Environmental, Safety & Health Committee, which shall consist of one or more members from each of various work groups to ensure all personnel have representation, members of which will receive appropriate training and meet monthly;
- Personal Protective Equipment, which shall assess worksites for hazards and establish the requirements for appropriate personal protective equipment, communicate such requirements to involved personnel and worksite visitors;
- Internal Auditing, which shall contain documented process to confirm compliance with ESH-MS processes, and identify necessary corrective/preventative actions; and
- Continual Improvement, which will initiate measures to continually monitor the ESH-MS and the delivery of the work, to be implemented by a designated Environmental, Safety & Health Manager.

6.4.2 Emergency Response Planning

The Proponent will update the current emergency response plan for the unlikely event of a site emergency during any phase of the Project. The emergency response plan will include a report form and a map of the Project site, showing the most direct route from the site to an emergency resource such as a hospital. All on-site personnel and contractors will be required to complete a site safety and emergency response orientation prior to the start of pre-construction and construction activities. . Prior to operation, the Proponent will provide specialized training to local fire department for aid to workers during high rescue and suspension trauma prevention.

In locating wind projects, the balance between proximity to load capacity and proximity to residents is a delicate one. The Kemptown Project is not accessible by vehicles not properly equipped to deal with mud, large rocks, steep slope and possibly a significant amount of precipitation. The Proponent is equipped to access the Project site during an emergency, especially in the winter months. (Figure 6.20)

Figure 6.20 Maintenance vehicle used to access turbines during winter

6.4.3 Project Environmental Protection Plan

Affinity will prepare a Project-specific Environmental Protection Plan (EPP) that will be used on-site during all construction, operation and maintenance activities. The EPP will be written in construction specification format and will include the recommended mitigation measures in this EA report, as well as industry-accepted construction practices. The EPP will be used by the construction contractor and by all operations and maintenance workers during the life of the Project.

6.5 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

The following section outlines the effects of the environment on the Project, which includes climatic fluctuations and extreme events that could potentially occur over the life of the Project.

6.5.1 Climatic Fluctuations

Several aspects of the potentially changing climate have been considered, and must continue to be monitored during the lifetime of the Project. The turbines are designed to have a safe upper working limit for windspeeds. As the frequency of storms increases, particularly the strong late summer hurricanes that are anticipated to retain strong windspeeds as tropical depressions as they move up the coast, there would be an associated increase in the frequency of conditions exceeding the safe operating envelope for the turbines. During such conditions, the turbines are halted and generation suspended until safe working conditions occur again. The lost generation due to the marginal increase in storm frequency is a relatively small quantity of generation time; that is, it is not anticipated to significantly negatively affect the economic viability of the Project. Similarly, any change in the frequency of freezing rain, or blade-icing conditions, is not anticipated to significantly affect operating times, and the monitoring instruments in place will allow the physical risk to the turbines to be managed effectively.

6.5.2 Extreme Events

Weather events that put wind turbines at risk include icing conditions, particularly freezing rain, lightning, and extreme winds. Although Nova Scotia has fewer lightning storms than, for example, central Canada, the lightning protection must, and will, be designed to cope with accepted industry standards. Freezing rain is an operations issue. Blade specifications are sufficient to cope with foreseeable icing loads, but it is possible that an event that exceeds this level could be encountered. In such an event, the turbine would have been halted, and the damage would be confined to the immediate vicinity of the turbine base, should ice falling, or structural damage occur.

The wind turbines will be the highest features in the surrounding landscape, and therefore it is necessary that a lightning protection system be incorporated into each turbine. For the Project, each turbine blade material is fibreglass-reinforced epoxy resin with integral lightning protection supply. Each blade and each turbine tower are grounded to prevent adverse effects from lightning strikes. Additional grounding rods can be installed at each turbine site. Most effects from a lightning strike would be dissipated. If lightning struck the generator at the top of the tower, serious damage could occur and the generator may be damaged.

The generator is designed to automatically shut down at wind speeds that exceed 25 m/s. The turbine tower is designed to withstand excessive wind speeds. Comprehensive geotechnical work at each site will enable for proper design of wind turbine foundation. Extreme wind conditions are used as a parameter in this design.

In the event of a lightning strike that hits a wind turbine generator, severe damage could occur and a new generator may need to be installed. However, it is highly unlikely that lightning would hit a wind turbine generator accurately enough to severely damage it. Taking into consideration the design features that will be used in the Project, a significant environmental effect is unlikely to occur as a result of extreme weather events.

6.6 CUMULATIVE EFFECTS

The assessment of cumulative effects is based on methodology developed to satisfy cumulative effects analysis requirements under *CEAA*. Although a CEAA screening assessment is not required for this Project, CEAA guidance and methodology for cumulative effects assessment is used for good practice. The evaluation of cumulative environmental effects follows five steps:

- Step 1- Identify environmental effects resulting from Project-related activities.
- Step 2- Identify other projects or activities that could interact with Project-related environmental effects.
- Step 3- Exclude environmental effects of other projects or activities that are not likely to act in combination with the environmental effects of the Project.
- Step 4- Identify the likely cumulative environmental effects that could result from the interaction of Project-related environmental effects with other past and future projects and activities.
- Step 5- Evaluate the significance of likely cumulative environmental effects.

Under *CEAA*, an EA must determine whether the project under review adds to the combined adverse effects of past, existing and imminent projects and activities. Specifically, the assessment determines the degree to which a single project is contributing to the total cumulative effects of human activities and developments in the region. For this study, "The Proponent's Guide to Wind Power Projects: Guide to Preparing an Environmental Assessment Registration Document" (NSE 2007, updated 2012) was also used to ensure provincial requirements for registration are met for describing other undertakings in the area.

A critical step in any EA is determining what other projects or activities have reached a level of certainty (*i.e.,* will be carried out) such that they are required to be considered.

It is helpful to consider the clarification provided by the Joint Review Panel for the Express Pipeline Project in Alberta. Following an analysis of subsection 16(1)(a) of *CEAA*, the Joint Review Panel determined that certain requirements must be met for the Panel to consider cumulative environmental effects:

- there must be a measurable environmental effect of the project being proposed;
- that environmental effect must be demonstrated to interact cumulatively with the environmental effects from other projects or activities; and

- it must be known that the other projects or activities have been, or will be, carried out and are not hypothetical (NEB and CEA Agency 1996).

Furthermore, the Joint Review Panel indicated that it is an additional requirement that the cumulative environmental effect is *likely* to occur, that is, there must be some *probability*, rather than a mere possibility, that the cumulative environmental effect will occur. These criteria were used to guide the assessment of cumulative environmental effects of the proposed Project.

Environmental effects resulting from Project-related activities were identified and assessed in Sections 6.1 to 6.4. The evaluation of cumulative environmental effects is warranted for several environmental components discussed in these sections, namely birds and other wildlife, visual impact, noise and economic development. This section outlines cumulative environmental effects that may result from the Project in combination with other projects or activities that have been or will be carried out, within the regional area. For the purposes of this cumulative effects assessment, the regional area is defined as Pictou and Colchester Counties.

6.6.1 Past, Present and Future Projects/Activities in the Regional Area

There is significant industrial development surrounding the Study Area: a large-scale waste management facility is located one kilometer to the east of the Project Area. This site is currently under expansion to include various recycling sorting facilities. In addition to this immediate development, other wind projects are in operation and/or are in various stages of development.

The Proponent currently owns and operates the 51 MW Dalhousie Mountain Wind Farm in Mount Thom, Nova Scotia, 14km to the east of the proposed Kemptown Project. As well, the 50.6 MW Nuttby Mountain Wind Farm is located approximately 10-15 km northwest of the proposed Project. The Spiddle Hill wind development is operational in Tatamagouche, 25km north-northeast of the Kemptown site.

There are other COMFIT projects approved by NS Department of Energy thus far including the Proponent's projects in Greenfield, Colchester County and Limerock and Fitzpatrick's Mountain, Pictou County. There will be a total of 10 turbines installed with these 5 projects, Kemptown inclusive. Other projects approved thus far within 25km are an additional turbine at Spiddle Hill and a 5 turbine wind farm in Millbrook/ Truro Heights.

Other activities that would be expected to potentially interact cumulatively with the Project include the land use activities in and around the Study Area, including forestry, landfill facilities, recycling facilities (under construction) and power line corridors. These activities have occurred in the past thereby influencing the current landscape and will continue to occur in the future (thereby overlapping temporally with the Project) and would have effects on bird and other wildlife, visual impact, noise and economic development that could potentially interact cumulatively with the effects predicted for the Kemptown Project.

6.6.2 Interactions between Projects/Activities and Description of Cumulative Environmental Effects

Identifying potential cumulative effects is considered through a comparison of the temporal and spatial scope of the additional projects identified in the regional area. Spatially, those projects that are within the regional area are considered to be relevant. Temporally, those projects that have existed in the past, exist presently, or are likely to exist in the near future are considered relevant.

6.6.2.1 Birds and Other Wildlife

Past and ongoing forestry activities in the regional area have resulted in a loss of forest and wetland habitat and reduced the area of contiguous mature forest habitat. The Project is not expected to result in additional loss of high quality habitat or expected to contribute significantly to the cumulative environmental effects of human activities on wildlife habitat, given the limited amount of interior forest that will be affected by the Project.

With respect to this Project and other projects in the area, birds and other wildlife could be affected on a regional scale. Wildlife mortality, specifically bird and bat mortality, is a residual environmental effect associated with the proposed Project. Bird and bat mortality may also occur as a result of collisions with overhead power lines, vehicles, communication towers and buildings resulting in a cumulative effect. Historical evidence (see Section 6.2.1.1 and Appendix G) as well as the post-construction monitoring reports prepared for the existing Dalhousie Project, have shown that the wind turbines do not likely kill large numbers of birds and bats compared with other structures. It is therefore unlikely that the incremental contribution of the Kemptown Project to bird and bat mortality will affect these species on a population basis causing adverse cumulative effects. Bird surveys did not reveal extensive use of the site by species of conservation concern making it also unlikely that rare species would experience significant cumulative effects. A post-construction bird and bat monitoring program will confirm these predictions. As a result, the cumulative effects of this Project with other activities on birds and other wildlife is deemed to be **not significant.**

6.6.2.2 Visual Impact

The development of the Project, taken into consideration with forest harvesting activities, existing and future power lines and communication towers, and an expansion to the Balefill Facility could be considered a further visual obstruction. However, since the landscape has already been influenced by human activities, the visual effect of the Project is incremental. As a result, the cumulative effect of this Project with the other existing structures in the landscape is deemed to be **not significant**.

6.6.2.3 Sound

Acceptable sound levels are expected to be produced by the Kemptown Project (Appendix D). The three turbines in Kemptown will not cumulatively affect the sound levels at residences as a result of the setbacks of the turbines to receptors. The Project is expected to only result in an incremental increase in sound and is considered to be **not significant**.

6.6.2.4 Economic Development

This Project will continue to contribute to the community through job creation for local contractors. It is estimated that the Project will provide 15 to 20 new or existing jobs during the construction phase, two new or existing jobs during the operation and maintenance phase. In addition, the Project will provide significant municipal tax revenues and income for landowners. Through the fundraising partnership with the SPCA, the Proponent is also committed to local community benefits. Some examples of recipients include the Valley-Kemptown Volunteer Fire Department, Cobequid Eco-Trails Society, the rodeo at the Provincial Exhibition, 4-H Club, local baseball field repair and upkeep, and other local charitable organizations such as the Special Olympics, food bank, Cancer fundraising and local benefit scenarios that occur in small communities for families in need. These increases in employment and economy will have a positive cumulative benefit for economic development in the region.

6.6.2.5 Summary

With the adherence to mitigation presented in this report, in addition to compliance with regulatory requirements (including terms and conditions of approval), the residual environmental effects of the Project, including cumulative effects, are predicted to be **not significant**.

6.7 SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS

A summary of recommended measures for managing and mitigating effects of the Project, based on the preceding analysis, is provided in Table 6.12.

Table 6.12 Summary of Impact Management and Proposed Mitigation Measures

Environmental Component	Project Activity	Potential Effects	Mitigation Measures
Birds and Other Wildlife	Construction & Decommissioning	Sensory disturbance	• Visitors will remain within relevant areas, both in-vehicle and on- foot and will aim to preserve the site’s natural areas. • Overall disturbance will be limited to designated workspaces and performed in compliance with the *Migratory Birds Convention Act*. • Delivery vehicles will remain on designated roads.
		Habitat loss/alteration	• Habitat loss will be mitigated by only clearing the land necessary for construction activities and by limiting the overall land disturbance to within designated workspaces.

Table 6.12 Summary of Impact Management and Proposed Mitigation Measures

Environmental Component	Project Activity	Potential Effects	Mitigation Measures
			• Upon completion of construction and/or decommissioning, habitat will be restored to the extent possible. • Areas of significance (*e.g.,* wetlands) will be avoided, to the extent possible.
		Mortality	• In order to reduce the potential of bird mortality, construction activities will be performed in compliance with the *Migratory Birds Convention Act (e.g.,* clearing outside the critical time periods for breeding birds). • Onsite personnel were trained in June 2012 regarding how to identify and properly deal with any wood turtles that may enter a work site. Proponent and workers will continue to receive training for specific species as needed.
	Operation	Sensory disturbance	• A pre- and post-construction Mainland Moose Monitoring Program will be conducted. • A moose monitoring program (pellet group counts) will be implemented to determine the degree to which moose use the Project Study Area. • Winter track surveys will be conducted to determine if moose and other mammal species avoid turbine sites. This study will help to determine if the turbines and associated infrastructure are an impediment to free movement of mammals. • Overall, the Proponent is also committed to working with NSDNR and landowners to protect the mainland moose population, e.g., through initiatives in the Mainland Moose Recovery Program.
		Mortality	• To reduce the potential for increased bird fatalities due to collision with wind turbines, several decisions were made in the planning of the wind farm. The turbines to be used extend no higher than 150m above the ground thus avoiding the flight height of nocturnally migrating landbirds. Lighting will be the minimum allowed by Transport Canada for aeronautical safety, and red lights (CL-865) may be used with the minimum intensity and flashes per minute allowable. Non-flashing red lights are also still an option, depending on the recommendations of NavCanada, Transport Canada, and CWS combined. The turbines for this Project will be built using tubular steel towers, as some data indicate that lattice towers encourage perching by raptors during hunting and, as a result, may put these birds at risk of collisions. Post-construction monitoring will direct the need and form of further post-construction mitigation measures. • A bird and bat monitoring program will be developed in consultation with NSDNR and CWS. Based on the results of the program, necessary modifications to mitigation plans and/or wind farm operations will be undertaken.

Table 6.12 Summary of Impact Management and Proposed Mitigation Measures

Environmental Component	Project Activity	Potential Effects	Mitigation Measures
Soils and Vegetation	Construction & Decommissioning	Soil erosion and compaction	• Access to the turbine sites will be limited to established access roads, where possible. • Size of access roads will be kept to the minimum required for the safe construction, operation and decommissioning of the equipment. • Whenever possible, clearing activities will be timed to periods when the ground surface is best able to support construction equipment (winter or dry season). • Compacted soil will be reclaimed as required. • Standard erosion and sediment control measures will be implemented as required. • Topsoil and subsurface soils will be separated and stored on-site to be replaced appropriately after the pouring of the concrete foundation. When the soils are stored they will be protected from erosion and runoff.
		Loss of plant species	• Rare plant surveys have been conducted to assist with micro-siting of turbines and access roads. • Where Plant Species of Conservation Concern are encountered, avoidance to the extent possible will be considered, especially where there maybe be a threat to the regional population. • Prior to construction, digital way-point files revealing the precise locations of all “Sensitive”, “May be at Risk”, “At Risk” and “Undetermined” listed species identified during field work within the area proposed for development will be provided to NSDNR (Appendix F).
Wetlands	Construction & Decommissioning	Loss of wetland area and/or function	• Wetlands will be avoided, where possible. • All activities, including equipment maintenance and refuelling, will be controlled, and/or will be done off-site, to prevent entry of petroleum products or other deleterious substances, including any debris, waste, rubble, stockpiled soils, or concrete material, into a wetland. • Construction material, excess material, construction debris, and empty containers will be stored away from wetlands. • Erosion and sediment control measures will be implemented to minimize interactions with wetlands. • Functional analyses will be conducted for wetlands that cannot be avoided. • Regulatory approval will be obtained (including compensation for no net loss of function) from NSE for wetland alteration as required. • Turbines will not be constructed within 30 m of a wetland unless approved by NSE.
Water Quality/ Aquatic Environment	Construction & Decommissioning	Surface water contamination	• Watercourses will be avoided to the extent possible. • Where alteration of watercourses is required, regulatory approval from NSE of the proposed alteration will be obtained prior to construction. • All activities, including equipment maintenance and refuelling, will be controlled, and/or will be done off-site, to prevent entry of petroleum products or other deleterious substances, including any debris, waste, rubble, stockpiled soils, or concrete material, into a watercourse.

Table 6.12 Summary of Impact Management and Proposed Mitigation Measures

Environmental Component	Project Activity	Potential Effects	Mitigation Measures
			• Construction material, excess material, construction debris, and empty containers will be stored away from watercourses and watercourse banks. • A contingency plan for accidental spills will be developed for the Project. • Turbines will not be constructed within 30 m of a watercourse unless approved by NSE.
		Sediment loading	• Watercourses will be avoided to the extent possible • General mitigation measures from the NSE Erosion and Sediment Control Handbook will be utilized to control surface water, reduce erosion and limit sedimentation. • If watercourse alterations are required, they will be done in consultation with NSE/DFO in accordance with regulatory requirements. • Land clearing and construction near watercourses (including crossing structure construction) will occur between June 1 and September 30 where possible. • Temporary erosion and sediment control measures, silt fence, straw bales (*etc.*) will be used and maintained until 100% of all work within or near a watercourse has been completed and stabilized. • Visual assessments will be completed bi-weekly and after severe storm events to ensure the effectiveness of erosion and sedimentation controls. • Temporary sediment control measures will be removed at the completion of the work but not until permanent erosion control measures, if required, have been established.
		Surface water flow	• Watercourses will be avoided to the extent possible. • The access road constructed across an existing watercourse that require a culvert will follow standard industry practice, installing culverts of sufficient size to accommodate expected maximum flows within the watercourse. • A Water Approval will be obtained for all required watercourse crossings and the conditions of approvals will be followed.
		Loss of fish habitat	• In-water work will be avoided. • New culvert will be of an open-bottom design. • Existing stream flows will be maintained downstream of the de-watered work area during all stages of work. • All sediment and erosion control measures will be inspected quarterly as well as immediately following rainfall events.
		Fish mortality	• Watercourses will be avoided to the extent possible. • Watercourse crossings, where required, will be constructed between June 1 to September 30 unless otherwise approved by NSE. • Where possible, culverts will be installed during low flow periods. If water is present, watercourses will be dammed and flow will be preserved through water pumps. In this case, a biologist would be on site to facilitate fish rescue within the dammed area.

Table 6.12 Summary of Impact Management and Proposed Mitigation Measures

Environmental Component	Project Activity	Potential Effects	Mitigation Measures
Sound	Construction & Decommissioning	Increases in sound levels due to the transportation and operation of clearing equipment	• Nearby residents will be advised of significant sound generating activities and these will be scheduled to create the least disruption to receptors. • Heavy equipment will be operated between 7:00 a.m. and 10:00 p.m., avoiding Sundays and holidays unless absolutely necessary. • Construction equipment will have mufflers. • Noise abatement equipment, in good working order, will be used on all heavy machinery used on the Project.
	Operation	Increase sound levels	• None required.
Tourism	Construction & Decommissioning	Effect on tourism and recreation	• None required.
	Operation	Effect on tourism and recreation	• None required.
Visual	Operation	Change to visual landscape	• Turbines will be all of the same type and model, and will be painted light grey to reduce reflection. • Screening opportunities for adjacent residences through tree planting or other measures may be considered where post-construction evaluation indicates a legitimate concern.
		Lighting	• Lighting will be the minimum allowed by Transport Canada to ensure the appropriate level of aeronautical safety.
		Shadow flicker	• None required.
Archaeological and Cultural Resources	Construction	Disturbance	• An archaeological field survey has been conducted and an Archaeological Contingency Plan developed. • Upon discovery of an artifact, work will be stopped in the area and the appropriate authorities will be contacted.
Land Use	Construction	Reduction of forested land	• Existing right-of-ways (RoWs) (*e.g.*, woods roads) will be used to the greatest extent possible to minimize the Project footprint. • Turbines, with their relatively small footprint on the land, have been sited with consideration for the potential impact to existing land uses. • Existing logging and access roads built earlier in the construction schedule will be used to install the collection system.
	Operation	Disruption to undeveloped woodlands or infrastructure	• The Project has been designed to minimize impacts to the local land use. No mitigation, therefore, is required as no significant impacts are predicted.
Health and Safety	Operation	Electromagnetic Fields (EMFs)	• None required.
		Infrasound energy	• None required.
		Ice throw	• During construction and operation activities, access to the wind turbine facility will be restricted to authorized

Table 6.12 Summary of Impact Management and Proposed Mitigation Measures

Environmental Component	Project Activity	Potential Effects	Mitigation Measures
			personnel wearing proper personal protective equipment and who have had appropriate safety training. • During site visits, vehicles will be parked up-wind of the turbines. • Warning signs will be posted at the perimeter of the Project Study Area, discouraging trespassing on private lands. • During operation, access to the wind turbine sites will be restricted to authorized personnel only.
Local Community	Construction	Hazards and/or inconveniences to forestry operation	• No modification to existing roads expected. • A Special Move Permit and any associated approvals will be obtained through the Department of Transportation and Infrastructure Renewal for heavy load transport.
	Operation	Effect on local economy	• Local residents will be employed to the extent possible during the construction, operation and decommissioning of the Project. • Financial benefits will be extended to the Valley-Kemptown Fire Department and other local organizations annually. • The SPCA will receive a significant annual donation from the production at this site. • Municipal taxes will be remunerated, thus increasing the local tax base, which could be used to increase funding of local municipal initiatives.
		Effect on property values	• None required.

7.0 FOLLOW-UP AND MONITORING

The Proponent is committed to conducting monitoring activities to address residual environmental effects with a high level of concern or uncertainty. While it is anticipated that the residual environmental effects of the Kemptown Project will not be significant, an Environmental Management Plan (EMP) and corresponding Environmental Protection, Monitoring, and Contingency Plans will be developed to address potential issues and concerns. In addition, there are site-specific pre-construction follow-up measures which the Proponent is committed to, in order to assist with micrositing of turbine and access road locations, refine mitigation as required, and support environmental regulatory approvals as required (*e.g.*, Water Approvals). The level of information contained in this EA Registration is considered sufficient to confidently predict the significance of residual Project-related environmental effects (including cumulative effects).

7.1 PRE-CONSTRUCTION SURVEYS AND APPROVALS

Watercourses and wetlands will be avoided to the greatest extent practical. Where these features are unavoidable, approval will be sought from NSE and DFO as appropriate for alteration. Follow-up watercourse and/or wetland functional analyses will be conducted as required to complete applications for approval. Habitat compensation planning, if required, will be done in consultation with NSE and/or DFO to ensure no net loss of function/habitat.

A post-construction Mainland Moose Monitoring Program will be conducted (see Table 7.1). The monitoring program will be confirmed with NSDNR. Overall, the Proponent is also committed to working with NSDNR and landowners to protect the mainland moose population, e.g., through initiatives in the Mainland Moose Recovery Program.

A post-construction bird and bat monitoring program, including carcass searches, efficiency trials and scavenger removal trials will be developed and implemented in consultation with CWS and DNR. This survey is expected to continue for a minimum of two years after operations begin at Kemptown.

An archaeological field survey was conducted based on final design and layout of Project infrastructure and proximity to areas deemed to have potential for First Nations and historical archaeological resources. The results were submitted to Nova Scotia Department of Communities, Culture and Heritage for their review and comment. The ARIA process is not considered complete until the CCH has completed their review and accepted the recommendations of the archaeologists. This information will be given to NSE as an addendum upon receipt.

An MEKS was conducted for specific land use history and to provide guidance on archaeological follow-up. This report has not been received to date, but will be made available as an addendum to this document upon the Proponent receiving the results.

7.2 FOLLOW-UP AND MONITORING PROGRAMS

The following section provides a brief overview of the Project follow-up and monitoring measures to be implemented to support construction and operations activities.

The EMP is generally overseen by the Operations Manager, but all Project personnel will be trained in their specific requirements towards its implementation. Training will include the safe handling of hazardous materials and petroleum products, compliance with WHMIS, proper use of on-site firefighting equipment, and an environmental orientation prior to initiating on-site work. Currently, all employees of the Proponent are required to be trained and audited from time to time and annually to ensure safe operations and management of any unforeseen spill/ accident/ etc.

The Environmental Protection Plan (EPP) is a key component of the EMP, and has been developed for both the Construction and Operations phases of the Project. The EPP for the construction period aims to reduce the environmental impact during construction activities and consists of environmental protection measures for routine activities associated with the construction of the Project. This will be accomplished through: contingency procedures in the event of an erosion control failure, fuel and hazardous material spill, fire and/or encounter of archaeological and heritage resources; environmental monitoring, inspection and reporting requirements; a list of applicable permits, approvals and authorizations; and a key contact list. The EPP for the operating period aims to reduce the environmental impact of the operation activities and consists of guidelines for: equipment maintenance activities; the safe storage, handling, and disposal of petroleum, oils and lubricants (POL); and the safe storage, handling and disposal of hazardous materials.

Environmental Monitoring is a key component of the EMP. Table 7.1 outlines the Environmental Monitoring Programs that will be in place for the Kemptown COMFIT Wind Project Project.

The last aspect of the EMP is the Contingency Procedure Plan, which consists of a detailed response system in the event of the accidental release of POLs or other hazardous materials. Aspects of the plan include environmental concerns, personnel training, prevention measures, response-action plan, and a spill clean-up resource list.

Table 7.1 Environmental Monitoring Programs (Operations)

Component	Method	Timing	Response-Action Plan
Sound	In response to noise complaints, if any occur, Affinity Renewables would measure ambient sound levels and wind speed at selected residential receptors. The sound and wind data will then be combined to produce a plot of background ambient	In response to noise complaints, if any occur.	If the ambient sound levels at any residential receptors are higher than permitted noise levels, a report shall be filed with NSE with the particulars of the concern, the suspected source, and any remedial actions taken or to be taken to resolve the concern.

Table 7.1 Environmental Monitoring Programs (Operations)

Component	Method	Timing	Response-Action Plan
	sound pressure levels versus wind speed.		If the sound exceedance is related to equipment wear, the maintenance schedule will be adjusted to account for this and minimize the potential for a reoccurrence.
Shadow Flicker	A registry will be created to document complaints of shadow flicker. In the event of a complaint, shadow flicker will be reviewed from that receptor using photographs, and/or video recording at the appropriate time of day and year. Anecdotal information about shadow flicker will be collected from nearby residences.	Shadow flicker will be monitored as required during operation of the Project. If required, it will be conducted once during the summer and once during the winter.	If a complaint or complaints of shadow flicker are received from a receptor located within 1,500 m of the turbine, shadow flicker will be reviewed from that receptor. Information collected from the shadow flicker monitoring will be used will be used to develop further mitigation, if warranted.
Bird and Bat Mortality	Bird and bat carcass monitoring will be performed within a 75m radius of each selected turbine. The fatality rate will require correction for scavenger removal of carcasses and field observation abilities of surveyors. The monitoring program will be confirmed with Environment Canada (CWS) and NSDNR.	It is expected that monitoring of bird and bat mortality surveys will be conducted during the two years following wind farm commissioning, with emphasis placed on surveying during peak spring and fall migration of birds and fall migration of bats.	It is likely that two years of monitoring will be conducted for bats and birds, to be determined in consultation with NSDNR and CWS
Moose	A post-construction Mainland Moose Monitoring Program will be conducted. The monitoring program will be confirmed with NSDNR.	In light of the discovery of what appears to be limited moose presence in the Project Study Region, a moose monitoring program (pellet group counts) will be implemented to determine the degree to which moose use the Project Study Area. Winter track surveys will be conducted to determine if moose and other mammal species avoid turbine sites. This study will help to determine if the turbines and associated infrastructure are an impediment to free movement of mammals where turbines are not present.	The information can then be used as baseline or reference material for the Provincial Moose Recovery Program.
Aesthetics and Visual Impacts	A registry will be established to record both negative and positive comments on the aesthetics and visual impact of the wind turbines.	Photographs will be taken at least once after the turbines become operational. The comment registry will be maintained and media comment will be collected throughout the operation of	Information collected from the aesthetics and visual impact monitoring will be used to develop further mitigation, if required.

Table 7.1 Environmental Monitoring Programs (Operations)

Component	Method	Timing	Response-Action Plan
	Media comment on the wind turbines will also be collected and documented. If required, photographs will be taken of the turbine locations from a minimum of two vantage points.	the Project.	
Electromagnetic Interference	A complaint resolution system will be in place to record and investigate complaints regarding telecommunications interference.	In response to interference complaints, if any occur.	Mitigation will be conducted on a case by case basis pending results of the investigation.

8.0 CONCLUSION

The Kemptown COMFIT Wind Project is expected to provide clean energy sufficient for 2,000 homes annually in Nova Scotia. The Project will result in displacement of burning fossil fuel with an expected avoidance of greenhouse gas emissions of approximately 17,200 tonnes of carbon dioxide, as well as tonnes of sulphur dioxide and nitrogen oxide. The Kemptown Project will therefore be an important component of Nova Scotia's commitment to renewable energy and reduction of air emissions from energy combustion.

Based on the results of this EA, the study team has concluded that the Kemptown Project is not predicted to result in any significant adverse residual environmental effects. The following section summarizes key points from the EA in justification of this conclusion.

The Project Study Area comprises approximately 40 ha in total. However the actual footprint of the tower structures and ancillary facilities for the proposed wind farm will occupy only a small fraction of the land base within the Project Study Area (cleared turbine area and area for the right-of-way between turbines). The Project is predicted to result in physical disturbance of approximately 4 ha of land (including development of access roads and turbine foundations). It is believed that this prediction is an overestimate and that Project development will result in a much smaller footprint.

Existing logging roads will be upgraded and used for turbine access. Sensitive features including watercourses, wetlands, plant species of conservation of concern, and areas of high archaeological potential will be avoided to the greatest extent practical or possible. Where avoidance is not practical nor possible, detailed mitigation will be developed and all required permits will be obtained prior to construction. Follow-up surveys will be conducted if necessary at areas to be disturbed based on final design which will allow for precise mitigation planning to minimize localized environmental effects on sensitive habitats.

Installation of the proposed Kemptown Project will be completed in approximately four months of on-site work limiting the period of potential disturbance to residents and wildlife associated with increased vehicle traffic and human activity. Construction activities will be scheduled where practical to minimize environmental effects (*i.e.,* to prevent rutting and to avoid significant life history events such as breeding season for most bird species). Remediation of disturbed surface areas will be undertaken as soon as possible after construction is complete, and the conditions of affected land will be remediated to approximate pre-construction conditions in accordance with landowner agreements. The residual environmental effects associated with Project construction are therefore predicted to be **minimal** and **not significant**.

Effects associated with Project operation are also predicted to be **minimal** and **not significant**. Operation of the wind farm will result in minimal adverse effects to birds and other wildlife. While turbines present a potential collision hazard to birds and bats, this hazard is fairly low relative to other tall structures. Bird and bat collisions are expected to be infrequent considering the topography of the area, observed flying patterns, distribution of habitat, and low collision rates documented at Phase I of this Project (Dalhousie Mountain) and other wind farms in the United States and Canada. Post-construction monitoring will be conducted in consultation with Environment Canada and NSDNR. This information will be used for future planning and develop mitigation if required. Any other disturbances to birds and other wildlife (*e.g.,* sensory disturbance) will be minimal, of short duration, reversible and on a local scale.

Operation of the facility will not result in production of air emissions. Sound levels and visual effects (*e.g.,* shadow flicker) will be within acceptable standards. The visual landscape of the region will be altered by the presence of wind turbines; while some receptors will have a clear view of the turbines, many of the homes close to the viewshed will be unable to see the wind farm due to topography and forest cover. Screening opportunities through tree planting or other measures will not likely be warranted but may be considered where post-construction assessment indicates a legitimate concern.

Existing land use (*i.e.,* residential, recreational, resource use) can continue during operation of the Project. A number of positive effects will also be realized. Landowners who are leasing their land for the Project will receive direct financial benefits from facility installation and operation, and the county will receive substantial revenue through property taxes, which will benefit county residents in turn. The power produced will provide large annual donations to the SPCA as well as annual donations on a lesser scale to the local fire department, and other community groups. The Project will offer employment and revenue to local workers, and tourism may actually increase as a result of the operation of the wind farm.

Appropriate and effective mitigation measures have been recommended for the proposed Kemptown Project to eliminate or minimize effects that may have been associated with the development. Any residual net adverse environmental effects are predicted to be **not significant** based on the results and conclusions of this EA.

9.0 SIGNATURE

This report presents details on the EA of the proposed Kemptown COMFIT Wind Project Project, conducted in accordance with "The Proponent's Guide to Wind Power Projects: Guide to Preparing an Environmental Assessment Registration Document" (NSEL 2007, updated 2012). The *"*Environmental Impact Statement Guidelines for Screenings of Inland Wind Farms Under the *Canadian Environmental Assessment Act"* (NRCan 2003) was also used for guidance in reporting as applicable. Overall, the residual effects of the Project are not significant and are acceptable, based on a balanced assessment against all of the screening criteria and the results and conclusions of the EA.

This EA was completed internally for Affinity Renewables. Specifically, and on behalf of Affinity Renewables, the report was prepared and reviewed by the following:

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10.0 REFERENCES

Arnett, E., D. Redell, J. Hayes, and M. Huso. 2006. Patterns of pre-construction of bat activity at proposed wind energy facilities. Presentation and Abstract. 36th Annual North American Symposium on Bat Research, Wilmington, North Carolina.

Atlantic Canada Conservation Data Centre (ACCDC). Data Report 4641: East Mountain 1-3, NS. 2011

Atlantic Canada Conservation Data Centre (ACCDC). 2010. Understanding Ranks, Retrieved 22 November 2011, from Atlantic Canada Conservation Data Centre, Web site: http://accdc.com/Data/ranks.html

Atlantic Canada Conservation Data Centre (ACCDC). 2010. Rarity Ranks and Legal Status by Province – Nova Scotia, Animal Vertebrate, Retrieved 22 November 2011, from Atlantic Canada Conservation Data Centre, Web site: http://www.accdc.com/webranks/NSVERT.HTM

Baerwald, E.F., G.H. D'Amours, B.J. Klug, and R.M.R. Barclay. 2008. Barotrauma is a significant cause of bat fatalities at wind turbines. Current Biology. Vol. 18 (16):R695-R696

Basquill, Sean, Lawrence Benjamin and Doug Orr. March 2011. Mainland Moose Habitat Classification and Modeling-A Preliminary Analysis using PGI Data, NSDNR Wildlife Division

Bat Conservation International. 2001. Bats in Eastern Woodlands. Bat Conservation International. Available online at: http://www.batcon.org/nabcp/newsite/forrep.pdf.

Blaney, S. 2013. A vascular plant inventory of the Kemptown COMFIT site, Colchester County, Nova Scotia, with notes on breeding birds

British Wind Energy Association (BWEA). 2005. Low Frequency Noise and Wind Turbines Technical Annex. February 2005. Available online: http://www.bwea.com/pdf/lfn-annex.pdf.

Broders and Henderson. 2007. Bat Species Composition and Activity at the Proposed Dalhousie Mountain Wind Development Site, Nova Scotia. Appendix C-7, Dalhousie Mountain Wind Farm EIA. File No. 10700-40 40100-30-141.

Broders, H., G. Quinn, and G. Forbes. 2003. Species status, and the spatial and temporal patterns of activity of bats in southwest Nova Scotia, Canada. Northeastern Naturalist 10:383-398.

Burns, L.E., and Broders, H.G., 2010. Structure and movements of bat populations among hibernacula in Atlantic Canada. 2010 Progress Report. Nova Scotia Habitat Conservation Fund.

Canadian Environmental Assessment Agency. 1999. Cumulative Effects Assessment Practitioners Guide.

Canadian Environmental Assessment Agency, 2003. The Responsible Authority's Guide

Canadian Renewable Energy Corp. (CREC). 2007. Wolfe Island Wind Project Environmental Review Report. Prepared by Stantec Consulting Ltd. November 2007.

Canadian Wildlife Service. 2007. Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds, Retrieved 23 November 2011, from Environment Canada, Web site: http://www.ec.gc.ca/Publications/C8CE090E-9F69-4080-8D47-0622E115A4FF%5CCWSWindTurbineAndBirdsMonitoringGuide2007.pdf

Canadian Wildlife Service. 2006. Wind Turbines and Birds A Guidance Document for Environmental Assessment, Retrieved 23 November 2011, from Environment Canada, Web site: http://www.bape.gouv.qc.ca/sections/mandats/eole_matane/documents/DB15.pdf

Canadian Wind Energy Association. 2008. Wind Energy – Wind Facts, Retrieved 12 November 2011, from Canadian Wind Energy Association, Web site: http://www.canwea.ca/wind-energy/index_e.php

Canning & Simmons, 2010. Wind Energy Study – Effect on Real Estate Values in the Municipality of Chatham-Kent, Ontario.

Chatham-Kent. 2008. Public Health Unit: The Health Impact of Wind Turbines: A Review of the Current White, Grey and Published Literature.

Chief Medical Officer of Health (CMOH). 2010. The potential health impact of wind turbines. Chief Medical Officer of Health Report. May 2010. Ontario.

Church, Ambrose. 1874. Topographical Township Map of Colchester County. A.F. Church & Co., Halifax. NSARM: Halifax, Nova Scotia.

Colby, W.D., R. Dobie, G. Leventhall G, D.M. Lipscomb, R.J. McCunney and M.T. Seilo. 2009. Wind Turbine Sound and Health Effects. An expert panel review: American Wind Energy Association and Canadian Wind Energy Association. Available online at: http://www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects.pdf.

Crawford, R.L., and R.T. Engstrom. 2001. Characteristics of avian mortality at a north Florida television tower: a 28-year experience. Tall Timbers Research Station, Tallahassee, Florida.

Crockford, N.J., 1992. A review of the possible impacts of wind farms on birds and other wildlife. Joint Nature Conservation Committee, JNCC report no. 27, Peterborough, United Kingdom.

Davis, D and S. Browne. 1996. The Natural History of Nova Scotia. Volume II: Theme Region. Nova Scotia Museum and Nimbus Publishing: Halifax, Nova Scotia. Accessed October 2011. Available online at: http://museum.gov.ns.ca/mnh/nature/nhns2/intronew.htm

de Boer, L. 2013. Kemptown Wind Project: Archaeological Resource Impact Assessment. Heritage Research Permit A2013NS088

Dunn, E. H. 1993. Bird mortality from striking residential windows in winter. Journal of Field Ornithology 64(3): 302-309.

ECONorthwest. 2002. Economic Impacts of Wind Power in Kittitas County. Final Report for the Phoenix Economic Development Group, November 2002.

Ellenbogen, J. M., S. Grace, W. J. Heiger-Bernays, J. F. Manwell, D. A. Mills, K. A. Sullivan and M. G. Weisskopf. 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel Prepared for: Massahusetts Department of Environmental Protection Massachusetts Department of Public Health

Environment Canada. 2013. National Climate Data and Information Archive. Canadian Climate Normals 1971-2000. Available online at: http://climate.weatheroffice.gc.ca/climate_normals/results_e.html?stnID=6491&lang=e&dCode=1&province=NS&provBut=&month1=0&month2=12. Accessed July 16, 2013.

Environment Canada. 2007a. Wind Turbines and Birds - A Guidance Document for Environmental Assessment. Available online at: http://www.cws-scf.ec.gc.ca/publications/eval/index_e.cfm. Last accessed January 21, 2008.

Environment Canada. 2007b. Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds. Available online at: http://www.cws-scf.ec.gc.ca/publications/eval/index_e.cfm.

Epilepsy Action. 2007. Photosensitive epilepsy. Available online at: http://www.epilepsy.org.uk/info/photo.html.

Erickson 2003. Updated information regarding bird and bat mortality and risk at new generation wind projects in the West and Midwest. Presentation at the National Wind Coordinating Committee meeting, “How is Biological Significance Determined When Assessing Possible Impacts?”, Washington, D.C., November 2003

Erickson, J. L., and S. D. West. 2002. The influence of regional climate and nightly weather conditions on activity patterns of insectivorous bats. Acta Chiropterologica 4:17–24.

Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P.Young, Jr., K.J.Sernka and R.E.Good. 2001. Avian collisions with wind turbines: A summary of existing studies and comparisons to other sources of avian collision mortality in the United States. Report prepared for National Wind Coordinating Committee, August 2001.

Evans, T., J. Cooper and V. Lenchine. 2013. Infrasound levels near wind farms and in other environments

Forbes, G. 2012a. Technical Summary and Supporting Information for an Emergency Assessment of the Little Brown Myotis Myotis lucifugus. Terrestrial Mammal Subcommittee, COSEWIC.

Forbes, G. 2012b. Technical Summary and Supporting Information for an Emergency Assessment of the Northern Myotis Myotis septentrionalis. Terrestrial Mammal Subcommittee, COSEWIC.

Forbes, G. 2012c. Technical Summary and Supporting Information for an Emergency Assessment of the Tri-colored Bat Perimyotis subflavus. Terrestrial Mammal Subcommittee, COSEWIC.

Gehring, J., O. Kerlinger and A.M. Manville II. 2009. Communications towers, lights, and birds: successful methods of reducing the frequency of avian collisions. Ecological Applications, 19(2). Pp. 505-514.

Gilhen, John. 1974. The Fishes of Nova Scotia's Lakes and Streams. 49p. Nova Scotia Museum

Gilhen, John. 1984. Amphibians and Reptiles of Nova Scotia. 162p. Nova Scotia Museum

Gill, J.P., M. Townsley, and G.P. Mudge. 1996. Review of the impacts of wind farms and other aerial structures upon birds. Scottish Natural Heritage Review. No. 21.

Grodsky, S. M., M. J. Behr, A. Gendler, D. Drake, B. D. Dieterle, R. J. Rudd, and N. L. Walrath. 2011. Investigating the cause of death for wind turbine associated bat fatalities. Journal of Mammalogy 92(5): 917-925

Hamper, Jody. 2013. Spring Moose PGI Survey for Kemptown Wind Project

Hall, L.S. and G.C. Richards. 1972. Notes on *Tadarida australis* (Chiroptera: Molossidae). Australian Mammalogy 1:46.

Hall, R. A. 2003. NS Freshwater Mussel Fieldwork. Nova Scotia Department of Natural Resources, 189 ACCDC recs.

Harding, G., P. Harding, A. Wilkins. Wind Turbine, Flicker, and Photosensitive Epilepsy: Characterizing the Flashing that may Precipitate Seizures and Optimizing Guidelines to Prevent Them. Epilepsia 2008, 49:10095-98.

Haugen, K. M. B. 2011. International Review of Policies and Recommendations for Wind Turbine Setbacks from Residents: Setbacks, Noise, Shadow Flicker, and other Concerns. Minnesota Department of Commerce: Energy Facility Permitting

Health Canada. 2010. Electric and magnetic fields at extremely low frequencies. Updated January 2010. Available online at: http://www.hc-sc.gc.ca/hl-vs/alt_formats/pdf/iyh-vsv/environ/magnet-eng.pdf

Health Canada 2012. Overview of proposed Health Canada study into human health associated with wind turbines. Available online at: http://www.hc-sc.gc.ca/ewh-semt/consult/_2012/wind_turbine_eoliennes/question-eng.php

HGC Engineering. 2006. Wind turbines and infrasound. Submitted to Canadian Wind Energy Association. Available online at: http://www.nationalwind.com/facts//CANWEA%20-%20Wind%20Turbines%20and%20Infrasound.pdf.

Hoen, B., R. Wiser, P. Cappers, M. Thayer, and G. Sethi. 2009. The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analyses

Ingersoll, T., Navo, K. & Valpine, P. de. (2010) Microclimate preferences during swarming and hibernation in the Townsend"s big-eared bat, Corynorhinus townsendii. Journal of Mammalogy, 91, 1242-1250.

James, R.D. 2003. Bird observations at the Pickering wind turbine. Ontario Birds 21: 84-97.

James, R.D., and G. Coady. 2003. Exhibition Place Wind Turbine Bird Monitoring Program in 2003. Report to Toronto Hydro Energy Services Inc. and Windshare, December 2003.

Johnson, G.D., W.P. Erickson, D.A. Shepherd, M. Perlik, M.D. Strickland, and C. Nations. 2002. Bat interactions with wind turbines at the Buffalo Ridge, Minnesota, Wind Resource Area: 2001 field season. Electric Power Research Institute, Palo Alto, California.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd and D.A. Shepherd. 2000. Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-year study. Technical report prepared for Northern States Power Co., Minneapolis, MN. 212pp.

Jones, J. and C.M Francis. 2003. The effects of light characteristics on avian mortality at lighthouses. Journal of Avian Biology 34 (4), 328–333.

Kerlinger, P. 2003. FAA lighting of wind turbines and bird collisions. Presentation at the National Wind Coordinating Committee meeting, "How Is Biological Significance Determined When Assessing Possible Impacts?", Washington, D.C., November 17-18, 2003.

Kerlinger, P. 2000. Avian mortality at communication towers: a review of recent literature, research and methodology. Prepared for the U.S. Fish and Wildlife Service, Office of Migratory Bird Management.

Kingsley, A., and B.Whittam. 2005. Wind Turbines and Birds: A Background Review for Environmental Assessment. Draft. Document prepared by Bird Studies Canada for Canadian Wildlife Service, Environment Canada, May 2005.

Knopper, L.D. and C.A. Ollsen. 2011. Health effects and wind turbines: a review of the literature. Environmental Health 2011(10): 78. Available online at: http://www.ehjournal.net/content/10/1/78.

Koehler, C.E. and R.M.R. Barclay. 2000. Post-natal growth and breeding biology of the hoary bat (*Lasiurus cinereus*). Journal of Mammalogy 81:234-244.

LeBlanc, M.P. 2007. Recommendation for Risk Assessment of Ice Throw and Blade Failure in Ontario. Garrard Hassan Canada. Report prepared for Canadian Wind Energy Association. May 31, 2007.

Leventhall, G. 2006. Infrasound from wind turbines: facts, fiction or deception. Can Acoust. 2006;34(2):29-36

Leventhall, G. 2004. Low frequency noise and annoyance. Noise and Health 6(923):59-72.

Leventhall, G., S. Benton, and P. Pelmear. 2003. A Review of Published Research on Low Frequency Noise and its Effects. Prepared for the Department of Environment, Food and Rural Affairs, United Kingdom. 88 pp.

MacGregor, Michelle K. and Mark Elderkin. 2003. Protecting and Conserving Wood Turtles: A Stewardship Plan for Nova Scotia.

Maritime Butterfly Atlas. Available online at http://www.accdc.com/butterflyatlas/home_e.html

McAlpine, D. F., F. Muldoon, G. Forbes, A. I. Wandeler, S. Makepeace, H. G. Broders, and J. P. Goltz. 2002. Over-wintering and reproduction by the big brown bat, Eptesicus fuscus, in New Brunswick. Canadian Field-Naturalist 116:645-647.

Millikin, R.L. 2005. Phase 3 Final Report for the Wind Consortium. Report prepared for Suncor Energy Products Inc., Vision Quest Windelectric, Canadian Hydro Developers Inc., Enbridge Wind Power Canada Inc., and Natural Resources Canada.

Ministry of the Environment (Ontario). 2008. Noise Guidelines for Wind Farms – Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities.

Morgan, C., E. Bossanyi, and H. Seifert. 1998. Assessment of Safety Risks Arising from Wind Turbine Icing. Wind Energy in Cold Climates. Presented at BOREAS IV Conference, Hetta Finland. Available online: http://www.renewwisconsin.org/wind/Toolbox-Fact%20Sheets/Assessment%20of%20risk%20due%20to%20ice.pdf

Municipality of Chatham-Kent, Ontario. 2013. Available online at: http://www.chatham-kent.ca/Pages/default.aspx

National Institute of Environmental Health Sciences. 2002. EMF – Electric and Magnetic Fields Associated with the Use of Electric Power. Questions and Answers. Prepared for the NIEHS/DOE EMF RAPID Program, June 2002.

National Research Council (NRC). 2007. Environmental Impacts of Wind-Energy Projects. Washington, DC.

Natural Resources Canada (NRC). 2003. Environmental Impact Statement Guidelines for Screenings of Inland Wind Farms Under the *Canadian Environmental Assessment Act*.

Nature Counts. 2011. Nature counts and breeding bird atlas data request to the Maritime Breeding Bird Atlas. November 2001.

Neily, P.D.;Quigley, E.; Benjamin, L.; Stewart, B.J.; and Duke, T. 2003. Ecological land classification for Nova Scotia: Volume 1 - mapping Nova Scotia's terrestrial ecosystems. NSDNR Report DNR 2003-2.

Nedeau, Ethan J., Mark A. McCollough and Bet I. Swartz. 2000. The Freshwater Mussels of Maine. Maine Dept. Inland Fisheries and Wildlife.

Nova Scotia Communities, Culture & Heritage, Heritage Division. 2011 Environmental Screening 11-09-07c: East Mountain Wind Project, Affinity Renewables Inc.

Nova Scotia Department of Natural Resources (NSDNR). 2011. General Status Ranks of Wild Species in Nova Scotia. Obtained from the Atlantic Conservation Data Center in April 2011. Otherwise available at: http://www.gov.ns.ca/natr/wildlife/genstatus/ranks.asp.

Nova Scotia Department of Natural Resources (NSDNR). 2009 Nova Scotia Abandoned Mine Openings Database (DP ME 10, Version 4). Digital product compiled by B. E. Fisher and E. W. Hennick.

Nova Scotia Department of Natural Resources (NSDNR). 2007. Recovery Plan for Moose (Alces alces Americana) in mainland Nova Scotia.
Nova Scotia Environment (NSE). 2011a. Wetland Conservation Policy.

Nova Scotia Environment (NSE). 2007, updated 2012. Proponents Guide to Wind Power Projects: Guide to Preparing an Environmental Assessment Registration Document. Available online at: http://www.gov.ns.ca/enla/ea/docs/EAGuideWindPower.pdf.

Nova Scotia Environment (NSE). 2006. Operational Bulletin Respecting the Alteration of Wetlands.

Nova Scotia Environment (NSE). 2005 revised in 2009. Guide to Addressing Wildlife Species and Habitat in an Environmental Assessment Registration Document.

Nova Scotia Environment (NSE). 1988. Erosion and Sedimentation Control Handbook for Construction Sites.

O'Neal, R.D., R.D. Hellweg Jr and R.M. Lampeter 2011. Low Frequency Noise and Infrasound from Wind Turbines. Noise Control Eng. J. 2011 59, March-April: 135-157.

Ontario Ministry of the Environment (MOE). 2008. Noise Guidelines for Wind Farms – Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities. Available online: http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/std01_079435.pdf

Orloff, S., and A. Flannery. 1992. Wind turbine effects on avian activity, habitat use and mortality in Altamont Pass and Solano County wind resource areas, 1989-1991. Prepared by BioSystems Analysis, Inc. Tiburon, California. Prepared for the California Energy Commission, Sacramento, Grant 990-89-003.

Pedersen, E. 2010. Human perception of sound from wind turbines. Halmstad University and Occupational and Environmental Medicine, Univerity of Gothenburg, Sweden. Available online at: http://www.naturvardsverket.se/Documents/publikationer/978-91-620-6370-2.pdf

Pedersen, E. and K. Persson Waye. 2008. Wind Turbines: low level noise sources interfering with restoration? Environ Res Lett. 2008:3:015002. Available online at: http://www.iop.org/EJ/article/1748-9326/3/1/015002/er18_1_015002.pdf.

Pedersen, E. and K. Persson Waye. 2007. Wind turbine noise, annoyance and self-reported health and well-being in different living environment. Occup Environ. Med. 2007;64(7):480-6.

Pedersen, E. and K. Persson Waye. 2004. Perception and annoyance due to wind turbine noise – a dose-response relationship. J Acoust Soc Am. 2004;116(6):3460-70.

Percival, S.M. 2001. Assessment of the effects of offshore wind farms on birds. Report ETSU W/13/00565/REP, DTI/Pub URN 01/1434.

Radio Advisory Board of Canada (RABC), Canadian Wind Energy Association (CanWEA). 2007. Technical Information and Guidelines on the Assessment of the Potential Impact of wind Turbines on Radio-communication, Radar and Seismo-acoustic Systems

Randall, J.H. 2011. Identification and characterization of swarming sites used by bats in Nova Scotia. Masters Thesis. Dalhousie University, Halifax.

Renewable Energy Policy Project (REPP). 2003. The Effect of Wind Development on Local Property Values. Available online at: http://www.crest.org/articles/static/1/binaries/wind_online_final.pdf.

Salt, A.N. and T.E. Hullar. 2010.Responses of the Ear to Low Frequency Sounds, Infrasound and Wind Turbines. Hear Res 2010, 268: 12-21.

Shafer,A.B.A. and D.T. Stewart. 2006. A disjunct population of Sorex dispar (Long-tailed Shrew) in Nova Scotia. Northeastern Naturalist 13: 603-608

Sierra Club Canada. 2011. The Real Truth About Wind Energy. A Literature Based Introduction to Wind Turbines in Ontario. S

Stantec, 2011. Clydesdale Ridge Wind Farm Environmental Assessment Registration

Stantec. 2011a. Kent Hills Wind Farm 2010 Post-Construction Monitoring Program. Final Report to TransAlta Corporation. January 24, 2011.

Stantec. 2010. Kent Hills Wind Farm 2009 Post-Construction Monitoring Program. Final Report to TransAlta Corporation. February 24, 2010.

Stantec. 2009. Post-construction Monitoring at the Mars Hill Wind Farm, Maine –Year 2. 2008. Prepared For: First Wind Management, LLC. Prepared By: Stantec Consulting, Topsham, ME. January 2009.

Statistics Canada. 2011. 2006 Community Profiles. Available online at: http://www12.statcan.gc.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E. Accessed November 2011.

Sterzinger, G., F.Beck and D.Kostiuk. 2003. The Effect of Wind Development on Local Property Values. Report for the Renewable Energy Policy Project, May 2003.

Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L., Morrison, J.A. Shaffer, and W. Warren-Hicks. 2011. Comprehensive Guide to Studying Wind Energy/Wildlife Interactions. Prepared for the National Wind Coordinating Collaborative, Washington, D.C., USA.

Taylor, C. and J. Post. 2013. Kemptown, Nova Scotia Wind Farm Breeding Bird Survey

Timm, R.M. 1989. Migration and molt patterns of red bats. Illinois Bulletin Chicago Academy of Science.

Transport Canada. 2009. Canadian Aviation Regulations Standard 621.19. Available on the internet at http://www.tc.gc.ca/eng/civilaviation/regserv/cars/part6-standards-standard621-512.htm

United States Environmental Protection Agency, 1974. Information on Levels of Environmental Noise to Protect Public Health and Welfare within an Adequate Margin of Safety

Vines, S. 2008b. Pre-construction Bird Monitoring: Dalhousie Mountain Wind Farm Project.July 2008. Appendix Supplement 5 in Dalhousie Mountain Wind Farms Environmental Assessment and Registration Document. July 30, 2008.

Woolaver, Lance G., Mark Elderkin, and Fred W. Scott. 1998. Sorex Dispar in Nova Scotia. Northeastern Naturalist 5(4): 323-330

World Health Organization (WHO) Europe. 2009. Night Noise Guidelines for Europe. Available at: http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf

Zimmerling, J. R., A. C. Pomeroy, M. V. d'Entremont, and C. M. Francis. 2013. Canadian estimate of bird mortality due to collisions and direct habitat loss associated with wind turbine developments. *Avian Conservation and Ecology* **8**(2): 10. Available online at http://dx.doi.org/10.5751/ACE-00609-080210

Zinn, T.L. and W.W. Baker. 1979. Seasonal migration of the hoary bat, *Lasiurus cinereus* through Florida. Journal of Mammalogy 60: 634-635.

Appendix A	Electromagnetic Interference Study Results
Appendix B	Kemptown Mi'kmaq Ecological Knowledge Study
Appendix C	ACCDC and Environmental Screening (Department of Heritage) Results
Appendix D	Sound Modeling Study
Appendix E	Public Consultation Materials
Appendix F	Vascular Plant Survey
Appendix G	Breeding Bird Survey
Appendix H	Archaeological Resource Impact Assessment (ARIA)
Appendix I	Bat Population Study
Appendix J	Mainland Moose PGI Study
Appendix K	Colchester Municipal Wind Turbine Bylaw
Appendix L	COMFIT Approval and Certification

Appendix A
Electromagnetic Interference Study Results

NAV CANADA

May 22, 2012

Your file
East Mountain Wind Project
Our file
12-0114

Ms Lisa Fulton
Affinity Renewables Inc.
796 Dan Fraser Rd.
Westville, NS
BoK 2A0

RE: Wind Farm: 4 wind turbines - East Mountain, NS
(See attached spreadsheet)

Ms. Fulton,

We have evaluated the captioned proposal and NAV CANADA has no objection to the project as submitted. Analysis shows that turbines 1-4 are marginally visible to the Halifax Radar and any changes to this proposal would need to be re-assessed for possible impact

While these proposed 4 wind turbines are acceptable, it does not constitute NAV CANADA's approval for any additional structures at this location. 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 start of construction. 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,

Aleksandar Trandafilovski
for
David Legault
Manager, Data Collection
Aeronautical Information Services

cc ATLR - Atlantic Region, Transport Canada (2011-541)

NAV CANADA

November 25, 2013

Your file
East Mountain Wind Project
Our file
13-4049

Ms Lisa Fulton
Affinity Renewables Inc.
1383 Mt Thom Road
Salt Springs, NS
B0K 1P0

RE: Wind Farm: 3 Wind Turbines - East Mountain, NS
(See attached spreadsheet)

Ms. Fulton,

We have evaluated the captioned proposal and NAV CANADA has no objection to the project as submitted. Analysis shows that all three turbines are marginally visible to the Halifax Radar. These turbines in this wind farm have the potential to be a constant source of false targets and could mask real aircraft in the vicinity of the wind farm. Any changes to this proposal would need to be re-assessed for possible impact.

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 start of construction. 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,

David Legault
Manager, Data Collection
Aeronautical Information Services

cc ATLR - Atlantic Region, Transport Canada (2011-541)

Subject: Kemptown Notifications
From: "Kirk Schmidt" <kirk.schmidt@al-pro.ca>
Date: 21/10/2013 10:21 AM
To: <lisa@rmsenergy.ca>

ForwardedMessage.eml

Subject: RE: Kemptown Wind Farm
From: "Weather Radars Contact,National Radar Program [Ontario]" <weatherradars@ec.gc.ca>
Date: 08/10/2013 10:35 AM
To: "Kirk Schmidt" <kirk@nortekresources.com>, "Weather Radars Contact,National Radar Program [Ontario]" <weatherradars@ec.gc.ca>
CC: "Lisa Fulton" <lisa@rmsenergy.ca>

Dear Mr. Kirk Schmidt,

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 4, 2013 indicates that any potential interference that may be created by the Kemptown Wind Farm located in Colchester County, NS 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 Wilson

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

Carolyn Wilson *(Rennie)*
Le Programme Nationale de Radar
Service météorologique du Canada

Environnement Canada
4905, rue Dufferin
Toronto, Ontario M3H 5T4
Bureau : 3N-WS12
NOUVEAU Carolyn.Wilson@ec.gc.ca
Téléphone : 416-739-4931

From: Kirk Schmidt [mailto:kirk@nortekresources.com]
Sent: Friday, October 04, 2013 8:50 AM
To: Weather Radars Contact,National Radar Program [Ontario]
Cc: 'Lisa Fulton'
Subject: Kemptown Wind Farm

To Whom it May Concern:

I am forwarding this message on behalf of Affinity Renewables Inc.which is currently developing the Kemptown Wind Farm which is located in Colchester County, Nova Scotia. I have attached the proposed turbine coordinates and pertinent data, as well as a general location map for your perusal. Can I ask you to open a file for this wind turbine project and complete your internal review to determine if you anticipate any interference issues with your existing radar systems.
Please let me know if you have any questions or require any additional data.
Regards

Kirk Schmidt, M.Sc.F., RPF
Manager
Nortek Resource Solutions Inc.
Nova Scotia, Canada
Tel: 902.922.3607
Fax: 902.922.3274
Web: nortekresources.com
Email: kirk@nortekresources.com

ForwardedMessage.eml

Subject: RE: Kemptown Wind Farm
From: "Cook, Norman" <COOKNB@gov.ns.ca>
Date: 08/10/2013 8:04 AM
To: "Kirk Schmidt" <kirk@nortekresources.com>
CC: "'Lisa Fulton'" <lisa@rmsenergy.ca>, "Brown, Todd A" <BROWNTA@gov.ns.ca>

Hello, Kirk,

There is no significant interference from the Kemptown Wind Farm into the Province's public safety Sites based on your data submitted to us.

Regards,

Norm Cook, P.Eng.

From: Kirk Schmidt [kirk@nortekresources.com]
Sent: October-04-13 9:51 AM

To: Cook, Norman
Cc: 'Lisa Fulton'
Subject: Kemptown Wind Farm

Hi Norm:

This is the last for now.

I am forwarding this message on behalf of Affinity Renewables Inc.which is currently developing the Kemptown Wind Farm which is located in Colchester County, Nova Scotia. I have attached the proposed turbine coordinates and pertinent data, as well as a general location map for your perusal. Can I ask you to open a file for this wind turbine project and complete your internal review to determine if you anticipate any interference issues with your existing communication systems.
Please let me know if you have any questions or require any additional data.
Regards

Kirk Schmidt, M.Sc.F., RPF
Manager
Nortek Resource Solutions Inc.
Nova Scotia, Canada
Tel: 902.922.3607
Fax: 902.922.3274
Web: nortekresources.com
Email: kirk@nortekresources.com

ForwardedMessage.eml

Subject: RE: Kemptown Wind Farm
From: Grégoire, Martin <Martin.Gregoire@dfo-mpo.gc.ca>
Date: 04/10/2013 6:02 PM
To: "Kirk Schmidt" <kirk@nortekresources.com>
CC: "Lisa Fulton" <lisa@rmsenergy.ca>

Hello,

The proposed wind farm (Kemptown) is located 95 km away from the Shannon Hill radar site. Therefore no interference issues are anticipated.

Regards,

Martin Grégoire, P. Eng
Canadian Coast Guard

From: Kirk Schmidt [mailto:kirk@nortekresources.com]
Sent: October 4, 2013 8:49 AM
To: XNCR, Windfarm Coordinator
Cc: 'Lisa Fulton'
Subject: Kemptown Wind Farm

To Whom it May Concern:

I am forwarding this message on behalf of Affinity Renewables Inc.which is currently developing the Kemptown Wind Farm which is located in Colchester County, Nova Scotia. I have attached the proposed turbine coordinates

and pertinent data, as well as a general location map for your perusal. Can I ask you to open a file for this wind turbine project and complete your internal review to determine if you anticipate any interference issues with your existing radar systems.
Please let me know if you have any questions or require any additional data.
Regards

Kirk Schmidt, M.Sc.F., RPF
Manager
Nortek Resource Solutions Inc.
Nova Scotia, Canada
Tel: 902.922.3607
Fax: 902.922.3274
Web: nortekresources.com
Email: kirk@nortekresources.com

ForwardedMessage.eml

Subject: Detailed Analysis Results - Kemptown Wind Farm - Colchester County, NS - WTA-3051
From: <ADIN.SWITZER@forces.gc.ca>
Date: 04/10/2013 4:08 PM
To: <kirk@nortekresources.com>
CC: <vinceph@navcanada.ca>

Kirk,

Thank you for your patience on this matter and for considering DND radar and airport facilities in your project development process.
We have completed the detailed analysis of your proposed site, Kemptown Wind Farm, located in Colchester County, NS (WTA-3051). The results of the detailed analysis and subsequent technical and operational impact assessments have confirmed there is likely to be minimal 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 correspondence. If the project should be cancelled or delayed during this timeframe please advise my point of contact.
It should be noted that each submission is assessed 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.
The issuance of this Letter of Non-Objection shall not constitute a waiver or alienation of any existing or future legal rights of the DND/CF nor shall it be construed to create any exemptions, indemnification, approvals, rights, acceptances in favour of Affinity Renewables Inc. The DND/CF expressly reserves its rights to take legal action or seek remedy for any and all liability, loss, harm, degradation of services or equipment, mitigation costs, damages, judgements or expenses that arise from the adverse effects, whether incidental, indirect or causal, of the Affinity Renewables Inc Kemptown Wind Farm upon the DND/CF radars, equipment and its provision of Air Traffic Services.
I trust that you will find this satisfactory. If you have any technical questions or concerns regarding any aspect of this investigation, please contact the ATESS Liaison Officer at (613) 392-2811 extension 4834, or at

+windturbines@forces.gc.ca.
A hard-copy of this response will be mailed separately.
<<Layout_Kemptown.xls>>

Sincerely,

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
Gouvernement du Canada | Government of Canada
ü Please consider the environment before printing this email | S'il vous plaît pensez à l'environnement a

ForwardedMessage.eml

Subject: FW: Kemptown Wind Farm
From: <MARIO.LAVOIE2@forces.gc.ca>
Date: 04/10/2013 1:24 PM
To: <kirk@nortekresources.com>

Hello,

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: Kirk Schmidt [mailto:kirk@nortekresources.com]
Sent: Friday, 4, October, 2013 08:45 AM
To: +WindTurbines@ATESS@TRENTON
Cc: 'Lisa Fulton'

Subject: Kemptown Wind Farm

To Whom it May Concern:

I am forwarding this message on behalf of Affinity Renewables Inc.which is currently developing the Kemptown Wind Farm which is located in Colchester County, Nova Scotia. I have attached the proposed turbine coordinates and pertinent data, as well as a general location map for your perusal. Can I ask you to open a file for this wind turbine project and complete your internal review to determine if you anticipate any interference issues with your existing radar systems.

Please let me know if you have any questions or require any additional data.

Regards

Kirk Schmidt, M.Sc.F., RPF
Manager
Nortek Resource Solutions Inc.
Nova Scotia, Canada
Tel: 902.922.3607
Fax: 902.922.3274
Web: nortekresources.com
Email: kirk@nortekresources.com

Attachments:

Kemptown Wind Farm.eml	14.0 KB
Kemptown Wind Farm.eml	7.2 KB
Kemptown Wind Farm.eml	10.2 KB
ForwardedMessage.eml	25.3 KB
Layout_Kemptown.xls	15.5 KB
Kemptown Wind Farm.eml	2.6 MB
Layout_Kemptown.xls	15.5 KB
Kemptown Location Map.pdf	1.9 MB

Transport Canada / Transports Canada

APPENDIX C TO CAR 621.19 - ANNEXE C RAC 621.19

TC File No. / Ref No. – TC n° du dossier/N° de réf.

RECEIVED / REÇU

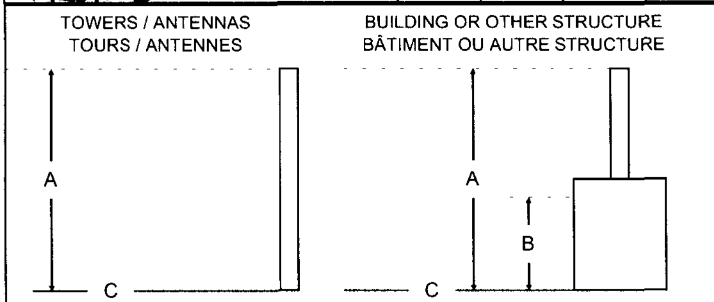
NOV 22 2011

TC2011-541

AERONAUTICAL OBSTRUCTION CLEARANCE FORM
FORMULAIRE D'AUTORISATION D'OBSTACLE AÉRIEN

TO BE COMPLETED BY APPLICANT – À REMPLIR PAR LE REQUÉRANT

Operator's Name – Nom de l'opérateur: AFFINITY RENEWABLES INC.		
Operator's Address – Adresse de l'opérateur: 796 DAN FRASER ROAD, RR#3 WESTVILLE NS B0K 2A0		
Operator's Contact – Agent de liaison de l'opérateur: LISA FULTON		
Contact's Telephone No. – N° de téléphone de liaison: 902-759-6626	Contact's FAX No. – N° de télécopieur de liaison: 902-925-9464	Contact's Email Address – Adresse électronique de liaison: lisafulton@eastlink.ca
Applicant's Name – Nom du requérant: AFFINITY RENEWABLES INC.	Address – Adresse: 796 DAN FRASER ROAD,	
City – Ville: WESTVILLE	Province/Territory - Province/Territoire: NOVA SCOTIA	Postal - Code – postal: B0K 2A0
Applicant's Telephone No. – N° de téléphone du requérant: 902-759-6626	Applicant's FAX No. – N° de télécopieur du requérant: 902-925-9464	Applicant's Email Address – Adresse électronique du requérant: lisafulton@eastlink.ca
Nearest city / town to proposed facility – Ville la plus proche de la structure proposée: TRURO	Geographic coordinates of structure – coordonnées géographiques de la structure: ° ' " N Latitude / Latitude N; ° ' " W Longtitude / Longtitude O: see attachment	☐ NAD27 ☒ NAD83 ☐ WGS84



		Feet – Pieds	Meters – Mètres
A	Height above ground / Hauteur au-dessus du sol	397	121
B	Building height / Hauteur du bâtiment		
C	Ground elevation above sea level / Hauteur du sol au-dessus du niveau de la mer	see attached	

List any tall adjacent buildings and structures which may shield the proposed structure (Attach sketch)

Faire une liste indiquant les structures et bâtiments avoisinants plus haut que le bâtiment projeté (Inclure un diagramme)

New struc. – Nouv. struc.	Add. to exist. struc. incl. total hght. – Ajout à un bâti. exis. incl. hauteur total	Proposed Construction – Date – de construction proposée
☑ Yes / Oui ☐ No / Non		DECEMBER 31, 2014

TYPE OF STRUCTURE (narrative description and function) – GENRE DE STRUCTURE (description narrative et fonction)

WIND TURBINE GENERATOR

Signature (of applicant) (du requérant) ▶ [signature]   Date (Y/A-M-D/J) 2011-11-11

TRANSPORT CANADA USE ONLY – À L'USAGE DE TRANSPORTS CANADA

AERONAUTICAL ASSESSMENT – ÉVALUATION AÉRONAUTIQUE

Site acceptable – Emplacement acceptable
☑ Yes / Oui ☐ No / Non (if no, reason) (si non, pourquoi)

Lighting as per (TP382) required – Balisage lumineux tel que demandé au (TP382)
☑ Yes / Oui ☐ No / Non or / ou

Painting as per (TP382) required – Balisage peint tel que demandé au (TP382)
☑ Yes / Oui ☐ No / Non or / ou

Temporary lighting required – Nécessité d'un balisage lumineux temporaire
☑ Yes / Oui ☐ No / Non (if yes, type) (si oui, de quel genre)

Advise Transport Canada in writing 90 days before construction / Avertir Transports Canada par écrit 90 jours avant la construction ▶ ☐ when construction starts / au commencement de la construction ☐ and on completion / et à la fin des travaux ☐ Valid to / Valide jusqu'au

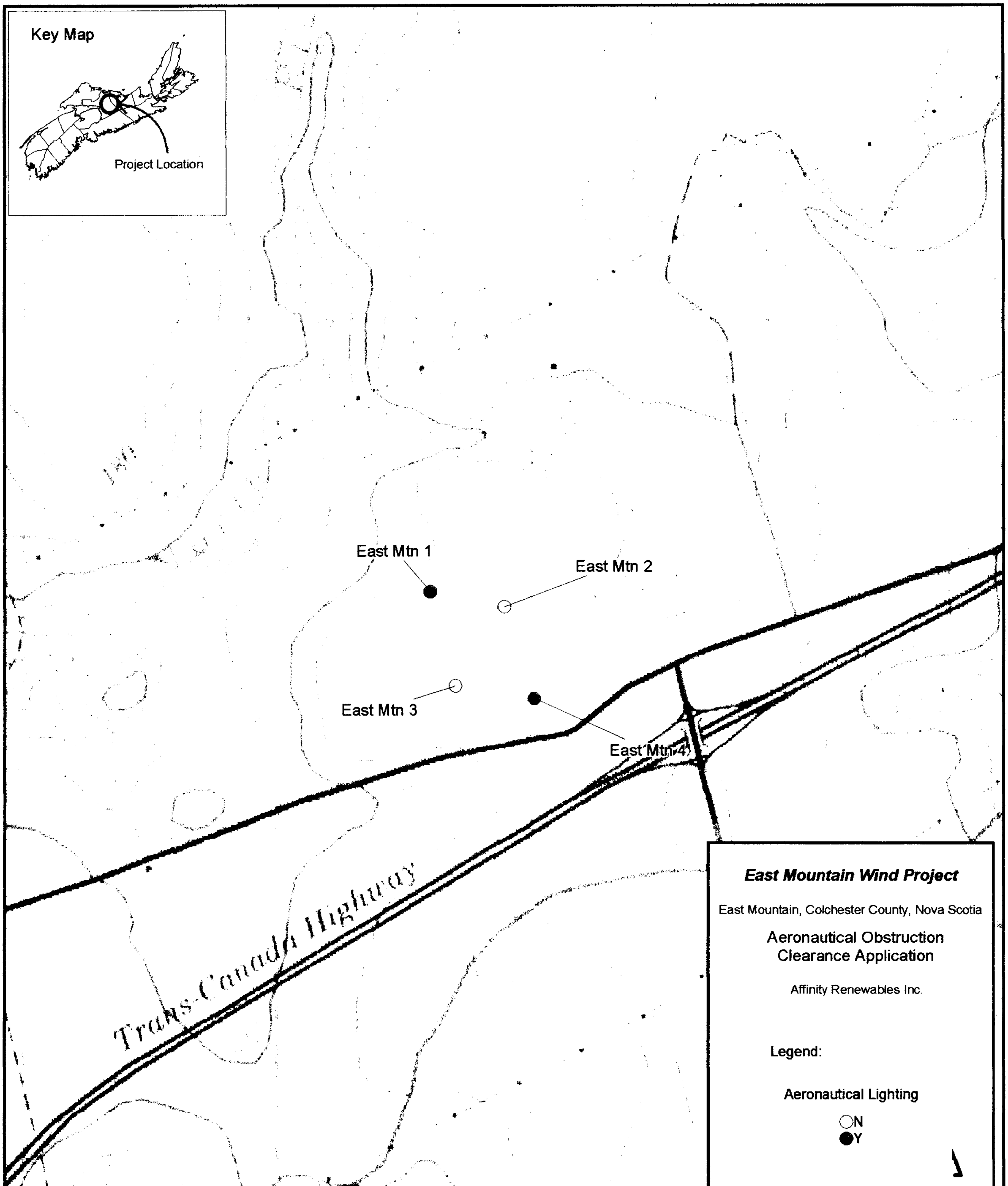
Civil Aviation Inspector (as required) – Inspecteur Aviation Civile (si nécessaire)
Comments – Commentaires

Signature [signature]   Date (Y/A-M-D/J) 2011-12-21

Regional Manager Aerodrome Safety / Gestionaire Régional Sécurité des aérodromes ▶ Signature [signature]   Date (Y/A-M-D/J) 2011-12-21

26-0427 (0005-01)

Canada



Turbine	Lat_dms	Long_dms	Base_Elev	Tip_Elev	Lit
East Mtn 1	45,27,0	45,27,0	164	285	Y
East Mtn 2	45,26,58	45,26,58	167	288	N
East Mtn 3	45,26,48	45,26,48	168	289	N
East Mtn 4	45,26,46	45,26,46	159	280	Y

Coordinate System: Latitude/Longitude, WGS 1984

Aeronautical Obstruction Clearance Form Attachment

East Mountain Wind Project

East Mountain, Colchester County, Nova Scotia

The table below describes: turbine by name; base elevation; tip elevation (total height of machine with blades in highest vertical position); whether or not ('N' or 'Y') the structure will be lit; the topographic map grid reference, and; the latitude and longitude in Degrees, Minutes, Seconds.

Table 1: Turbine location descriptions, East Mountain Wind Project

Turbine	Base Elevation	Tip Elevation	Lit?	Topo grid	Latitude: d, m, s	Longitude: d, m, s
East Mtn 1	164	285	Y	11E/6	45,27,0	-63,7,12
East Mtn 2	167	288	N	11E/6	45,26,58	-63,6,59
East Mtn 3	168	289	N	11E/6	45,26,48	-63,7,8
East Mtn 4	159	280	Y	11E/6	45,26,46	-63,6,53

The table below describes the elevation of the structure, in both feet and meters. Each GE 1.6mw SLE wind turbine generator has a hub height of 80m and a rotor diameter of 82.5m. Therefore, the total height of the structure in its highest vertical position is 121.25m above ground level.

H = hub height + rotor diameter/ 2

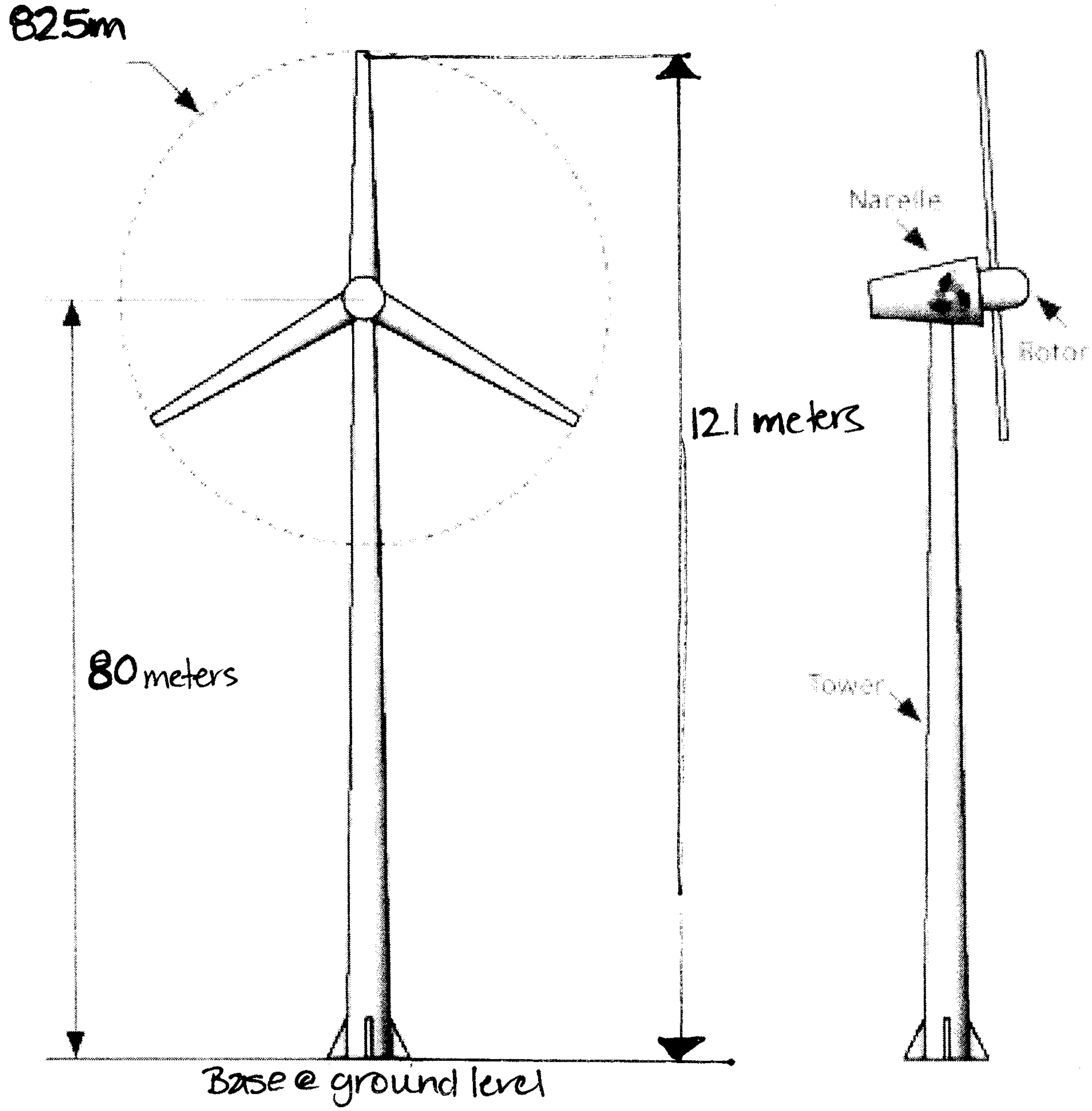
H = 80m + 82.5m/2 H = 262' + 270.5'/2

H = 80m + 41.25m H = 262' + 135.25'

H = 121.25m H = 397.25'

Table 2: Table describing elevations in imperial and metric

Turbine	Base elevation (ft)	Base elevation (m)	Total elevation (ft)	Total elevation (m)
East Mountain 1	538	164	935	285
East Mountain 2	551	168	948	289
East Mountain 3	548	167	945	288
East Mountain 4	521	159	918	280



Above is a diagram of the wind turbine generator with dimensions in meters. The structure's total height is 121 meters.

Structure Dimensions
GE 1.6mw SLE

03/11/2011

Appendix B

Kemptown Mi'kmaq Ecological Knowledge Study

Appendix C

ACCDC and Environmental Screening (Department of Heritage) Results

NOVA SCOTIA

Communities, Culture & Heritage
Heritage Division

1747 Summer Street
Halifax, Nova Scotia
B3H 3A6

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

November 21st, 2011

Lisa Fulton
c/o Affinity Renewables Inc.
796 Dan Fraser Road
RR# # Greenhill, NS B0K 2A0

Dear Ms. Fulton:

RE: **Environment Screening 11-09-07c**
East Mountain Wind Project
Affinity Renewables Inc.

Further to your request of September 7th, 2011, staff of the Heritage Division have reviewed their files for reference to the presence of heritage resources in the study area. Please be aware that our information is not comprehensive, in that it is incomplete and of varying degrees of accuracy with respect to the precise location and condition of heritage resources.

Archaeological and Historical Site Remains

Staff notes that there are no recorded archaeological sites on file within the study area. There are three recorded sites immediately to the north and just outside the study area. There is also a recorded site to the south east of the study area. It is also notable that the Debert and Belmont Palaeo-Indian archaeology sites are within 15 to 20 km of the study area. Historic maps also indicate settlement.

Staff recommends that an assessment for archaeological resources takes place.

Botany

Staff have reviewed the records for plant species-at-risk and report that the following species-at-risk are found or may be expected within the footprint as outlined in the request in the East Mountain area:

Allium tricoccum (provincially Red-listed)
Alopecurus aequalis (provincially Yellow-listed)
Anenome virginiana, var. alba (provincially Yellow-listed)
Botrychium lanceolatum, var. angustsegmentum (provincially Yellow-listed)
Carex garberi (provincially Red-listed)
Carex hirtifolia (provincially Red-listed)
Carex plantaginea (provincially Red-listed)
Caulophyllum thalictroides (provincially Red-listed)
Cinna arundinacea (provincially Red-listed)

Desmodium canadense (provincially Yellow-listed)
Dryopteris fragrans (provincially Yellow-listed)
Equisetum pratense (provincially Yellow-listed)
Floerkea prserpinacoides (provincially Yellow-listed)
Laportea canadensis (provincially Yellow-listed)
Lilium canadense (provincially Yellow-listed)
Platanthera flava, var. flava (provincially Yellow-listed)
Polygala sanguinea (provincially Yellow-listed)
Triosteum aurantiacum (provincially Yellow-listed)
Viola nephrophylla (provincially Yellow-listed)
Zizia aurea (provincially Yellow-listed)

The presence/absence of these species should be determined during field assessment and reported in any submission. Staff recommendation is that field assessment be conducted during the growing season or when the identity can be determined to species or variety.

Zoology

Staff do not have records for the footprint outlined. However, staff do have records for species of significance within the general area:

Grooved Fingernail Clam *(Sphaerium similie)*
Blue-spotted Salamander *(Ambystoma laterale)* - popyploid populations
Eastern Red-back Salamander *(Plethodon cinereus) erethrystic forma*

There are nesting records for the following bird species of concern:

Boblink *(Dolichonyx oryzivorus)* - provincially Yellow-listed
Canada Warbler *(Wilsonia canadensis)* - provincially Yellow-listed
Boreal Chickadee *(Parus hudsonicus)* - provincially Yellow-listed
Barn Swallow *(Hirundo rustica)* - provincially Yellow-listed
Olive-sided Flycatcher *(Contopus borealis)* - provincially Yellow-listed
Chimney Swift *(Chaetura pelagica)* - provincially Yellow-listed

Staff also notes that there are potential bat hibernation sites in the vicinity of the footprint associated with abandoned mine sites.

Palaeontology

Staff notes that this project will disrupt rocks of either the Parrsboro Formation of the Cumberland Group, or rocks from the Pictou Group, or possibly both. The Pictou Group contains known fossils of the invertebrate Arthropleura sp. (particularly trace fossils of Arthropleura sp.), as well as numerous plant fossils. There is also a slight chance vertebrate fossils may be encountered, fish in particular. The Parrsboro Formation contains known vertebrate trackways and known vertebrate jaws. There is potential for other types of fossils to be found.

In the event that fossils are found during construction, work should stop and contact be made with the Heritage Division.

If you have any questions, please contact me at 424-6475.

Sincerely,

Laura Bennett,
Coordinator, Special Places

Atlantic Canada Conservation Data Centre
Centre de données sur la conservation du Canada Atlantique

DATA REPORT 4641: East Mountain 1-4, NS

Prepared 23 November, 2011
by S.H. Gerriets

CONTENTS OF REPORT

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (ACCDC) is part of a network of circa 85 NatureServe data centres and heritage programs in 50 states, 10 provinces and 1 territory, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The ACCDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador. Although a non-governmental agency, the ACCDC is supported by 6 federal agencies, plus 4 provincial governments, outside grants and data processing fees. URL: www.ACCDC.com.

Upon request and for a fee, the ACCDC reports known observations of rare and endangered flora and fauna, in and near a specified study area. As a supplement to that data, the ACCDC includes locations of managed areas with some level of protection, and also known sites of ecological interest. Data summarised in each report is attached as DBF files which may be opened from within data software (Excel, Access) or mapped in GIS (ArcView, MapInfo, AutoCAD).

1.1 RESTRICTIONS

The ACCDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By receiving ACCDC data, recipients assent to the following limits of use:

a.) Data is restricted to use by trained personnel who are sensitive to its potential threat to rare and endangered taxa.
b.) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
c.) The ACCDC requires Data Users to cease using and delete data 12 months after receipt.
d.) ACCDC data responses are restricted to that data in our Data System at the time of the data request.
e.) Data is qualified as to location (Precision) and time (SurveyDate); cf Data Dictionary for details.
f.) ACCDC data reports are not to be construed as exhaustive inventories of taxa in an area.
g.) The non-occurrence of a taxon cannot be inferred by its absence in an ACCDC data report.

1.2 ADDITIONAL INFORMATION

Please direct biological questions about ACCDC data to: Sean Blaney, ACCDC: (506) 364-2658, and technical data queries to: Stefen Gerriets, ACCDC: (506) 364-2657.
For provincial information on rare taxa and protected areas, or information on game animals, deer yards, old growth forest, archeological sites, fish habitat etc, please contact Sherman Boates, NSDNR: (902) 679-6146.

2.0 RARE AND ENDANGERED TAXA

A 100km buffer around the study area contains 3501 records of 470 taxa from 112 sources, a relatively low-to-moderate density of records (quintile 2): 0.11 rec/km2.

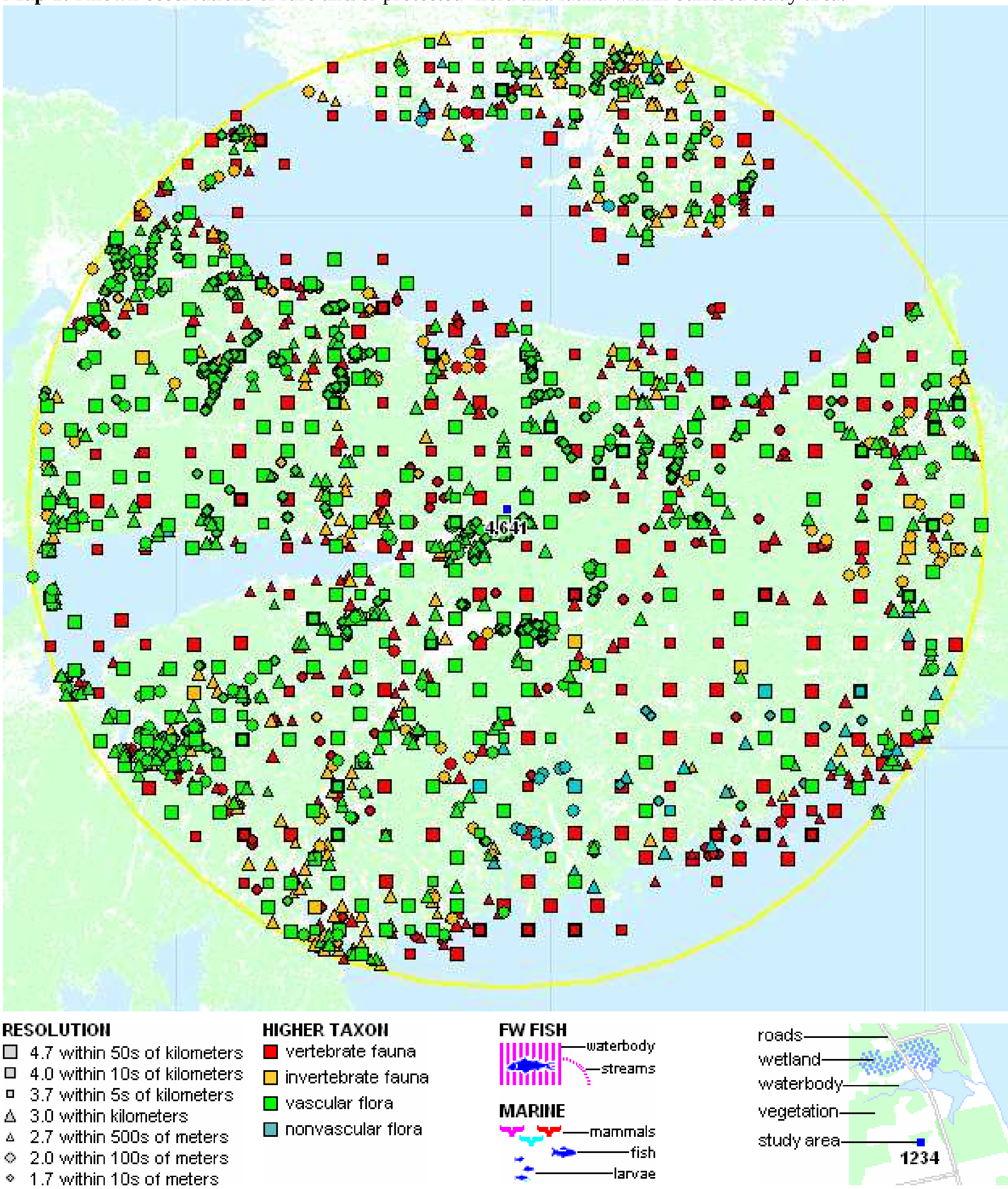
2.1 FLORA

A 100km buffer around the study area contains 1637 records of 284 vascular, 63 records of 19 nonvascular flora (see attached *ob.dbf).

2.2 FAUNA

A 100km buffer around the study area contains 1296 records of 76 vertebrate, 505 records of 91 invertebrate fauna (cf attached *ob.dbf). Sensitive data: Wood Turtles are POTENTIALLY present in the study area (cf attached WOTU.rtf).

Map 1: Known observations of rare and/or protected flora and fauna within buffered study area.



3.0 SPECIAL AREAS

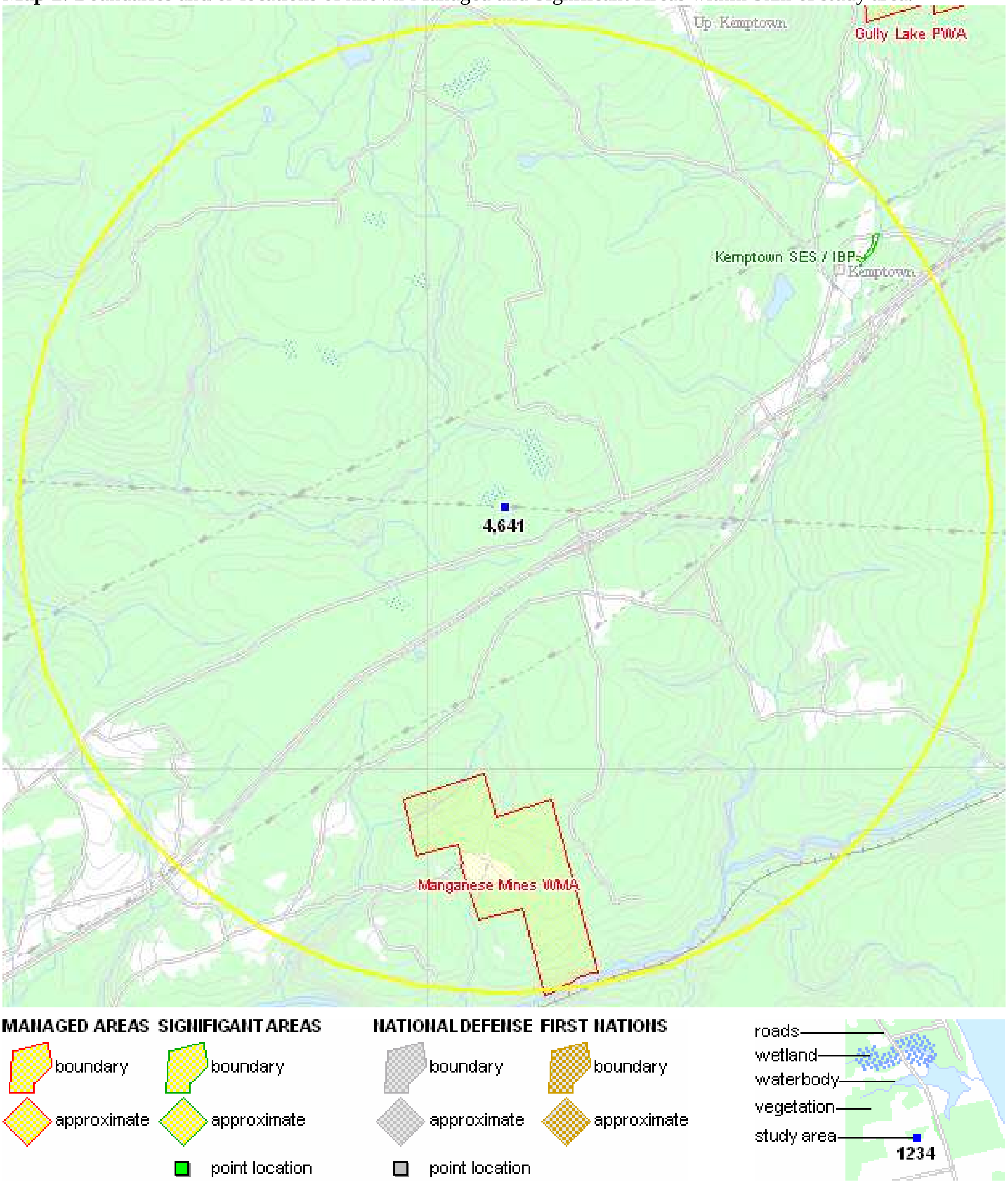
3.1 MANAGED AREAS

The GIS scan identified 1 Managed Area with some degree of protected status, in the vicinity of the study area (see attached *ma.dbf).

3.2 SIGNIFICANT AREAS

The GIS scan also identified 1 biologically significant site in the vicinity of the study area; such sites are known for exceptional biotic richness but may or may not have legal status (see attached *sa.dbf).

Map 2: Boundaries and/or locations of known Managed and Significant Areas within 5km of study area.



4.0 TAXON LISTS

Rare and/or endangered taxa within the buffered area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation. [p] = vascular plant, [n] = nonvascular plant, [a] = vertebrate animal, [i] = invertebrate animal, [c] = community.

4.1 FLORA

	scientific name	common name	prov. rarity	prov. status	COSEWIC	obs	dist.km
n	Erioderma pedicellatum (Atlantic pop.)	Boreal Felt Lichen (Atlantic pop.)	S1S2	Endangered	E	42	50 ±1
p	Clethra alnifolia	Coastal Sweet Pepperbush	S1	Vulnerable	SC	1	98 ±0.1
p	Isoetes prototypus	Prototype Quillwort	S2	Vulnerable	SC	3	45 ±0.1
p	Lilaeopsis chinensis	Eastern Lilaeopsis	S2	Vulnerable	SC	1	64 ±0
n	Pseudevernia cladonia	Ghost Antler Lichen	S2S3		SC	1	69 ±0
p	Floerkea proserpinacoides	False Mermaidweed	S2		NAR	2	3 ±10
p	Cypripedium arietinum	Ram's-Head Lady's-Slipper	S1	Endangered		12	45 ±0.1
p	Thuja occidentalis	Eastern White Cedar	S1S2	Vulnerable		15	15 ±0.5
n	Ditrichum rhynchostegium	a Moss	S1			1	67 ±0.1
n	Bryhnia graminicolor	a Moss	S1			1	83 ±0.5
p	Selaginella rupestris	Rock Spikemoss	S1			1	88 ±0
p	Botrychium lunaria	Common Moonwort	S1			1	90 ±5
p	Cryptogramma stelleri	Steller's Rockbrake	S1			3	6 ±0
p	Adiantum pedatum	Northern Maidenhair Fern	S1			5	17 ±1
p	Sparganium fluctuans	Floating Burreed	S1			1	97 ±5
p	Puccinellia fasciculata	Saltmarsh Alkali Grass	S1			1	100 ±1
p	Festuca subverticillata	Nodding Fescue	S1			8	46 ±1
p	Elymus hystrix var. bigeloviana	Spreading Wild Rye	S1			5	38 ±1
p	Elymus hystrix	Spreading Wild Rye	S1			1	85 ±0.1
p	Elymus wiegandii	Wiegand's Wild Rye	S1			12	25 ±0
p	Cinna arundinacea	Sweet Wood Reed Grass	S1			3	25 ±0
p	Bromus latiglumis	Broad-Glumed Brome	S1			6	25 ±0
p	Alopecurus aequalis	Short-awned Foxtail	S1			18	10 ±1
p	Malaxis brachypoda	White Adder's-Mouth	S1			4	71 ±10
p	Allium tricoccum	Wild Leek	S1			5	5 ±0.1
p	Juncus vaseyi	Vasey's Rush	S1			3	6 ±0
p	Juncus stygius ssp. americanus	Moor Rush	S1			2	96 ±0.1
p	Juncus greenei	Greene's Rush	S1			4	62 ±5
p	Iris prismatica	Slender Blue Flag	S1			2	86 ±10
p	Scirpus pedicellatus	Stalked Bulrush	S1			2	26 ±0
p	Cyperus lupulinus ssp. macilentus	Hop Flatsedge	S1			3	41 ±10
p	Carex wiegandii	Wiegand's Sedge	S1			2	43 ±0
p	Carex tuckermanii	Tuckerman's Sedge	S1			8	29 ±0.1
p	Carex plantaginea	Plantain-Leaved Sedge	S1			3	9 ±0.1
p	Carex livida var. radicaulis	Livid Sedge	S1			1	96 ±10
p	Carex pellita	Woolly Sedge	S1			5	6 ±0
p	Carex haydenii	Hayden's Sedge	S1			2	16 ±1
p	Carex garberi	Garber's Sedge	S1			3	5 ±0
p	Carex chordorrhiza	Creeping Sedge	S1			3	92 ±10
p	Carex foenea	Silvery-flowered Sedge	S1			2	78 ±5
p	Viola canadensis	Canada Violet	S1			2	3 ±10
p	Pilea pumila	Dwarf Clearweed	S1			4	22 ±0
p	Dirca palustris	Eastern Leatherwood	S1			13	39 ±10
p	Amelanchier nantucketensis	Nantucket Serviceberry	S1			1	93 ±1
p	Ranunculus pensylvanicus	Pennsylvania Buttercup	S1			3	44 ±0
p	Clematis occidentalis	Purple Clematis	S1			3	96 ±10
p	Montia fontana	Water Blinks	S1			1	98 ±1
p	Polygala polygama	Racemed Milkwort	S1			1	96 ±1
p	Fraxinus pennsylvanica	Red Ash	S1			2	69 ±10
p	Ribes americanum	Wild Black Currant	S1			3	13 ±5
p	Desmodium glutinosum	Large Tick-Trefoil	S1			3	80 ±0
p	Desmodium canadense	Canada Tick-trefoil	S1			6	3 ±10
p	Cuscuta cephalanthi	Buttonbush Dodder	S1			1	37 ±1
p	Hypericum majus	Large St. John's-wort	S1			3	66 ±0
p	Hudsonia tomentosa	Woolly Beach-heath	S1			2	56 ±10
p	Suaeda maritima ssp. richii	White Sea-blite	S1			1	100 ±10
p	Draba glabella	Rock Whitlow-Grass	S1			1	97 ±0.1
p	Cochlearia tridactylites	Limestone Scurvy-grass	S1			3	94 ±10
p	Cynoglossum virginianum var. boreale	Wild Comfrey	S1			1	89 ±1
p	Ageratina altissima	White Snakeroot	S1			1	100 ±10
p	Hieracium umbellatum	Umbellate Hawkweed	S1			1	69 ±5
p	Pseudognaphalium obtusifolium	Eastern Cudweed	S1			1	85 ±1
p	Bidens hyperborea	Estuary Beggarticks	S1			2	64 ±0
p	Antennaria parlinii	Parlin's Pussytoes	S1			7	26 ±0
p	Zizia aurea	Golden Alexanders	S1			10	6 ±1
p	Sanicula odorata	Clustered Sanicle	S1			6	21 ±10
n	Tetraphis geniculata	a Moss	S1?			1	94 ±0.5
n	Campylium polygamum	a Moss	S1?			1	94 ±0.5
p	Dichanthelium acuminatum var. lindheimeri	Woolly Panic Grass	S1?			1	42 ±0.1
p	Schoenoplectus robustus	Sturdy Bulrush	S1?			2	52 ±10
p	Viola sagittata var. ovata	Arrow-Leaved Violet	S1?			3	83 ±1
p	Rubus pensilvanicus	Pennsylvania Blackberry	S1?			5	74 ±5
p	Crataegus submollis	Quebec Hawthorn	S1?			7	36 ±5
p	Crataegus robinsonii	Robinson's Hawthorn	S1?			2	13 ±5
p	Amelanchier stolonifera	Running Serviceberry	S1?			2	74 ±1
p	Humulus lupulus var. lupuloides	Common Hop	S1?			4	74 ±5

p	Suaeda rolandii	Roland's Sea-Blite	S1?	2	87 ±10
p	Suaeda calceoliformis	Horned Sea-blite	S1?	8	42 ±1
p	Chenopodium rubrum	Red Pigweed	S1?	2	48 ±10
p	Atriplex acadiensis	Maritime Saltbush	S1?	2	61 ±10
p	Solidago hispida	Hairy Goldenrod	S1?	2	54 ±10
p	Hieracium kalmii var. fasciculatum	Kalm's Hawkweed	S1?	1	98 ±5
n	Polytrichum formosum	a Hair-Cap Moss	S1S2	1	86 ±1
n	Platydictya subtilis	a Moss	S1S2	1	86 ±1
n	Campylostelium saxicola	a Moss	S1S2	1	86 ±1
p	Calamagrostis stricta var. stricta	Slim-stemmed Reed Grass	S1S2	2	83 ±10
p	Calamagrostis stricta ssp. stricta	Slim-stemmed Reed Grass	S1S2	1	95 ±1
p	Calamagrostis stricta	Slim-stemmed Reed Grass	S1S2	4	91 ±0.5
p	Platanthera flava var. herbiola	Tubercled Orchid	S1S2	1	29 ±0
p	Najas gracillima	Thread-Like Naiad	S1S2	1	85 ±0.1
p	Carex tenera	Tender Sedge	S1S2	7	21 ±5
p	Carex pensylvanica	Pennsylvania Sedge	S1S2	3	56 ±10
p	Gratiola neglecta	Clammy Hedge-Hyssop	S1S2	3	17 ±10
p	Ranunculus sceleratus	Cursed Buttercup	S1S2	4	97 ±1
p	Hepatica nobilis var. obtusa	Round-lobed Hepatica	S1S2	16	18 ±0
p	Hepatica nobilis	Round-Lobe Hepatica	S1S2	2	89 ±0
p	Anemone virginiana var. alba	Virginia Anemone	S1S2	3	3 ±10
p	Atriplex franktonii	Frankton's Saltbush	S1S2	3	38 ±1
p	Arabis hirsuta var. pycnocarpa	Western Hairy Rockcress	S1S2	1	76 ±0.1
p	Huperzia selago	Northern Firmoss	S1S3	10	11 ±5
p	Equisetum pratense	Meadow Horsetail	S2	9	7 ±0.1
p	Woodsia glabella	Smooth Cliff Fern	S2	2	36 ±10
p	Dryopteris fragrans var. remotiuscula	Fragrant Wood Fern	S2	9	7 ±10
p	Asplenium trichomanes-ramosum	Green Spleenwort	S2	5	44 ±10
p	Asplenium trichomanes	Maidenhair Spleenwort	S2	3	96 ±5
p	Potamogeton friesii	Fries' Pondweed	S2	2	17 ±10
p	Piptatherum canadense	Canada Rice Grass	S2	4	25 ±1
p	Spiranthes lucida	Shining Ladies'-Tresses	S2	11	5 ±0
p	Platanthera macrophylla	Large Round-Leaved Orchid	S2	5	12 ±1
p	Platanthera flava var. flava	Tubercled Orchid	S2	1	96 ±10
p	Platanthera flava	Tubercled Orchid	S2	3	5 ±10
p	Listera australis	Southern Twayblade	S2	2	72 ±0.1
p	Goodyera tesselata	Checkered Rattlesnake-Plantain	S2	2	73 ±0.5
p	Goodyera pubescens	Downy Rattlesnake-Plantain	S2	3	53 ±1
p	Cypripedium reginae	Showy Lady's-Slipper	S2	14	25 ±10
p	Cypripedium parviflorum var. makasin	Yellow Lady's-slipper	S2	2	92 ±0.1
p	Cypripedium parviflorum var. pubescens	Yellow Lady's-slipper	S2	10	47 ±10
p	Allium schoenoprasum var. sibiricum	Wild Chives	S2	1	11 ±10
p	Vallisneria americana	Wild Celery	S2	4	30 ±1
p	Eriophorum gracile	Slender Cottongrass	S2	9	17 ±10
p	Carex hystericina	Porcupine Sedge	S2	5	33 ±0
p	Carex comosa	Bearded Sedge	S2	7	22 ±10
p	Carex castanea	Chestnut Sedge	S2	1	72 ±0
p	Carex capillaris	Hairlike Sedge	S2	1	93 ±0.1
p	Carex atratiformis	Scabrous Black Sedge	S2	1	89 ±1
p	Carex atlantica ssp. capillacea	Atlantic Sedge	S2	2	47 ±10
p	Viola nephrophylla	Northern Bog Violet	S2	8	7 ±10
p	Limosella australis	Southern Mudwort	S2	15	52 ±0
p	Tiarella cordifolia	Heart-leaved Foamflower	S2	11	4 ±0
p	Saxifraga paniculata ssp. neogaea	White Mountain Saxifrage	S2	2	94 ±10
p	Parnassia palustris var. parviflora	Marsh Grass-of-Parnassus	S2	1	82 ±1
p	Salix sericea	Silky Willow	S2	1	68 ±1
p	Salix pedicellaris	Bog Willow	S2	6	25 ±0
p	Galium boreale	Northern Bedstraw	S2	7	49 ±5
p	Ranunculus gmelinii	Gmelin's Water Buttercup	S2	10	25 ±0
p	Ranunculus flammula var. flammula	Lesser Spearwort	S2	5	3 ±10
p	Caltha palustris	Yellow Marsh Marigold	S2	1	56 ±0.1
p	Anemone virginiana var. virginiana	Virginia Anemone	S2	2	17 ±10
p	Anemone virginiana	Virginia Anemone	S2	8	7 ±0
p	Anemone quinquefolia	Wood Anemone	S2	7	25 ±0.1
p	Anemone canadensis	Canada Anemone	S2	3	80 ±10
p	Samolus valerandi ssp. parviflorus	Seaside Brookweed	S2	4	52 ±0
p	Primula mistassinica	Mistassini Primrose	S2	5	3 ±10
p	Plantago rugelii	Rugel's Plantain	S2	7	11 ±10
p	Rumex salicifolius var. mexicanus	Triangular-valve Dock	S2	3	63 ±10
p	Polygonum arifolium	Halberd-leaved Tearthumb	S2	15	46 ±0.1
p	Oenothera fruticosa ssp. glauca	Narrow-leaved Evening Primrose	S2	4	11 ±10
p	Epilobium strictum	Downy Willowherb	S2	7	87 ±5
p	Myriophyllum verticillatum	Whorled Water Milfoil	S2	5	26 ±0
p	Myriophyllum farwellii	Farwell's Water Milfoil	S2	8	25 ±0.1
p	Chamaesyce polygonifolia	Seaside Spurge	S2	3	63 ±1
p	Vaccinium uliginosum	Alpine Bilberry	S2	1	98 ±10
p	Vaccinium caespitosum	Dwarf Bilberry	S2	5	5 ±0
p	Vaccinium boreale	Northern Blueberry	S2	4	79 ±10
p	Empetrum eamesii ssp. eamesii	Pink Crowberry	S2	1	83 ±5
p	Shepherdia canadensis	Soapberry	S2	9	80 ±10
p	Triosteum aurantiacum	Orange-fruited Tinker's Weed	S2	23	3 ±10
p	Hudsonia ericoides	Pinebarren Golden Heather	S2	2	88 ±10
p	Stellaria humifusa	Saltmarsh Starwort	S2	7	73 ±0.1
p	Minuartia groenlandica	Greenland Stitchwort	S2	7	63 ±10
p	Draba arabisans	Rock Whitlow-Grass	S2	2	91 ±1
p	Cardamine parviflora var. arenicola	Small-flowered Bittercress	S2	2	96 ±1

p	Arabis drummondii	Drummond's Rockcress	S2	7	6 ±0
p	Betula michauxii	Newfoundland Dwarf Birch	S2	14	40 ±10
p	Betula pumila	Bog Birch	S2	1	92 ±0.1
p	Caulophyllum thalictroides	Blue Cohosh	S2	21	5 ±0.1
p	Impatiens pallida	Pale Jewelweed	S2	2	96 ±1
p	Symphyotrichum undulatum	Wavy-leaved Aster	S2	5	83 ±10
p	Senecio pseudoarnica	Seabeach Ragwort	S2	6	11 ±10
p	Rudbeckia laciniata var. gaspereauensis	Cut-Leaved Coneflower	S2	4	10 ±10
p	Rudbeckia laciniata	Cut-Leaved Coneflower	S2	7	4 ±0
p	Iva frutescens ssp. oraria	Big-leaved Marsh-elder	S2	3	96 ±0
p	Iva frutescens	Big-leaved Marsh-elder	S2	2	98 ±0
p	Hieracium robinsonii	Robinson's Hawkweed	S2	2	16 ±1
p	Erigeron philadelphicus	Philadelphia Fleabane	S2	5	36 ±5
p	Panax trifolius	Dwarf Ginseng	S2	4	73 ±0.5
p	Osmorhiza longistylis	Smooth Sweet Cicely	S2	11	27 ±0.1
p	Conioselinum chinense	Chinese Hemlock-parsley	S2	2	21 ±5
n	Timmia megapolitana	a Moss	S2?	1	71 ±1
n	Paludella squarrosa	a Moss	S2?	1	81 ±10
n	Calliergon giganteum	a Moss	S2?	1	99 ±1
n	Buxbaumia aphylla	Bug On a Stick	S2?	3	86 ±1
n	Brachythecium albicans	a Moss	S2?	1	86 ±1
n	Atrichum crispum	a Moss	S2?	1	95 ±0.5
p	Dichanthelium linearifolium	Narrow-leaved Panic Grass	S2?	4	6 ±0
p	Juncus dudleyi	Dudley's Rush	S2?	5	33 ±0
p	Eleocharis ovata	Ovate Spikerush	S2?	6	12 ±0.5
p	Carex peckii	Peck's Sedge	S2?	2	12 ±0.1
p	Carex houghtoniana	Houghton's Sedge	S2?	2	32 ±5
p	Galium obtusum	Blunt-leaved Bedstraw	S2?	1	96 ±1
p	Amelanchier fernaldii	Fernald's Serviceberry	S2?	1	76 ±5
p	Epilobium coloratum	Purple-veined Willowherb	S2?	3	45 ±1
p	Symphyotrichum boreale	Boreal Aster	S2?	3	11 ±10
p	Hieracium kalmii var. kalmii	Kalm's Hawkweed	S2?	4	12 ±5
p	Hieracium kalmii	Kalm's Hawkweed	S2?	2	21 ±1
n	Sphagnum wulfianum	a Peatmoss	S2S3	1	49 ±0.1
n	Fissidens bryoides	a Moss	S2S3	1	86 ±1
n	Dicranella subulata	Awl-Leaved Fork Moss	S2S3	2	83 ±0.1
n	Amblystegium varium	a Moss	S2S3	1	83 ±0.5
p	Ophioglossum pusillum	Northern Adder's-tongue	S2S3	3	75 ±10
p	Botrychium simplex	Least Moonwort	S2S3	5	45 ±0
p	Botrychium lanceolatum var. angustisegmentum	Triangle Moonwort	S2S3	5	18 ±1
p	Lycopodium hickeyi	Hickey's Tree-clubmoss	S2S3	1	69 ±0.1
p	Potamogeton zosteriformis	Flat-stemmed Pondweed	S2S3	11	26 ±0
p	Potamogeton richardsonii	Richardson's Pondweed	S2S3	2	87 ±1
p	Potamogeton obtusifolius	Blunt-leaved Pondweed	S2S3	11	56 ±0
p	Poa glauca	Glaucous Blue Grass	S2S3	3	79 ±1
p	Panicum tuckermanii	Tuckerman's Panic Grass	S2S3	7	44 ±0
p	Spiranthes romanzoffiana	Hooded Ladies'-Tresses	S2S3	5	78 ±5
p	Spiranthes ochroleuca	Yellow Ladies'-tresses	S2S3	2	65 ±1
p	Cypripedium parviflorum	Yellow Lady's-slipper	S2S3	18	33 ±10
p	Coeloglossum viride var. virescens	Long-bracted Frog Orchid	S2S3	1	47 ±0.1
p	Lilium canadense	Canada Lily	S2S3	60	11 ±1
p	Eleocharis olivacea	Yellow Spikerush	S2S3	4	24 ±0
p	Carex hirtifolia	Pubescent Sedge	S2S3	23	5 ±1
p	Carex adusta	Lesser Brown Sedge	S2S3	7	16 ±0.5
p	Galium labradoricum	Labrador Bedstraw	S2S3	4	25 ±0
p	Rumex maritimus	Sea-Side Dock	S2S3	7	77 ±0.1
p	Polygonum ramosissimum var. ramosissimum	Bushy Knotweed	S2S3	2	87 ±5
p	Polygonum ramosissimum	Bushy Knotweed	S2S3	3	77 ±0.1
p	Polygonum buxiforme	Small's Knotweed	S2S3	4	11 ±10
p	Polygala sanguinea	Blood Milkwort	S2S3	12	3 ±10
p	Fraxinus nigra	Black Ash	S2S3	40	25 ±0
p	Hedeoma pulegioides	American False Pennyroyal	S2S3	7	43 ±5
p	Halenia deflexa	Spurred Gentian	S2S3	1	94 ±1
p	Hypericum dissimulatum	Disguised St John's-wort	S2S3	3	47 ±10
p	Betula pumila var. pumila	Bog Birch	S2S3	1	98 ±10
p	Symphyotrichum ciliolatum	Fringed Blue Aster	S2S3	9	32 ±0.1
p	Asclepias incarnata ssp. pulchra	Swamp Milkweed	S2S3	4	45 ±1
p	Schizaea pusilla	Little Curlygrass Fern	S3	3	79 ±1
p	Botrychium dissectum	Cut-leaved Moonwort	S3	7	23 ±5
p	Isoetes acadiensis	Acadian Quillwort	S3	2	35 ±1
p	Equisetum variegatum	Variegated Horsetail	S3	13	7 ±0
p	Sparganium natans	Small Burreed	S3	9	17 ±5
p	Dichanthelium clandestinum	Deer-tongue Panic Grass	S3	5	49 ±0
p	Platanthera orbiculata	Small Round-leaved Orchid	S3	17	11 ±10
p	Platanthera hookeri	Hooker's Orchid	S3	4	46 ±0.1
p	Platanthera grandiflora	Large Purple Fringed Orchid	S3	21	9 ±1
p	Goodyera repens	Lesser Rattlesnake-plantain	S3	4	64 ±1
p	Corallorhiza trifida	Early Coralroot	S3	14	16 ±0.5
p	Juncus subcaudatus	Woodland Rush	S3	4	37 ±10
p	Juncus marginatus	Grass-leaved Rush	S3	1	81 ±10
p	Triglochin gaspensis	Gaspé Arrowgrass	S3	1	98 ±0
p	Eleocharis nitida	Quill Spikerush	S3	3	61 ±10
p	Carex rosea	Rosy Sedge	S3	13	10 ±0.1
p	Carex ormostachya	Necklace Spike Sedge	S3	1	96 ±1
p	Carex lupulina	Hop Sedge	S3	5	25 ±0
p	Carex eburnea	Bristle-leaved Sedge	S3	3	35 ±0.1

p	Verbena hastata	Blue Vervain	S3			44	5 ±0
p	Laportea canadensis	Canada Wood Nettle	S3			13	22 ±0
p	Geocaulon lividum	Northern Comandra	S3			4	55 ±0
p	Salix petiolaris	Meadow Willow	S3			15	4 ±0
p	Rosa palustris	Swamp Rose	S3			2	24 ±0
p	Agrimonia gryposepala	Hooked Agrimony	S3			17	5 ±0
p	Pyrola asarifolia	Pink Pyrola	S3			8	4 ±0
p	Polygonum scandens	Climbing False Buckwheat	S3			23	8 ±0
p	Polygonum pensylvanicum	Pennsylvania Smartweed	S3			13	3 ±10
p	Teucrium canadense	Canada Germander	S3			5	44 ±5
p	Proserpinaca pectinata	Comb-leaved Mermaidweed	S3			3	36 ±1
p	Proserpinaca palustris var. crebra	Marsh Mermaidweed	S3			4	25 ±0
p	Proserpinaca palustris	Marsh Mermaidweed	S3			2	25 ±0
p	Geranium bicknellii	Bicknell's Crane's-bill	S3			2	69 ±0
p	Bartonia virginica	Yellow Bartonia	S3			1	61 ±10
p	Empetrum eamesii	Pink Crowberry	S3			1	88 ±10
p	Viburnum edule	Squashberry	S3			1	18 ±0
p	Stellaria longifolia	Long-leaved Starwort	S3			10	5 ±1
p	Campanula aparinoides	Marsh Bellflower	S3			30	5 ±0
p	Packera paupercula	Balsam Groundsel	S3			10	5 ±0.1
p	Megalodonta beckii	Water Beggarticks	S3			9	23 ±10
p	Erigeron hyssopifolius	Hyssop-leaved Fleabane	S3			5	38 ±0
p	Bidens connata	Purple-stemmed Beggarticks	S3			4	84 ±5
p	Asclepias incarnata ssp. incarnata	Swamp Milkweed	S3			1	73 ±0.1
p	Asclepias incarnata	Swamp Milkweed	S3			22	25 ±0
p	Polypodium appalachianum	Appalachian Polypody	S3?			4	13 ±0
p	Lycopodium sitchense	Sitka Clubmoss	S3?			3	11 ±5
p	Lycopodium sabinifolium	Ground-Fir	S3?			5	25 ±0.1
p	Potamogeton praelongus	White-stemmed Pondweed	S3?			11	12 ±1
p	Elodea canadensis	Canada Waterweed	S3?			4	69 ±0
p	Carex tribuloides	Blunt Broom Sedge	S3?			3	33 ±1
p	Carex cryptolepis	Hidden-scaled Sedge	S3?			2	26 ±0
p	Carex bebbii	Bebb's Sedge	S3?			11	5 ±0
p	Carex foenea	Fernald's Hay Sedge	S3?			6	26 ±0.5
p	Lycopodiella appressa	Southern Bog Clubmoss	S3S4			3	12 ±1
p	Lycopodium complanatum	Northern Clubmoss	S3S4			6	21 ±0.1
p	Equisetum scirpoides	Dwarf Scouring-Rush	S3S4			13	7 ±0
p	Cystopteris bulbifera	Bulblet Bladder Fern	S3S4			10	8 ±0.1
p	Trisetum spicatum	Narrow False Oats	S3S4			6	5 ±0
p	Liparis loeselii	Loesel's Twayblade	S3S4			12	34 ±1
p	Luzula parviflora	Small-flowered Woodrush	S3S4			2	61 ±0
p	Juncus nodosus	Knotted Rush	S3S4			6	64 ±5
p	Sisyrinchium angustifolium	Narrow-leaved Blue-eyed-grass	S3S4			4	25 ±0
p	Eriophorum chamissonis	Russet Cotton-Grass	S3S4			4	94 ±0.1
p	Symplocarpus foetidus	Eastern Skunk Cabbage	S3S4			5	92 ±10
p	Lindernia dubia	Yellow-seeded False Pimperel	S3S4			18	28 ±0
p	Rhamnus alnifolia	Alder-leaved Buckthorn	S3S4			12	25 ±0
p	Polygonum robustius	Stout Smartweed	S3S4			2	25 ±0
p	Sanguinaria canadensis	Bloodroot	S3S4			19	11 ±0.1
p	Utricularia gibba	Humped Bladderwort	S3S4			4	38 ±10
p	Myriophyllum sibiricum	Siberian Water Milfoil	S3S4			1	25 ±0
p	Isoetes lacustris	Lake Quillwort	S4			6	35 ±1
p	Solidago simplex var. randii	Sticky Goldenrod	SH			1	99 ±1
p	Lactuca hirsuta var. sanguinea	Hairy Lettuce	SH			3	73 ±10
p	Lobelia spicata	Pale-Spiked Lobelia	SNR			10	31 ±10

4.2 FAUNA

	scientific name	common name	prov. rarity	prov. status	COSEWIC	obs	dist.km
a	Sterna dougallii	Roseate Tern	S1B	Endangered	E	13	84 ±0.5
a	Calidris canutus rufa	Red Knot rufa ssp	S2S3M	Endangered	E	28	24 ±0.5
i	Gomphus ventricosus	Skillet Clubtail	S1		E	2	66 ±0.5
a	Dermochelys coriacea	Leatherback Sea Turtle	S1S2N		E	1	99 ±1
a	Salmo salar pop. 1	Atlantic Salmon - inner Bay of Fundy pops	S2		E	23	5 ±10
a	Salmo salar pop. 1	Atlantic Salmon - inner Bay of F	S2		E	1	7 ±0
a	Numenius borealis	Eskimo Curlew	SXM		E	1	100 ±0.5
a	Catharus bicknelli	Bicknell's Thrush	S1S2B	Vulnerable	T	1	76 ±5
a	Glyptemys insculpta	Wood Turtle	S3	Vulnerable	T	75	17 ±1
a	Morone saxatilis	Striped Bass	S1		T	3	54 ±10
a	Acipenser oxyrinchus	Atlantic Sturgeon	S1?		T	3	46 ±10
a	Caprimulgus vociferus	Whip-Poor-Will	S1?B		T	5	48 ±5
a	Sturnella magna	Eastern Meadowlark	S1B		T	1	94 ±5
a	Dolichonyx oryzivorus	Bobolink	S3S4B		T	211	9 ±5
a	Histrionicus histrionicus pop. 1	Harlequin Duck - Eastern pop.	S2N	Endangered	SC	5	86 ±10
a	Falco peregrinus anatum	Peregrine Falcon anatum ssp	S1B	Vulnerable	SC	1	98 ±10
a	Passerculus sandwichensis princeps	Savannah Sparrow princeps ssp	S1B		SC	1	84 ±0.1
a	Bucephala islandica (Eastern pop.)	Barrow's Goldeneye (Eastern pop.)	S1N		SC	4	48 ±0.1
a	Asio flammeus	Short-eared Owl	S1S2		SC	4	50 ±5
i	Alasmidonta varicosa	Brook Floater	S1S2		SC	8	39 ±0.1
a	Euphagus carolinus	Rusty Blackbird	S2S3B		SC	85	14 ±5
i	Danaus plexippus	Monarch	S3B		SC	8	15 ±1
a	Aegolius funereus	Boreal Owl	S1B		NAR	2	25 ±0.1
a	Chlidonias niger	Black Tern	S1B		NAR	3	95 ±0.1
a	Fulica americana	American Coot	S1B		NAR	5	35 ±5
a	Glaucomys volans	Southern Flying Squirrel	S2S3		NAR	1	96 ±10
a	Hemidactylium scutatum	Four-toed Salamander	S3		NAR	22	32 ±0.1
a	Sialia sialis	Eastern Bluebird	S3B		NAR	16	16 ±0.1

a	Sterna hirundo	Common Tern	S3B		NAR	94	31 ±0.5
a	Accipiter gentilis	Northern Goshawk	S3S4		NAR	45	16 ±5
a	Alces americanus	Moose	S1	Endangered		21	19 ±10
a	Sorex dispar	Long-tailed Shrew	S1			2	46 ±10
i	Strophitus undulatus	Creeper	S1			2	67 ±1
i	Leptodea ochracea	Tidewater Mucket	S1			4	82 ±10
i	Chromagrion conditum	Aurora Damsel	S1			1	68 ±1
i	Enallagma signatum	Orange Bluet	S1			2	75 ±0.1
i	Enallagma aspersum	Azure Bluet	S1			2	71 ±1
i	Enallagma minusculum	Little Bluet	S1			2	92 ±0.1
i	Coenagrion resolutum	Taiga Bluet	S1			4	35 ±0.1
i	Leucorrhinia frigida	Frosted Whiteface	S1			1	92 ±0.1
i	Celithemis elisa	Calico Pennant	S1			1	92 ±0.1
i	Williamsonia fletcheri	Ebony Boghaunter	S1			1	45 ±0.5
i	Somatochlora minor	Ocellated Emerald	S1			2	90 ±0.1
i	Somatochlora incurvata	Incurvate Emerald	S1			1	97 ±1
i	Somatochlora franklini	Delicate Emerald	S1			3	50 ±1
i	Somatochlora cingulata	Lake Emerald	S1			3	90 ±0.1
i	Somatochlora brevicincta	Quebec Emerald	S1			2	82 ±0.1
i	Dorocordulia lepida	Petite Emerald	S1			2	71 ±1
i	Boyeria vinosa	Fawn Darner	S1			2	93 ±1
i	Basiaeschna janata	Springtime Darner	S1			1	100 ±1
i	Aeshna subarctica	Subarctic Darner	S1			2	71 ±1
i	Ophiogomphus mainensis	Maine Snaketail	S1			1	77 ±0.1
i	Ophiogomphus aspersus	Brook Snaketail	S1			3	66 ±0.1
i	Oeneis jutta ascerta	Jutta Arctic	S1			1	69 ±0.1
i	Oeneis jutta	Jutta Arctic	S1			3	76 ±10
i	Polygonia gracilis	Hoary Comma	S1			2	15 ±1
i	Polygonia satyrus	Satyr Comma	S1			3	92 ±0.1
i	Plebejus saepiolus	Greenish Blue	S1			1	98 ±1
i	Erora laeta	Early Hairstreak	S1			1	86 ±0.5
i	Satyrium acadica	Acadian Hairstreak	S1			3	40 ±1
i	Lycaena hyllus	Bronze Copper	S1			4	34 ±0
a	Perimyotis subflavus	Eastern Pipistrelle	S1?			5	35 ±5
a	Vireo gilvus	Warbling Vireo	S1?B			7	68 ±5
a	Toxostoma rufum	Brown Thrasher	S1?B			4	36 ±5
a	Tringa solitaria	Solitary Sandpiper	S1?B,S4S5M			7	46 ±0.5
a	Hylocichla mustelina	Wood Thrush	S1B			11	13 ±5
a	Cistothorus palustris	Marsh Wren	S1B			1	96 ±5
a	Progne subis	Purple Martin	S1B			5	64 ±5
a	Gallinula chloropus	Common Moorhen	S1B			7	32 ±5
a	Nycticorax nycticorax	Black-crowned Night-heron	S1B			1	100 ±5
a	Aythya marila	Greater Scaup	S1B,S2N			1	98 ±5
a	Calidris minutilla	Least Sandpiper	S1B,S5M			3	60 ±5
a	Picoides dorsalis	American Three-toed Woodpecker	S1S2			1	97 ±5
i	Stylurus scudderi	Zebra Clubtail	S1S2			3	58 ±0.5
i	Somatochlora kennedyi	Kennedy's Emerald	S1S2			4	84 ±1
i	Ophiogomphus rupinsulensis	Rusty Snaketail	S1S2			3	58 ±0.5
i	Nymphalis vaualbum j-album	Compton Tortoiseshell	S1S2			5	15 ±1
i	Callophrys lanoraieensis	Bog Elfin	S1S2			4	74 ±1
a	Passerina cyanea	Indigo Bunting	S1S2B			2	27 ±5
a	Eremophila alpestris	Horned Lark	S1S2B,S4N			5	37 ±5
a	Charadrius semipalmatus	Semipalmated Plover	S1S2B,S5M			8	32 ±5
a	Loxia curvirostra	Red Crossbill	S1S2B,SNAN			1	83 ±5
a	Myotis septentrionalis	Northern Long-eared Bat	S2			6	40 ±10
a	Salmo salar	Atlantic Salmon	S2			42	23 ±10
a	Asio otus	Long-eared Owl	S2			10	29 ±0.1
i	Lampsilis radiata	Eastern Lampmussel	S2			37	25 ±0.1
i	Lestes eurinus	Amber-Winged Spreadwing	S2			1	71 ±1
i	Leucorrhinia glacialis	Crimson-Ringed Whiteface	S2			7	68 ±1
i	Somatochlora forcipata	Forcipate Emerald	S2			3	93 ±1
i	Epitheca princeps	Prince Baskettail	S2			5	45 ±0.5
i	Gomphus spicatus	Dusky Clubtail	S2			6	90 ±0.1
i	Gomphus descriptus	Harpoon Clubtail	S2			2	49 ±1
i	Nymphalis milberti	Milbert's Tortoiseshell	S2			6	33 ±1
i	Nymphalis vaualbum	Compton Tortoiseshell	S2			1	88 ±1
i	Polygonia comma	Eastern Comma	S2			4	94 ±1
i	Boloria chariclea	Arctic Fritillary	S2			4	23 ±1
i	Callophrys niphon	Eastern Pine Elfin	S2			8	80 ±1
i	Callophrys henrici	Henry's Elfin	S2			6	80 ±1
i	Satyrium calanus falacer	Banded Hairstreak	S2			1	99 ±0.5
i	Satyrium calanus	Banded Hairstreak	S2			4	28 ±1
i	Pieris oleracea	Mustard White	S2			15	12 ±1
i	Amblyscirtes vialis	Common Roadside-Skipper	S2			5	41 ±1
i	Amblyscirtes hegon	Salt and Pepper Skipper	S2			8	64 ±1
i	Thorybes pylades	Northern Cloudywing	S2			3	38 ±1
a	Lasiurus cinereus	Hoary Bat	S2?			1	69 ±10
a	Vireo philadelphicus	Philadelphia Vireo	S2?B			10	13 ±0.1
a	Piranga olivacea	Scarlet Tanager	S2B			8	28 ±5
a	Myiarchus crinitus	Great Crested Flycatcher	S2B			7	23 ±5
a	Empidonax traillii	Willow Flycatcher	S2B			3	89 ±5
a	Rallus limicola	Virginia Rail	S2B			21	31 ±5
a	Anas strepera	Gadwall	S2B			8	76 ±5
a	Bucephala clangula	Common Goldeneye	S2B,S5N			36	37 ±10
a	Larus ridibundus	Black-headed Gull	S2M,S1N			1	95 ±1
i	Alasmidonta undulata	Triangle Floater	S2S3			18	25 ±0.1

i	Erynnis juvenalis	Juvenal's Duskywing	S2S3	8	28 ±1
a	Icterus galbula	Baltimore Oriole	S2S3B	32	27 ±5
a	Pooecetes gramineus	Vesper Sparrow	S2S3B	23	13 ±5
a	Phalaropus fulicaria	Red Phalarope	S2S3M	1	100 ±0.5
a	Branta bernicla	Atlantic Brant	S2S3M,S2S3N	2	92 ±10
i	Amphiagrion saucium	Eastern Red Damsel	S3	1	16 ±1
i	Nehalennia gracilis	Sphagnum Sprite	S3	7	68 ±1
i	Sympetrum semicinctum	Band-Winged Meadowhawk	S3	6	79 ±1
i	Sympetrum danae	Black Meadowhawk	S3	4	84 ±1
i	Nannothemis bella	Elfin Skimmer	S3	6	71 ±1
i	Somatochlora williamsoni	Williamson's Emerald	S3	1	98 ±0.5
i	Somatochlora walshii	Brush-Tipped Emerald	S3	4	71 ±1
i	Somatochlora tenebrosa	Clamp-Tipped Emerald	S3	7	71 ±1
i	Somatochlora elongata	Ski-Tailed Emerald	S3	8	71 ±1
i	Epitheca spinigera	Spiny Baskettail	S3	4	90 ±0.1
i	Dorocordulia libera	Racket-Tailed Emerald	S3	6	71 ±1
i	Gomphaeschna furcillata	Harlequin Darner	S3	6	66 ±1
i	Boyeria grafiana	Ocellated Darner	S3	6	43 ±0.1
i	Aeshna eremita	Lake Darner	S3	12	71 ±1
i	Aeshna constricta	Lance-Tipped Darner	S3	15	16 ±1
i	Aeshna clepsydra	Mottled Darner	S3	7	60 ±1
i	Ophiogomphus carolus	Riffle Snaketail	S3	19	20 ±0
i	Lanthus parvulus	Northern Pygmy Clubtail	S3	6	13 ±5
i	Cordulegaster maculata	Twin-Spotted Spiketail	S3	11	84 ±1
i	Enodia anthedon	Northern Pearly-Eye	S3	6	40 ±1
i	Nymphalis milberti milberti	Milbert's Tortoiseshell	S3	2	93 ±0.1
i	Polygonia faunus	Green Comma	S3	8	15 ±1
i	Euphydryas phaeton	Baltimore Checkerspot	S3	13	15 ±1
i	Satyrium liparops strigosum	Striped Hairstreak	S3	2	87 ±10
i	Satyrium liparops	Striped Hairstreak	S3	1	81 ±1
i	Lycaena dospassosi	Salt Marsh Copper	S3	18	33 ±0.1
i	Hesperia comma laurentina	Laurentian Skipper	S3	12	35 ±1
i	Hesperia comma	Common Branded Skipper	S3	3	35 ±1
a	Coccyzus erythropthalmus	Black-billed Cuckoo	S3?B	42	25 ±5
a	Mimus polyglottos	Northern Mockingbird	S3B	25	36 ±5
a	Sterna paradisaea	Arctic Tern	S3B	19	81 ±10
a	Anas clypeata	Northern Shoveler	S3B	13	48 ±5
a	Anas acuta	Northern Pintail	S3B	27	22 ±5
i	Polygonia interrogationis	Question Mark	S3B	11	15 ±1
a	Mergus serrator	Red-breasted Merganser	S3B,S4S5N	39	33 ±5
a	Tringa melanoleuca	Greater Yellowlegs	S3B,S5M	28	35 ±5
a	Phalaropus lobatus	Red-necked Phalarope	S3M	6	34 ±0.5
a	Limosa haemastica	Hudsonian Godwit	S3M	14	32 ±0.5
a	Numenius phaeopus	Whimbrel	S3M	14	36 ±0.5
a	Pluvialis dominica	American Golden-Plover	S3M	23	36 ±0.5
a	Calidris maritima	Purple Sandpiper	S3M,S3N	16	45 ±0.5
a	Cardinalis cardinalis	Northern Cardinal	S3S4	12	12 ±0.1
a	Cepphus grylle	Black Guillemot	S3S4	18	43 ±5
i	Polygonia progne	Gray Comma	S3S4	10	15 ±1
i	Speyeria aphrodite	Aphrodite Fritillary	S3S4	11	15 ±1
i	Callophrys polios	Hoary Elfin	S3S4	10	74 ±1
i	Feniseca tarquinius	Harvester	S3S4	13	15 ±1
a	Sayornis phoebe	Eastern Phoebe	S3S4B	44	14 ±5

4.3 RANGE MAPS

The legally protected taxa listed below are linked to the study area by predictive range maps based upon expert estimates of distribution. Taxa listed here but not in the observation data above, are unknown within the study area but perhaps present. Ranges of rank 1 indicate possible occurrence, those of rank 2 and 3 increasingly less probable.

	scientific name	common name	prov. rarity	prov. status	COSEWIC	range
a	Glyptemys insculpta	Wood Turtle	S3	Vulnerable	T	1
p	Listera australis	Southern Twayblade	S2			1
p	Isoetes prototypus	Prototype Quillwort	S2	Vulnerable	SC	1
i	Danaus plexippus	Monarch	S2B		SC	1
a	Salmo salar pop. 1	Atlantic Salmon - inner Bay of Fundy	S2		E	1

5.0 SOURCE BIBLIOGRAPHY

The recipient of this data shall acknowledge the ACCDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

recs	source
487	Lepage, D. 2009. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 143,498 recs.
339	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
327	Benjamin, L.K. (compiler). 2007. Significant Habitat & Species Database. Nova Scotia Dept Natural Resources, 8439 recs.
246	Newell, R.E. 2000. E.C. Smith Herbarium Database. Acadia University, Wolfville NS, 7139 recs.
202	Brunelle, P.-M. (compiler). 2009. ADIP/MDDS Odonata Database: data to 2006 inclusive. Atlantic Dragonfly Inventory Program (ADIP), 24200 recs.
167	Pronych, G. & Wilson, A. 1993. Atlas of Rare Vascular Plants in Nova Scotia. Nova Scotia Museum, Halifax NS, I:1-168, II:169-331. 1446 recs.
166	Blaney, C.S & Spicer, C.D.; Popma, T.M.; Basquill, S.P. 2003. Vascular Plant Surveys of Northumberland Strait Rivers & Amherst Area Peatlands. Nova Scotia Museum Research Grant, 501 recs.
154	Layberry, R.A. & Hall, P.W., LaFontaine, J.D. 1998. The Butterflies of Canada. University of Toronto Press. 280 pp+plates.
144	Blaney, C.S.; Mazerolle, D.M. 2010. Fieldwork 2010. Atlantic Canada Conservation Data Centre. Sackville NB, 15508 recs.
95	Morrison, Guy. 2006. Maritime Shorebird Survey (MSS) database. Canadian Wildlife Service, Ottawa, 52 taxa, 570 sites, 11496 surveys. 59704 recs.
93	Newell, R.E. 2005. E.C. Smith Digital Herbarium. E.C. Smith Herbarium, Irving Biodiversity Collection, Acadia University, Web site: http://luxor.acadiau.ca/library/Herbarium/project/. 582 recs.
78	Zinck, M. & Roland, A.E. 1998. Roland's Flora of Nova Scotia. Nova Scotia Museum, 3rd ed., rev. M. Zinck; 2 Vol., 1297 pp.
78	Catling, P.M., Erskine, D.S. & MacLaren, R.B. 1985. The Plants of Prince Edward Island with new records, nomenclatural changes & corrections & deletions, 1st Ed. Research Branch, Agriculture Canada, Ottawa, Publication 1798. 22pp.
78	Blaney, C.S. 2000. Fieldwork 2000. Atlantic Canada Conservation Data Centre. Sackville NB, 1265 recs.
73	Roland, A.E. & Smith, E.C. 1969. The Flora of Nova Scotia, 1st Ed. Nova Scotia Museum, Halifax, 743pp.
57	Hicks, Andrew. 2009. Coastal Waterfowl Surveys Database, 2000-08. Canadian Wildlife Service, Sackville, 46488 recs (11149 non-zero).
45	Wilhelm, S.I. & et al. 2011. Colonial Waterbird Database. Canadian Wildlife Service, Sackville, 2698 sites, 9718 recs (8192 obs).
41	Blaney, C.S.; Spicer, C.D.; Popma, T.M.; Hanel, C. 2002. Fieldwork 2002. Atlantic Canada Conservation Data Centre. Sackville NB, 2037 recs.
34	Scott, F.W. 2002. Nova Scotia Herpetofauna Atlas Database. Acadia University, Wolfville NS, 8856 recs.
31	Cameron, R.P. 2009. Erioderma pedicellatum database, 1979-2008. Dept Environment & Labour, 103 recs.
30	Blaney, C.S.; Mazerolle, D.M.; Oberndorfer, E. 2007. Fieldwork 2007. Atlantic Canada Conservation Data Centre. Sackville NB, 13770 recs.
27	Blaney, C.S.; Spicer, C.D.; Rothfels, C. 2004. Fieldwork 2004. Atlantic Canada Conservation Data Centre. Sackville NB, 1343 recs.
25	Blaney, C.S.; Spicer, C.D. 2001. Fieldwork 2001. Atlantic Canada Conservation Data Centre. Sackville NB, 717 recs.
24	Benjamin, L.K. (compiler). 2001. Significant Habitat & Species Database. Nova Scotia Dept of Natural Resources, 15 spp, 224 recs.
23	Hall, R.A. 2003. NS Freshwater Mussel Fieldwork. Nova Scotia Dept Natural Resources, 189 recs.
22	Cameron, E. 2008. Canadian Gypsum Co. survey 2007-08. Conestoga-Rovers & Assoc., 623 recs.
20	Blaney, C.S.; Spicer, C.D.; Mazerolle, D.M. 2005. Fieldwork 2005. Atlantic Canada Conservation Data Centre. Sackville NB, 2333 recs.
17	Pulsifer, M.D. 2002. NS Freshwater Mussel Fieldwork. Nova Scotia Dept Natural Resources, 369 recs.
17	Blaney, C.S.; Mazerolle, D.M.; Klymko, J; Spicer, C.D. 2006. Fieldwork 2006. Atlantic Canada Conservation Data Centre. Sackville NB, 8399 recs.
17	Blaney, C.S. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre. Sackville NB, 1042 recs.
17	Belland, R.J. 2010. Database of Prince Edward Island moss specimens. Devonian Botanic Garden, University of Alberta, 748 recs.
16	Harding, R.W. 2008. Harding Personal Insect Collection 1999-2007. R.W. Harding, 309 recs.
15	Blaney, C.S.; Mazerolle, D.M. 2008. Fieldwork 2008. Atlantic Canada Conservation Data Centre. Sackville NB, 13343 recs.
13	Edsall, J. 2007. Personal Butterfly Collection: specimens collected in the Canadian Maritimes, 1961-2007. J. Edsall, unpubl. report, 137 recs.
13	Curley, F.R. 2005. PEF&W Collection 2003-04. PEI Fish & Wildlife Div., 716 recs.
12	Powell, B.C. 1967. Female sexual cycles of Chrysemy spicta & Clemmys insculpta in Nova Scotia. Can. Field-Nat., 81:134-139. 26 recs.
12	Erskine, D. 1960. The plants of Prince Edward Island, 1st Ed. Research Branch, Agriculture Canada, Ottawa., Publication 1088. 1238 recs.
11	Benjamin, L.K. 2011. NSDNR Fieldwork & Consultants Reports. Nova Scotia Dept Natural Resources, 86 recs.
11	Benjamin, L.K. (compiler). 2002. Significant Habitat & Species Database. Nova Scotia Dept of Natural Resources, 32 spp, 683 recs.
9	Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc, 6042 recs.
9	Spicer, C.D. & Harries, H. 2001. Mount Allison Herbarium Specimens. Mount Allison University, 128 recs.
9	Morrison, Guy. 2007. Maritime Shorebird Survey (MSS) database. Canadian Wildlife Service, Ottawa, 1149 recs (1373 by species).
9	Doucet, D.A. 2009. Census of Globally Rare, Endemic Butterflies of Nova Scotia Gulf of St Lawrence Salt Marshes. Nova Scotia Dept of Natural Resources, Species at Risk, 155 recs.
9	Basquill, S.P. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre, Sackville NB, 69 recs.
8	Gilhen, J. 1984. Amphibians & Reptiles of Nova Scotia, 1st Ed. Nova Scotia Museum, 164pp.
8	Archibald, D.R. 2003. NS Freshwater Mussel Fieldwork. Nova Scotia Dept Natural Resources, 213 recs.
7	Webster, R.P. & Edsall, J. 2007. 2005 New Brunswick Rare Butterfly Survey. Environmental Trust Fund, unpublished report, 232 recs.
7	Goltz, J.P. & Bishop, G. 2005. Confidential supplement to Status Report on Prototype Quillwort (Isoetes prototypus). Committee on the Status of Endangered Wildlife in Canada, 111 recs.
7	Downes, C. 1998-2000. Breeding Bird Survey Data. Canadian Wildlife Service, Ottawa, 111 recs.
7	Benjamin, L.K. & Boreal Felt Lichen, Mountain Avens, Orchid and other recent records. 2009. Nova Scotia Dept Natural Resources, 105 recs.
6	Curley, F.R. 2007. PEF&W Collection. PEI Fish & Wildlife Div., 199 recs.
6	Cam, S. 1999. Cam Stevens field data from PEI vegetation plots. Sent along with specimens to C.S. Blaney. UNB masters research project, 732 recs.
5	Popma, T.M. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre. Sackville NB, 113 recs.
5	Olsen, R. Herbarium Specimens. Nova Scotia Agricultural College, Truro. 2003.
5	Oldham, M.J. 2000. Oldham database records from Maritime provinces. Oldham, M.J; ONHIC, 487 recs.
5	Hall, R.A. 2001. S.. NS Freshwater Mussel Fieldwork. Nova Scotia Dept Natural Resources, 178 recs.
5	Giberson, D. 2008. UPEI Insect Collection. University of Prince Edward Island, 157 recs.
5	Doucet, D.A. 2007. Lepidopteran Records, 1988-2006. Doucet, 700 recs.
5	Adams, J. & Herman, T.B. 1998. Thesis, Unpublished map of C. insculpta sightings. Acadia University, Wolfville NS, 88 recs.
4	Smith, M.E.M. 2008. AgCan Collection. Agriculture Canada, Charlottetown PE, 44 recs.
4	Daury, R.W. & Bateman, M.C. 1996. The Barrow's Goldeneye (Bucephala islandica) in the Atlantic Provinces and Maine. Canadian Wildlife Service, Sackville, 47pp.
4	Cameron, R.P. 2009. Nova Scotia nonvascular plant observations, 1995-2007. Nova Scotia Dept Natural Resources, 27 recs.
4	Blaney, C.S.; Mazerolle, D.M. 2009. Fieldwork 2009. Atlantic Canada Conservation Data Centre. Sackville NB, 13395 recs.
3	Speers, L. 2001. Butterflies of Canada database. Agriculture & Agri-Food Canada, Biological Resources Program, Ottawa, 190 recs.
3	Blaney, C.S. Miscellaneous specimens received by ACCDC (botany). Various persons. 2001-08.
3	Benjamin, L.K. 2009. NSDNR Fieldwork & Consultants Reports. Nova Scotia Dept Natural Resources, 143 recs.
3	Benedict, B. Connell Herbarium Specimen Data . University New Brunswick, Fredericton. 2003.
3	Bateman, M.C. 2001. Coastal Waterfowl Surveys Database, 1965-2001. Canadian Wildlife Service, Sackville, 667 recs.
2	Standley, L.A. 2002. Carex haydenii in Nova Scotia. , Pers. comm. to C.S. Blaney. 4 recs.
2	Spicer, C.D. 2004. Specimens from CWS Herbarium, Mount Allison Herbarium Database. Mount Allison University, 5939 recs.
2	Sollows, M.C,. 2008. NBM Science Collections databases: mammals. New Brunswick Museum, Saint John NB, download Jan. 2008, 4983 recs.

2 Newell, R. E., MacKinnon, C. M. & Kennedy, A. C. 2006. Botanical Survey of Boot Island National Wildlife Area, Nova Scotia, 2004. Canadian Wildlife Service, Atlantic Region, Technical Report Series Number 450. 3 recs.
2 Nelly, T.H. 2006. Cypripedium arietinum in Hants Co. Pers. comm. to C.S. Blaney. 22 recs, 22 recs.
2 Neily, P.D. Plant Specimens. Nova Scotia Dept Natural Resources, Truro. 2006.
2 Mills, Pamela. 2007. Iva frutescens records. Nova Scotia Dept of Natural Resources, Wildlife Div. Pers. comm. to S. Basquil, 4 recs.
2 Matthew Smith. 2010. Field trip report from Avon Caving Club outlining the discovery of Cyrpipedium arietinum and Hepatica nobilis populations. Public Works and Government Services Canada.
2 Kelly, Glen 2004. Botanical records from 2004 PEI Forestry fieldwork. Dept of Environment, Energy & Forestry, 71 recs.
2 Kelly, G. 2005. Fraxinus nigra. Dept of Agricuture, Fisheries, Aquaculture & Forestry. Pers. comm. to C.S. Blaney, Mar. 2, 11 recs.
2 Erskine, A.J. 1999. Maritime Nest Records Scheme (MNRS) 1937-1999. Canadian Wildlife Service, Sackville, 313 recs.
2 Clayden, S.R. 1998. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, 19759 recs.
2 Cameron, R.P. 2005. Erioderma pedicellatum unpublished data. NS Dept of Environment, 9 recs.
2 Cameron, E. 2007. Canadian Gypsum Co. survey 2005-07. Dillon Consulting Ltd, 40 recs.
2 Bredin, K.A. 2002. NS Freshwater Mussel Fieldwork. Atlantic Canada Conservation Data Centere, 30 recs.
2 Benedict, B. Connell Herbarium Specimens. University New Brunswick, Fredericton. 2003.
1 Whittam, R.M. 1999. Status Report on the Roseate Tern (update) in Canada. Committee on the Status of Endangered Wildlife in Canada, 36 recs.
1 Tingley, S. (compiler). 2001. Butterflies of New Brunswick. , Web site: www.geocities.com/Yosemite/8425/buttrfly. 142 recs.
1 Sollows, M.C. 2008. NBM Science Collections databases: herpetiles. New Brunswick Museum, Saint John NB, download Jan. 2008, 8636 recs.
1 Scott, F.W. 1988. Status Report on the Southern Flying Squirrel (Glaucomys volans) in Canada. Committee on the Status of Endangered Wildlife in Canada, 2 recs.
1 Robinson, C.B. 1907. Early intervale flora of eastern Nova Scotia. Transactions of the Nova Scotia Institute of Science, 10:502-506. 1 rec.
1 Neily, T.H. 2010. Erioderma Pedicellatum records 2005-09. Mersey Tobiatic Research Institute, 67 recs.
1 McAlpine, D.F. 1998. NBM Science Collections databases to 1998. New Brunswick Museum, Saint John NB, 241 recs.
1 Mazerolle, D.M. 2005. Bouctouche Irving Eco-Centre rare coastal plant fieldwork results 2004-05. Irving Eco-centre, la Dune du Bouctouche, 174 recs.
1 MacQuarrie, K. 1991-1999. Site survey files, maps. Island Nature Trust, Charlottetown PE, 60 recs.
1 Macaulay, M. Notes on newly discovered Hepatica nobilis var. obtusa population in Cumberland Co. NS. Pers. comm. to S. Blaney, 1 rec.
1 Lautenschlager, R.A. 2010. Miscellaneous observations reported to ACCDC (zoology). Pers. comm. from various persons, 2 recs.
1 Jacques Whitford Ltd. 2003. Cananda Lily location. Pers. Comm. to S. Blaney. 2pp, 1 rec, 1 rec.
1 Hinds, H.R. 1986. Notes on New Brunswick plant collections. Connell Memorial Herbarium, unpubl, 739 recs.
1 Glen, W. 1991. 1991 Prince Edward Island Forest Biomass Inventory Data. PEI Dept of Energy and Forestry, 10059 recs.
1 Edsall, J. 2001. Lepidopteran records in New Brunswick, 1997-99. , Pers. comm. to K.A. Bredin. 91 recs.
1 Donell, R. 2008. Rare plant records from rare coastal plant project. Bouctouche Dune Irving Eco-centre. Pers. comm. to D.M. Mazerolle, 50 recs.
1 Crowell, A. 2004. Cypripedium arietinum in Weir Brook, Hants Co. Pers. comm. to S. Blaney, 1 rec.
1 Clayden, S.R. 2006. Pseudevernia cladonia records. NB Museum. Pers. comm. to S. Blaney, Dec, 4 recs.
1 Christie, D.S. 2000. Christmas Bird Count Data, 1997-2000. Nature NB, 54 recs.
1 Brunelle, P.-M. (compiler). 2010. ADIP/MDDS Odonata Database: NB, NS Update 1900-09. Atlantic Dragonfly Inventory Program (ADIP), 935 recs.
1 Blaney, C.S. & Whittam, R.M. 2003. Botanical & freshwater mussel observations at Lake Killarney, Cumberland Co., NS - Sept. 27, 2003. Atlantic Canada Conservation Data Centre, 3 recs.
1 Benedict, B. Connell Herbarium Specimens, Digital photos. University New Brunswick, Fredericton. 2005.
1 Basquill, S.P. 2009. 2009 field observations. Nova Scotia Dept of Natural Resources.
1 Basquill, S. P. 2008. Nova Scotia Dept of Natural Resources.
1 Bagnell, B.A. 2001. New Brunswick Bryophyte Occurrences. B&B Botanical, Sussex, 478 recs.
1 Amiro, P.G. 1998. Atlantic Salmon Inner Bay of Fundy SFA 22 & part of 23. DFO Sci. SSR D3-12.
1 NSDNR. 2007. Restricted & Limited Use Land Database (RLUL).
1 NS DOE. Protected Areas

Appendix D

Sound Modeling Study

Project:
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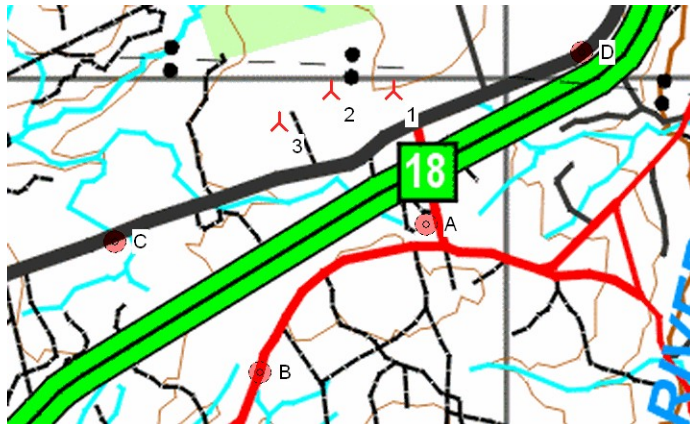
Calculated:
11/12/2013 5:01 PM/2.9.207

DECIBEL - Main Result

Calculation: Kemptown Sound General @ 7 m/s

Noise calculation model:
ISO 9613-2 General
Wind speed:
7.0 m/s
Ground attenuation:

Meteorological coefficient, C0:
0.0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure and Impulse tone penalty are added to WTG source noise
Height above ground level, when no value in NSA object:
2.0 m Allow override of model height with height from NSA object
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0.0 dB(A)



Scale 1:50,000
New WTG   Noise sensitive area

WTGs

	UTM (north)-NAD83 (US+CA) Zone: 20				WTG type						Noise data				
	East	North	Z [m]	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Creator	Name	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones
1	491,443	5,032,858	0.0	GE WIND ENERGY GE 1.6 1...	Yes	GE WIND ENERGY	GE 1.6-1,600	1,600	82.5	80.0	USER	06.2 1.6 1.68 -82.5 Prodcut Accoustic Spec	7.0	106.0	0 dB
2	491,028	5,032,864	0.0	GE WIND ENERGY GE 1.6 1...	Yes	GE WIND ENERGY	GE 1.6-1,600	1,600	82.5	80.0	USER	06.2 1.6 1.68 -82.5 Prodcut Accoustic Spec	7.0	106.0	0 dB
3	490,684	5,032,649	0.0	GE WIND ENERGY GE 1.6 1...	Yes	GE WIND ENERGY	GE 1.6-1,600	1,600	82.5	80.0	USER	06.2 1.6 1.68 -82.5 Prodcut Accoustic Spec	7.0	106.0	0 dB

Calculation Results

Sound Level

Noise sensitive area		UTM (north)-NAD83 (US+CA) Zone: 20				Demands	Sound Level		Demands fulfilled ?
No.	Name	East	North	Z [m]	Imission height [m]	Noise [dB(A)]	From WTGs [dB(A)]	Distance to noise demand [m]	Noise
A	Noise sensitive point: (2)	491,655	5,031,975	169.2	2.0	36.0	37.4	-151	**No**
B	Noise sensitive point: (3)	490,554	5,030,995	163.4	2.0	36.0	30.9	666	Yes
C	Noise sensitive point: (4)	489,593	5,031,864	140.0	2.0	36.0	32.4	419	Yes
D	Noise sensitive point: (5)	492,690	5,033,108	160.1	2.0	36.0	32.9	351	Yes

Distances (m)

	WTG		
NSA	1	2	3
A	908	1088	1182
B	2064	1928	1659
C	2100	1749	1344
D	1272	1680	2058

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DECIBEL - Detailed results

Calculation: Kemptown Sound General @ 7 m/s**Noise calculation model:** ISO 9613-2 General 7.0 m/s

Assumptions

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction

Calculation Results

Noise sensitive area: A Noise sensitive point: (2)

WTG **Wind speed: 7.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	908	913	**34.06**	106.0	0.00	70.21	1.73	0.00	0.00	0.00	71.94	0.00
2	1,088	1,092	**32.16**	106.0	0.00	71.76	2.07	0.00	0.00	0.00	73.84	0.00
3	1,182	1,186	**31.27**	106.0	0.00	72.48	2.25	0.00	0.00	0.00	74.73	0.00

Sum 37.43

Noise sensitive area: B Noise sensitive point: (3)

WTG **Wind speed: 7.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	2,064	2,066	**24.77**	106.0	0.00	77.30	3.93	0.00	0.00	0.00	81.23	0.00
2	1,928	1,930	**25.62**	106.0	0.00	76.71	3.67	0.00	0.00	0.00	80.38	0.00
3	1,659	1,661	**27.43**	106.0	0.00	75.41	3.16	0.00	0.00	0.00	78.57	0.00

Sum 30.86

Noise sensitive area: C Noise sensitive point: (4)

WTG **Wind speed: 7.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	2,100	2,101	**24.56**	106.0	0.00	77.45	3.99	0.00	0.00	0.00	81.44	0.00
2	1,749	1,750	**26.81**	106.0	0.00	75.86	3.33	0.00	0.00	0.00	79.19	0.00
3	1,344	1,345	**29.87**	106.0	0.00	73.58	2.56	0.00	0.00	0.00	76.13	0.00

Sum 32.39

Noise sensitive area: D Noise sensitive point: (5)

WTG **Wind speed: 7.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	1,272	1,274	**30.47**	106.0	0.00	73.11	2.42	0.00	0.00	0.00	75.53	0.00
2	1,680	1,682	**27.29**	106.0	0.00	75.52	3.20	0.00	0.00	0.00	78.71	0.00
3	2,058	2,059	**24.81**	106.0	0.00	77.28	3.91	0.00	0.00	0.00	81.19	0.00

Sum 32.91

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11/12/2013 5:01 PM/2.9.207

DECIBEL - Assumptions for noise calculation

Calculation: Kemptown Sound General @ 7 m/s**Noise calculation model:** ISO 9613-2 General 7.0 m/s

Noise calculation model:
ISO 9613-2 General
Wind speed:
7.0 m/s
Ground attenuation:

Meteorological coefficient, C0:
0.0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure and Impulse tone penalty are added to WTG source noise
Height above ground level, when no value in NSA object:
2.0 m Allow override of model height with height from NSA object
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0.0 dB(A)
Octave data not required
Air absorption: 1.9 dB/km

WTG: GE WIND ENERGY GE 1.6 1600 82.5 !O!
Noise: 06.2 1.6 1.68 -82.5 Prodcut Accoustic Spec

Source	Source/Date	Creator	Edited
GE	11/6/2012	USER	11/6/2013 1:06 PM

Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones
From Windcat	80.0	7.0	106.0	No

NSA: Noise sensitive point: (2)-A
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 36.0 dB(A)
Distance demand:

NSA: Noise sensitive point: (3)-B
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 36.0 dB(A)
Distance demand:

NSA: Noise sensitive point: (4)-C
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 36.0 dB(A)
Distance demand:

NSA: Noise sensitive point: (5)-D
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 36.0 dB(A)
Distance demand:

Project:
761 Kemptown

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11/12/2013 5:02 PM / 4

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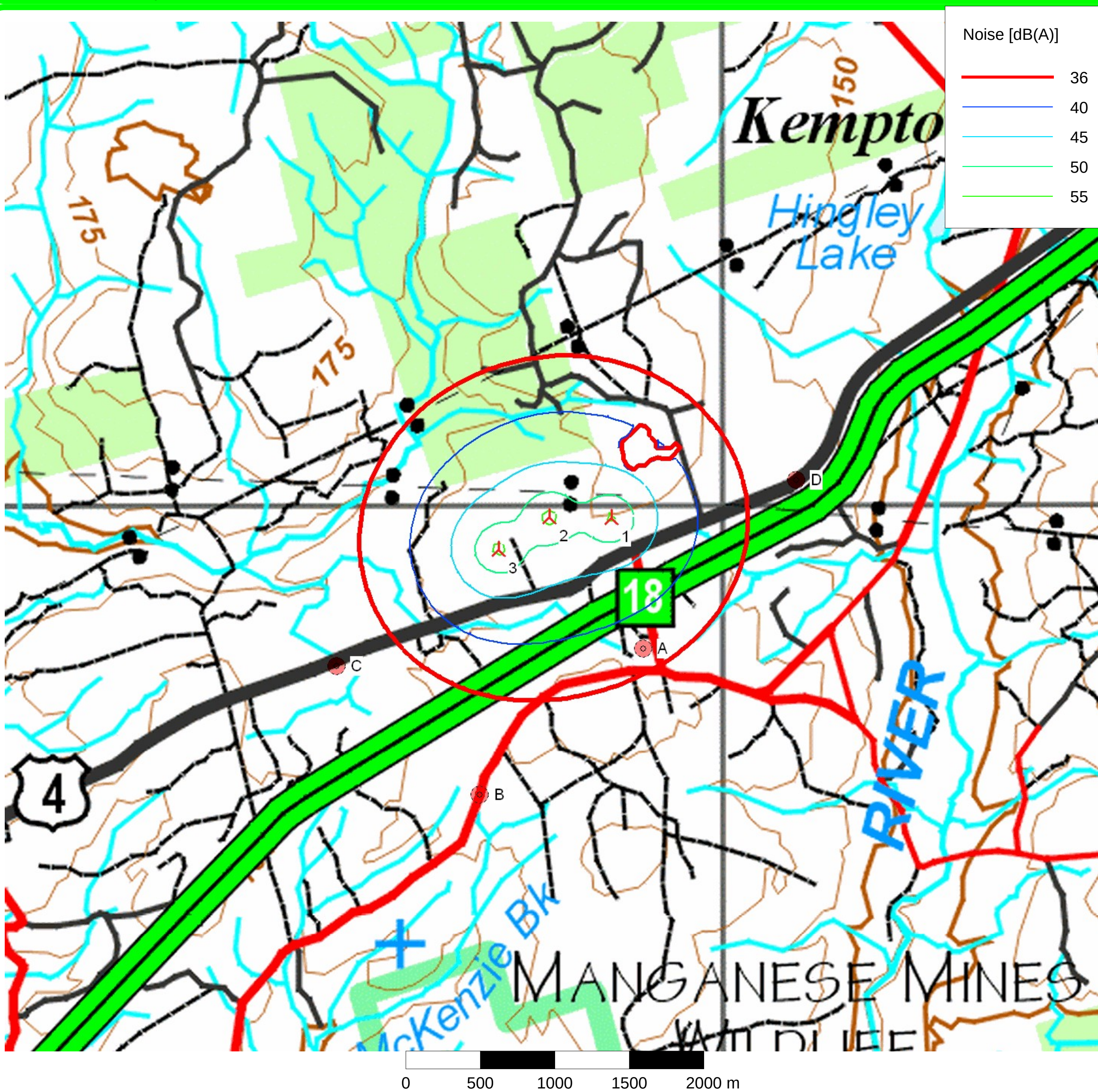
Calculated:
11/12/2013 5:01 PM/2.9.207

DECIBEL - Map 7.0 m/s

Calculation: Kemptown Sound General @ 7 m/s**Noise calculation model:** ISO 9613-2 General 7.0 m/s



Map: map , Print scale 1:40,000, Map center UTM (north)-NAD83 (US+CA) Zone: 20 East: 491,064 North: 5,032,756

New WTG   Noise sensitive area

Noise calculation model: ISO 9613-2 General. Wind speed: 7.0 m/s
Height above sea level from active line object

Appendix E

Public Consultation Materials