E. HISTORICAL RESOURCES

"In September 2010, Davis MacIntyre & Associates Limited was contracted by McCallum Environmental to conduct an archaeological resource impact assessment of the proposed Hampton Mountain Wind Power Project in Annapolis County. The purpose of the assessment was to determine the potential for archaeological resources within the development zone and to provide recommendations for further mitigation if deemed necessary. This assessment included consultation of the Maritime Archaeological Resource Inventory in the Heritage Division of the Nova Scotia Museum as well as historic maps, manuscripts and published resources. A field reconnaissance was also conducted." (Davis MacIntyre & Associates Limited, October 2010)

The "assessment was conducted under Category C Heritage Research Permit A2010NS70 issued by the Nova Scotia Heritage Division." The report conforms to the standards required by the Heritage Division under the Special Places program." (Davis MacIntyre & Associates Limited, October 2010)

"The assessment indicated that no heritage resources of significance would be impacted by the proposed wind farm project. No further mitigation is recommended at this time." (Davis MacIntyre & Associates Limited, October 2010)

The report in its entirety can be found in Appendix IV.

F. SOCIO-ECONOMIC CONDITIONS

The Project is located near Bridgetown, Nova Scotia, a community in Annapolis County. Background on the area and its population are summarized below.

a. Population and Demographics

Annapolis County, the 10th most populous county in Nova Scotia, had a total population of 21,438 in the year 2006, approximately 2.3% of the Provincial population. Over the past ten years, the population of the county has declined 4% while the population for the Province increased by 0.5%.

Annapolis County has three main towns. From smallest to largest, they are: Annapolis Royal, Bridgetown, and Middleton. The community of Bridgetown had a population in 2006 of 2,589, 1.5% lower than in 2001.

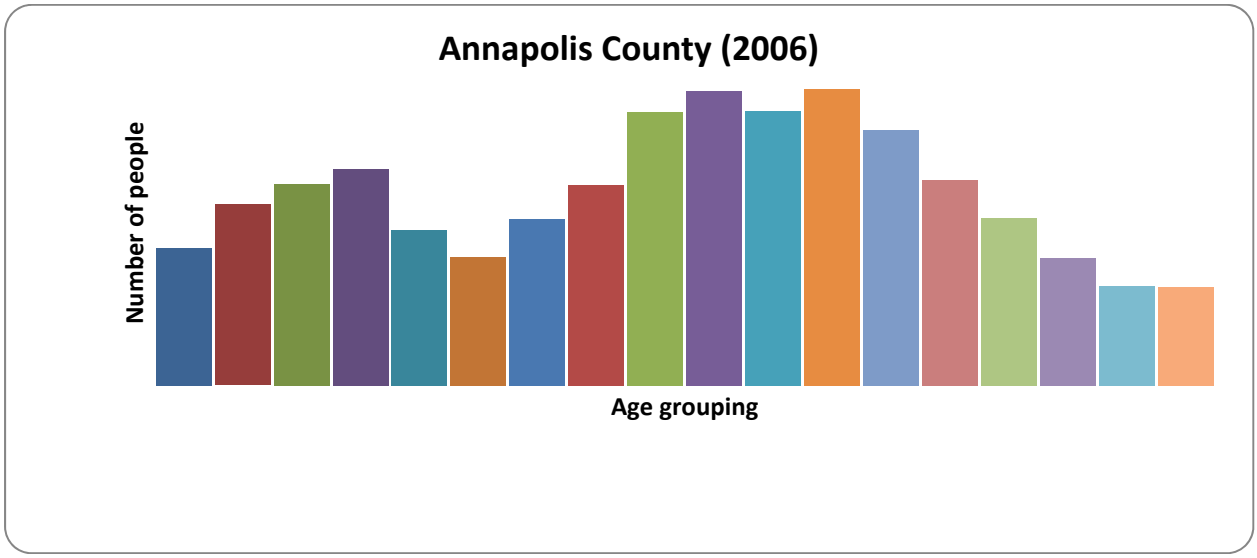
Table 24. Population and Demographics

	Bridgetown	Annapolis County
Population in 2006	2,589	21,438
Population in 2001	2,629	21,773
2001-2006 Population Change (%)	- 1.5	- 1.5
Total private dwellings (2006)	487	11,038
Total number of households (2006)	450	9,205
Population density per square km (2006)	274.3	6.7
Land area (square km) (2006)	3.54	3,185
Median Age of the Population (2006)	48.6	46.3

Source: Statistics Canada 2006 Census of Population Community Profiles

The population of Annapolis County has a median age of 46.3 years, slightly older than that of the province as a whole, which has a median age of 41.8.

Figure 27. Population by Age Cohort, Annapolis County



Source: Statistics Canada 2006 Census of Population Community Profiles

Median income in Bridgetown (2006) for persons 15 years and older with income was $20,248. Sixty-four percent of income came from earnings, while 20.7% came from Government Transfers. In Annapolis County (2006), median income was $18,671, with earnings accounting for 59.9% of income and 21.1% coming from Government transfers.

b. Health, Industry and Employment

The town of Bridgetown falls within the Annapolis Valley Health District, which is served by the Valley Regional Hospital in Kentville, which was opened in 1992. Other facilities include the Annapolis Community Health Centre (Annapolis Royal), Soldiers Memorial Hospital

(Middleton), Western Kings Memorial Health Centre (Berwick), Eastern Kings Memorial Community Health Centre (Wolfville), and the AVH Chipman Building (Kentville).

Table 25. Labour Force by Industry, Annapolis County

Industry	Total	Male	Female
Total experienced labour force 15 years and over	9,845	5,280	4,565
Agriculture and other resource-based industries	815	645	170
Construction	795	750	40
Manufacturing	830	600	230
Wholesale trade	280	200	80
Retail trade	1,180	485	695
Finance and real estate	295	95	200
Health care and social services	1,140	155	985
Educational services	730	275	455
Business services	1,395	820	570
Other services	2,380	1,240	1,135

Source: Statistics Canada 2006 Census of Population

Fifty-four percent of the experienced labour force in Annapolis County is male, and the "Other Services" industry is the largest employer. "Other services" would include tourism and accommodation, which would also be supported by the Wholesale and Retail trade industries. Just over 8% of the labour force works in the construction industry. Although the agriculture sector is not a major employer in the region, agriculture is of great importance to the history and cultural roots of the Annapolis Valley. Bridgetown is home to "Ciderfest", an annual fall festival which celebrates the apple harvest.

The participation rate (the percentage of working age population in the labour force) in 2006 for Bridgetown was 51.1%, and for Annapolis County it was 55.9%. The unemployment rate for Bridgetown in 2006 was 13.5%, nearly double the Provincial average of 7.1%. The unemployment rate in Annapolis County in 2006 was 11.4%.

c. Tourism and Annapolis County

Nova Scotia markets itself as a tourism destination, with a tourism industry that contributes more than $1 billion to the provincial economy1 and supporting over 30,000 direct and spinoff jobs. The Annapolis Valley / Fundy Shore tourism region in 2008 accounted for 16% of total Provincial revenues generated by tourism.

1 http://www.gov.ns.ca/tch/tourism/research-pdfs/2007TourismIndustryFacts.pdf

Table 26. Tourism Economic Impacts, 2008

	Nova Scotia	Annapolis Valley / Fundy Shore Tourism Region	Annapolis County
Revenues	**$1,327,000,000**	**$207,900,000**	**$27,140,000**
Taxes			
Federal	$80,500,000	$12,600,000	$1,600,000
Provincial	$100,300,000	$15,700,000	$2,100,000
Municipal	$23,000,000	$3,600,000	$500,000
Total Taxes	$203,800,000	$31,900,000	$4,200,000
Employment			
Direct Jobs	22,900	3,600	500
Spinoff Jobs	8,700	1,400	200
Total Jobs	10,700	4,900	600
Payroll			
Direct Payroll	$369,200,000	$57,800,000	$7,600,000
Indirect Payroll	$149,700,000	$23,400,000	$3,100,000
Total Payroll	$519,000,000	$81,300,000	$10,600,000

Source: Nova Scotia Department of Tourism, Culture and Heritage
Note: Numbers may not total due to rounding

d. Property Values

There were 9,205 private dwellings in Annapolis County in 2006, with an average value of $132,670 (16% lower than the Provincial average). Eighty-one percent of dwellings in Annapolis County were owned, and the majority (81%) of dwellings was constructed prior to 1986.

e. Effects of the Project

i. Economic

In order to complete the Project within the economic constraints, Sprott has determined Project permitting costs, construction costs and requirements (i.e. manhours), operational costs and requirements, and life cycle costs for the Project. Although these internal cost calculations are proprietary, Sprott has provided the expected economic outcomes.

The Project represents an investment of approximately $100 million for both the Phase I (25MW) and a future assumed Phase II Project of 15MW. This includes:

- Option, lease, and royalty payments to landowners. Royalty payments alone are expected to be in excess of $150,000;

- Costs for services to complete Project permitting, including internal Sprott costs;
- Costs for Project construction, including turbines, electrical infrastructure, substation components, payments to Nova Scotia Power for costs associated with NSPI transmission line development, equipment, materials and labour estimates, including:
    - An estimated $20 million of goods and services purchased locally and within the province including:
        - 6,000 cubic metres of concrete;
        - 700,000 kilograms of rebar;
        - 10,000 metres of aggregate for 7 kilometres of improved roads and turbine areas;
        - 12 kilometres of transmission and collection system plus transformer installation;
        - Almost 50 person-years of construction labour filled mostly by local trades people
        - Accommodations for the construction personnel;
- Costs for operational activities at the Project, excluding costs captured under warranty or other contractual obligations during operations;
        - More than $220,000 in annual property taxes for County of Annapolis as well as continued economic support for local community initiatives;
        - 5 direct full time jobs;
        - Service contracts for snow removal, electrical and mechanical maintenance (approximately 6 contractors provide daily, weekly or monthly services to the Project);
        - 5,000 sq ft office and warehouse would be required to service facilities;
        - Accommodations for the construction and permanent staff
        - Strong local business to support Bridgetown initiatives; and
- Costs for the abandonment and reclamation obligations (ARO) associated with the Project, including net present value (NPV) calculations of ARO costs;

As per the permitting stages of the Project, the intent is to fulfill construction and operations contracts/positions with local personnel wherever possible. However, due to the specialized nature of wind turbine delivery, erection, and energization, if local personnel cannot be found, personnel may be required from other municipal, provincial, national, or international firms. As no job postings have been placed at this time, the number of local personnel available for the Project is unknown.

In 2009, the University of Moncton commissioned a study on the short and long term economic impacts of a 100 MW Generic Wind Farm Project. (Yves Gagnon P.Eng., Leclerc Ph.D, & Landry P.Eng., M.Eng, 2009). The study compared publicly financial data of wind farms

constructed in Eastern Canada. (Yves Gagnon P.Eng., Leclerc Ph.D, & Landry P.Eng., M.Eng, 2009) and created a generic profile of investment and expenditures for both the construction and operations phases of this generic model. The study estimated that a 100 MW wind farm represents a $200 million investment. (Yves Gagnon P.Eng., Leclerc Ph.D, & Landry P.Eng., M.Eng, 2009) As projects of this type tend to follow linear progressions, the following table uses the data provided in that generic wind farm example and extrapolates it to the Hampton Project.

Table 27. Comparison of Investment for the Generic Study and Extrapolation of the data to the Hampton Mountain Project

Project Location & Details		
Location	NB	NS
Total Installed Capacity (MW)	100	25.2
Number of Turbines	33	12
	Hampton Mtn as % of Generic (turbine #s)	36%
Investment		
Total Project Investment	$200,000,000	$72,727,272
Cost per MW	$2,000,000	$2,886,002
Construction Phase		
Construction Year	2009	2010
Provincial Expenditures	$34,000,000	$12,363,636
% of Provincial Expenditures / Total Project Investment	17%	17%
Duration	14 months	
Wind Farm Employment (Average During Construction)	70	25
Total Number of Jobs (Person-years)	81	29
Number of Jobs per MW (Person-years)	0.81	1.17
Operation & Maintenance Phase		
Estimated annual revenues	$ 25,228,800	$ 9,174,109
Estimated annual O&M expenditures	$ 3,153,600	$ 1,146,763
Annual O&M provincial expenditures	$ 1,450,656	$ 527,511
% of O&M provincial / O&M total	46%	46%
Direct wind farm O&M employment	9	3
Direct wind farm O&M employment per MW (Jobs/MW)	0.09	0.12
Annual landowner royalties	$ 500,000	$ 181,818
Annual provincial direct tax revenues	$ 934,852	$ 339,946

The comparison between the Project totals provided by Sprott, and the values extrapolated from the generic example result in slight discrepancy. However, the generic example cannot take into account currency fluctuations, variations in turbine pricing, changes in lending rates, New Brunswick economic conditions, or other financial indicators which have changed since the New Brunswick study was commissioned. In addition Sprott cannot provide exact financial values due to proprietary restrictions. Therefore, it should be expected that the true financial contribution of the Project will fall somewhere between the values provided by Sprott and the calculations provided in Table 27 above.

ii. Property Values

The concern that property values will be adversely affected by the Project is one put forth by a single stakeholder in the area. In 2009 a study was commissioned by the U.S. Department of Energy to determine if this impact does in fact exist. (Hoen, Wiser, Cappers , Thayer, & Sethi, 2009) The study collected data on almost 7,500 sales of single family homes situated within 10 miles of 24 existing wind facilities in nine different U.S. states. (Hoen, Wiser, Cappers , Thayer, & Sethi, 2009) In addition, the study reviewed a number of data sources and published material. Although that reviewed information addressed concerns about the possible impact of wind energy facilities on the property values of nearby homes, Hoen et al. found that "the available literature that has sought to quantify the impacts of wind Projects on residential property values has a number of shortcomings". The list of shortcomings identified in that study (Hoen, Wiser, Cappers , Thayer, & Sethi, 2009) are as follows:

1. Studies relied on surveys of homeowners or real estate professionals, rather than trying to quantify real price impacts based on market data;
2. Studies relied on simple statistical techniques that have limitations and that can be dramatically influenced by small numbers of sales transactions or survey respondents;
3. Studies used small datasets that are concentrated in only one wind Project study area, making it difficult to reliably identify impacts that might apply in a variety of areas;
4. Many studies had no reported measurements of the statistical significance of their results;
5. Many studies have concentrated on an investigation of the existence of Area Stigma, and have ignored Scenic Vista and/or Nuisance Stigma;
6. Only a few studies included field visits to homes to determine wind turbine visibility and collect other important information about the home (e.g., the quality of the scenic vista); and,
7. Only two studies have been published in peer-reviewed academic journals.

Ultimately, the Hoen et al. study indicated that "none of the models uncovers conclusive evidence of the existence of any widespread property value impacts that might be present in communities surrounding wind energy facilities. Specifically, neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measurable, and statistically significant effect on home sales prices. Although the analysis cannot dismiss the possibility that individual homes or small numbers of homes have been or could be negatively impacted, it finds that if these impacts do exist, they are either too small and/or too

infrequent to result in any widespread, statistically observable impact." (Hoen, Wiser, Cappers , Thayer, & Sethi, 2009) As Hoen et al. note, just as a potential home purchaser may avoid a property due to the fact they don't like the kitchen, the same may hold true due to the proximity of the home to this Project. As this is a completely subjective opinion, further evaluation is not warranted and no mitigation will be employed to address the concern.

iii. Tourism

In 2002, MORI (Market & Opinion Research International) completed an independent research study on the "Economic Impacts of wind farms on Scottish tourism" for the British Wind Energy Association (BWEA) and the Scottish Renewables Forum. (Market & Opinion Research International, March 2008) MORI interviewed tourists visiting Argyll and Bute, Scotland, an area chosen because, at the time, had the greatest concentration of wind farms in Scotland. In addition the tourism industry in the region has a strong reliance on the area's high landscape value (the study indicates that 48% of the respondents who came to the area reporting doing so for the scenery). (Market & Opinion Research International, March 2008)

The MORI study indicates that fourty (40%) percent of tourists interviewed were aware of the existence of wind farms in the area and when asked whether this presence had a positive or negative effect, 43% indicated that it had a positive effect, while a similar proportion (43%) felt it made no difference. 8% felt that it had a negative effect.

In comparison, a 2003 study was completed for the Wales Tourist Board (NFO World Group, 2003) in response to an inquiry from the Welsh Assembly to "assess the effects of renewable energy, and particularly wind farms, on tourism." (NFO World Group, 2003) This study used a 266 person sample size and found that overall 78% of respondents were positive or neutral towards wind farms, with 21% negative, and 1% with no opinion.

Although the effects of the Hampton Project on local tourism and tourist perceptions cannot definitively be known until the Project is implemented, past research in the Scottish and Wales examples indicates that the dominant perceptions of the Project will likely either positive or neutral.

f. Mitigation

At present, no mitigation is available for impacts resulting from Project Effects and none will be implemented.

G. SOUND

A Sound Impact Assessment (SIA) has been completed for this Project by M. K. Ince and Associates Ltd. (MKI). This report can be found in Appendix V.

a. Effects of the Project

When modeled according to the ISO 9613-2 method "*Acoustics – attenuation of sound during propagation outdoors*," most receptors will experience noise levels below 40 dB(A). Eleven receptors will experience noise levels between 40 dB(A) and 45 dB(A). Only one (1) receptor, a seasonal camp, is predicted to experience noise levels above 45 dB(A).

The following conclusions and conditions are also listed:

- Tonality penalties do not apply to the turbine noise emission levels;
- The transformer substation was assumed to generate a noise level of 80 dB(A), in accordance with CAN-CSA-C88-M90;
- A 5 dB(A) tonality penalty has been applied to the transformer substation;
- A modeled turbine sound power level of 107 dB(A) was used;
- Surrounding terrain is consistent with a ground factor of 0.7;
- Conservative atmospheric conditions for least impeded noise propagation were used for the calculations;
- No acoustic shielding or damping specifically from vegetation or buildings etc. is used;
- Receptors were modeled as points 4.5 m above ground level at the centre of the residences.

Conservative assumptions have been selected for the turbine noise emission level, POR height, and atmospheric conditions. In addition, the presence of crops, foliage, and other sound impeding obstacles were not modeled. Therefore the results of the calculations performed for this report are considered to be conservative.

b. Mitigation

The single receptor expected to receive noise levels above 45 dB(A) was directly consulted as a result of this prediction. The owner of that seasonal camp indicated they have no concerns with this noise level, and has provided a letter to this affect. This letter is provided in Appendix V, following the Sound Assessment.

In the event noise complaints are received, appropriate mitigation will be implemented and may include:

- The Project provides, and will continue to provide, periodic newsletter updates to the community and residents. This will act as a conduit to what is deemed to be a successful, and ongoing, public consultation process;
- The Project will typically operate from 7:30 a.m. (arrival of personal vehicles), with heavy equipment in operation from 7:00 a.m. to dusk, 5 days a week. . During certain construction activities, such as the turbine foundation concrete placement and the

erection of the turbine, the work hours and number of days worked per week may be extended;

- The Project has an *Inquiry & Complaint Reporting Procedures* (Appendix III) in place in the event any complaints are received. The *Inquiry & Complaint Reporting Procedures* outlines a methodology for handling complaints. If complaints cannot be resolved through communication with the complainant, on-site monitoring can be carried out at the site in question in order to assess the extent of the problem.

i. On-site Noise Monitoring Protocol

On-Site Noise Monitoring may include the following work:

- Scheduled Monitoring, at the residence of concern;
- Responsive monitoring when required as part of complaint resolution;

Scheduled/Background Noise Monitoring will be performed by a qualified technician within 15 metres of the residence (with the landowners' permission) during which overall A-weighted sound levels will be measured and recorded. Scheduled/Background Noise Monitoring will be undertaken over a one week sampling period to allow for the meaningful assessment of variations in wind speed, wind direction, and humidity. One-hour average (Leq) sound levels will be recorded continuously, when weather conditions are suitable, for at least 48 hours over the one-week sampling period. At least 24 hours of nighttime measurements will be recorded.

Responsive Noise Monitoring will be performed when conditions are representative of the conditions identified by the complainant at the earliest opportunity after the complaint is received. The monitoring will be performed over a 4 to 24 hour period with at least 3 hours of representative data collected.

Results from the Responsive Noise Monitoring will be compared with the predictive noise modeling. When the Responsive Noise Monitoring exceeds the predictive noise modeling, but noise from the wind farm is not considered to be responsible for the exceedance, a further assessment using an appropriate background and ambient noise analysis technique may be carried out to separate the facility noise contribution from the Responsive Noise Monitoring. This will, in effect, separate noises not related to the facility.

Measurement Instruments used to conduct both the Scheduled/Background Noise Monitoring and the Responsive Noise Monitoring surveys will meet the minimum technical specifications in the International Electro-technical Commission (IEC) publication 60804 or its latest revision for Type II sound level metres.

If public complaints are received, it may be appropriate to monitor for low frequency noise. This determination will be based upon the nature of the complaint received. If this occurs, as per

ANSI S12.2-1995 Standard B criteria for Evaluating Room Noise, sound levels in the 63 Hz octave band will be compared to 70 dB to indicated or deny the presence of low frequency noise.

ii. Reporting

Reporting will summarize the results of any noise complaints received, any on-site noise monitoring, additional mitigation recommended or implemented, and steps taken to resolve the complaints. The following information will be included in the Post-Construction Noise Monitoring Report:

- distance and direction of dwelling from the wind turbines, including a map;
- record of calibration results;
- environmental conditions during monitoring period (wind speed and direction etc.) and the source of the data;
- operating conditions for wind farm turbines included in the survey;
- graphs showing measured noise levels and any ambient analysis; and,
- summary table including the predicted noise levels for residences, measured sound level, ambient analysis results, and valid hours of the survey.

H. RECREATION

In areas without active timber harvesting, land use is dominated by hiking, camping, use of seasonal cabins/accommodations, fishing, and water recreation. Consultation with one of the landowners within the Project area indicated that there is limited to no hunting on the Project lands. According to the landowner, there is a lack of suitable prey (i.e. partridge; pheasant) and limited visibility for hunting of deer.

All Terrain Vehicles (ATV) use is extensive within the Project area and there is a myriad of interconnected trails, stopping locations, and tracks suggesting continuous and extensive use. None of the trails are associated with an organization or known recreational group. All trails appear to be used by public riders. No signs or other trail indicators are present.

No other public recreational lands exist within the Project boundaries.

a. Effects of the Project

The construction and operation of the Project will result in modified use by ATVs, hikers, general users or landowners. Although some ATV trails will be lost due to access road construction, the access roads, by definition, will continue to allow access by ATVs or other recreational users but such access will still be subject to permission from the private landowners.

No effects to the use of seasonal cabins, lakes, fishing, or water sports are expected.

Unless gates are placed on access roads to prevent public access, increased access to the Project lands may occur.

Effects to hunting are expected to be limited due to lack of hunting.

b. Mitigation

Unless access restrictions (i.e. gates) are requested by landowners, no mitigation will be implemented as no significant or long term impacts to recreational uses are expected.

I. VISUAL

Any loss of aesthetic value associated with the Project may be as a result from the physical presence of new turbines, trails, increased traffic, and changes in vegetation and wildlife communities.

Currently, no data is available which indicates how wind power Project visual thresholds are defined or exceeded. Therefore it is assumed that much of the aesthetic value is perceived by residents and visitors to the area. In order for the public and regulatory personnel to effectively estimate the visual effect of the Project, the following was completed:

1. A visual representation of the Project from 3 vantage points in Bridgetown. The visual representations were provided in power point presentations to the Annapolis County Council, Town of Bridgetown, Landowners, and the Bridgetown Community during presentations. In addition, these visual representations were placed on a poster board at the open house held in Bridgetown on September 15, 2010. They are found on the following pages.

View of Project from Bridgetown

View of Project from Clarence Road

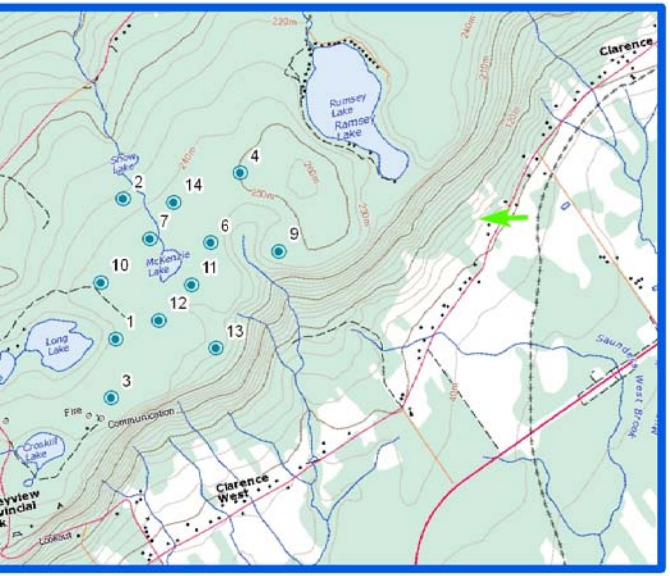
View of Project from Highway 101

2. A visual representation of the Project from 2 vantage points along Clarence Road. The visual representations were provided in response to inquiries made by a resident along Clarence Road. They are found on the following pages.

Visual Simulation - Hampton Mt. 1797 Clarence Rd.

Simulation

al Photo



Wire Frame

Prepared By:

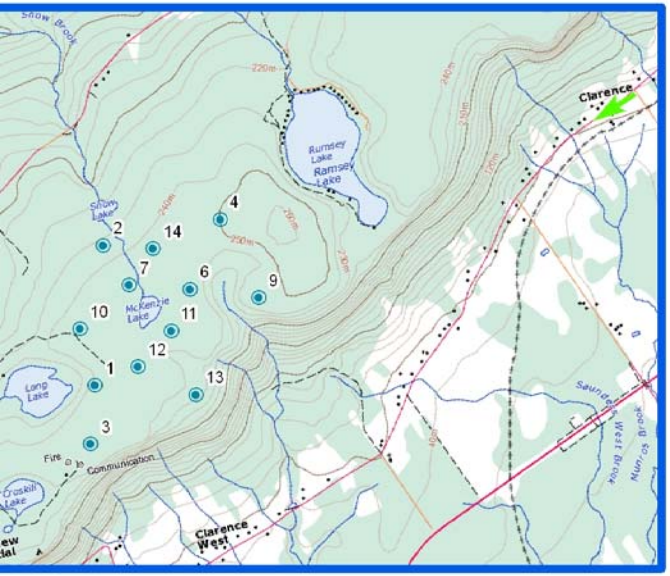
ORTECH Power
a division of ORTECH Consulting Inc.

Location of Visual Simulation:	179
Coordinates (UTM NAD 83, Zone 20N):	32
Direction of View (With respect to North):	
Closest Visible Turbine ID:	
Distance:	

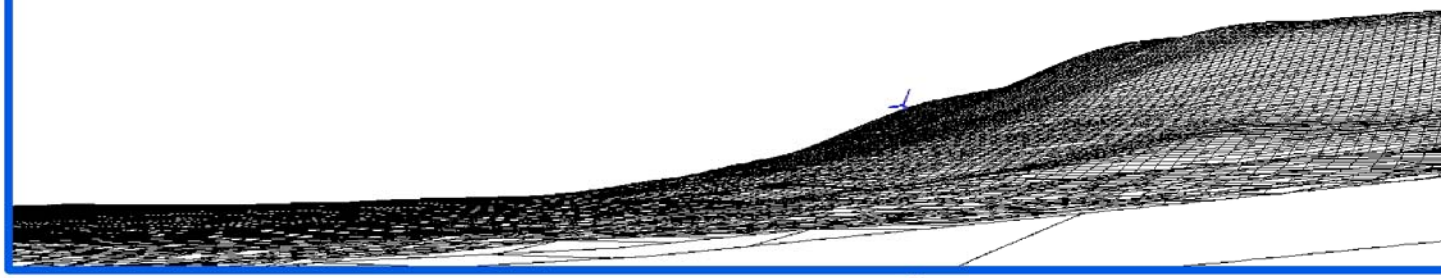
Visual Simulation - Hampton Mt. 2131 Clarence Rd.

Simulation

al Photo



Wire Frame

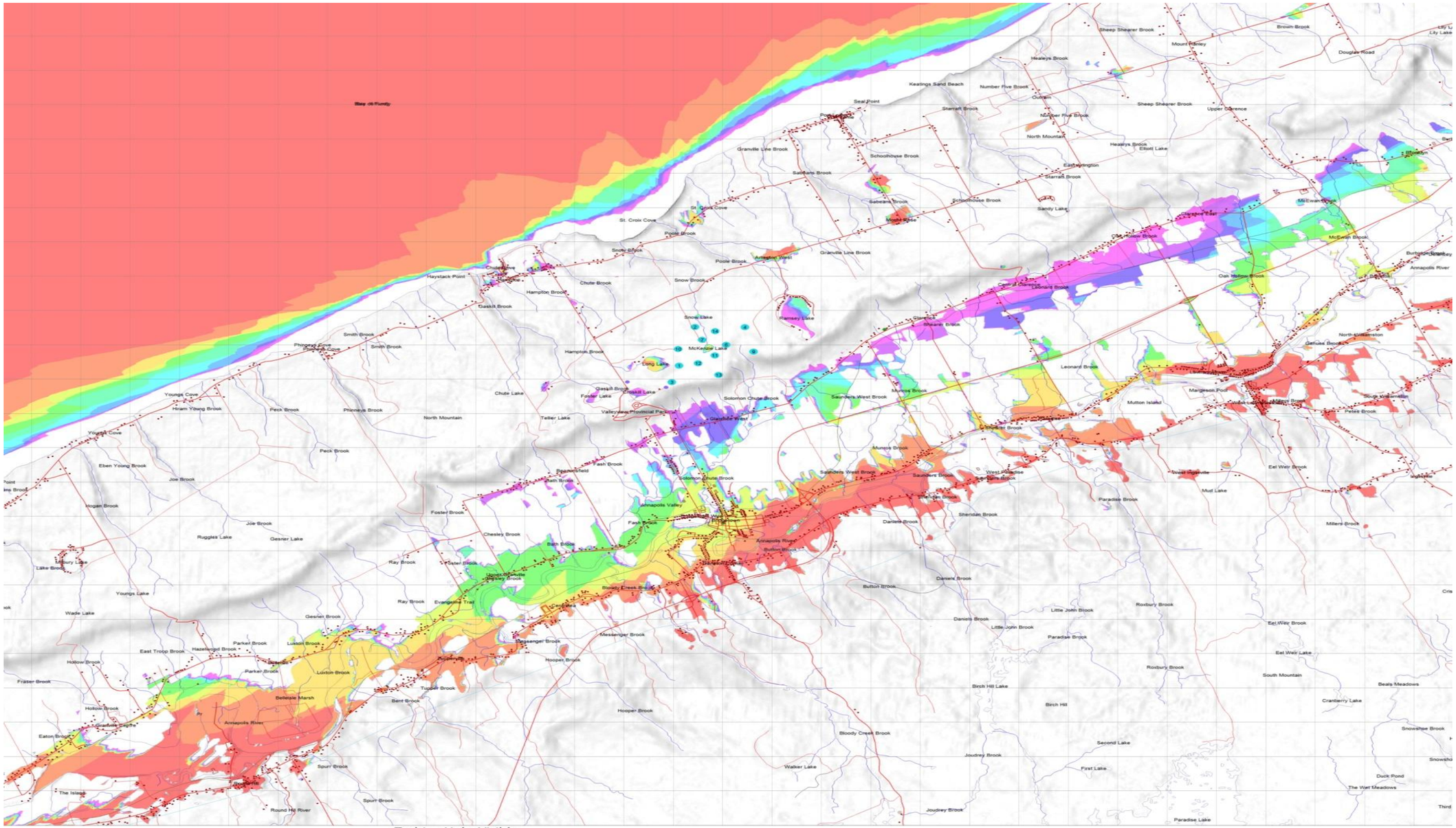


Prepared By:

ORTECH Power
a division of ORTECH Consulting Inc.

Location of Visual Simulation:	213
Coordinates (UTM NAD 83, Zone 20N):	32
Direction of View (With respect to North):	
Closest Visible Turbine ID:	
Distance:	

3. Visual zone of influence analysis. This study uses line of site analysis and incorporates topographic features collected from 1:50,000 base maps, turbine characteristics (hub height, rotor diameter), GPS coordinates for turbines, and GPS coordinates for receptors (i.e. homes), and analyzes how many turbines will be seen from a geographic area (within which a specific receptor may be located).



Map datum NAD 83

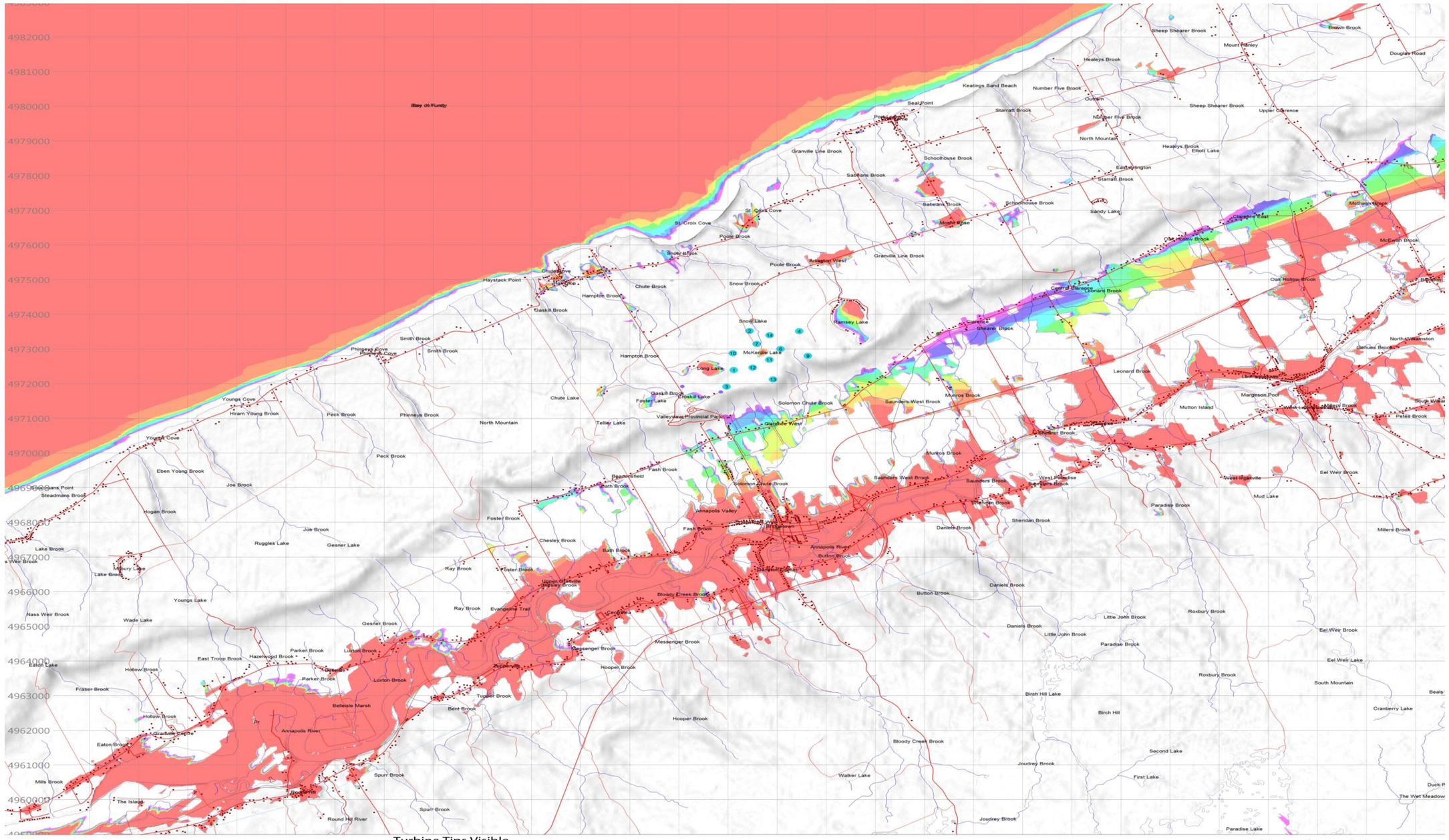
UTM zone 20, North

Turbine Hubs Visible

- 10+
- 9
- 8
- 7
- 6
- 5
- 4
- 3
- 2
- 1

- Building
- Road
- Water
- Wind Turbine

October 12, 2010



Turbine Tips Visible

- 10 +
- 9
- 8
- 7
- 6
- 5
- 4
- 3
- 2
- 1

Map datum NAD 83

UTM zone 20, North

- Building
- Road
- Water
- Wind Turbine

October 12, 2010

In addition to visual impacts and aesthetics experienced by residents, the Project will affect the visual characteristics and, therefore, opinions of visitors to the region. Nova Scotia markets itself as a natural, coastal destination. From a tourism perspective, the question of how the Project will impact the visitor experience from the local scenic perspective is unknown, as that experience highly subjective. However, the Project is located between the primary east/west travel corridor (Highways 1 and 101) and the Bay of Fundy. But the Bay of Fundy cannot be seen from this travel corridor (referred to as the "Valley"). Thus both the North and South Mountains (as they are locally referred to) dominate the scenery in the Valley.

Furthermore, the Project is located south of the Bay of Fundy. Visitors to the region who travel along the coastal edge of the Bay of Fundy probably do so along the Fundy's edge, or in as close proximity to the edge as possible. The Shore Road East provides an east/west travel corridor along the Bay of Fundy. In addition, a secondary road, the Arlington Road travels east/west and is adjacent to the north side of the Project. In both cases, these roads are situated between the Project and the Bay of Fundy.

Finally, the Hampton Mountain Road travels north/south and connects both the Shore Road, and Arlington Road to the Valley. Approximately three quarters of the way up the Hampton Mountain Road (on the edge of the North Mountain), a small pullout is present. This pullout is advertised on road signs as providing a view of Bridgetown and the Valley. The visual zone of influence model indicates that no turbines will be visible from this location. The Project will not affect this viewscape.

a. Effects of the Project

Currently, no data is available which indicates how wind power Project visual thresholds are defined or exceeded. Therefore it is assumed that much of the aesthetic value is perceived by residents and visitors to the area and is subjective to the individual. To date, only a single, part-time resident of the area has expressed concerns with the visual impact of the Project.

b. Mitigation

In an attempt to provide clarity to the concerned resident, Sprott has completed a visual model, with photos taken along Clarence Road (located south of the Project). In addition, Sprott has reviewed the visual zone of influence model, with specific emphasis on this resident's home to determine the most likely visual impact. That information has been provided to the resident for his review. No further mitigation will be implemented.

J. AIR QUALITY

Air Quality has been selected as a VEC because of its intrinsic importance to the health and well being of humans, wildlife, and vegetation both at a Project level, community level, regional, and provincial levels. Air quality will be assessed in the context of Project-related emissions and ground-level concentrations for particulate matter (PM; total suspended particulate (TSP); dust). No major industrial operations are located within the immediate air shed.

A comprehensive assessment of the effects of the nitrogen oxides (NO_x and NO_2) emissions from the Project was not conducted as the only emissions associated with the Project are related to vehicle and equipment emissions during construction and operations. No other industrial source emissions are associated with the Project.

a. Effects of the Project

The addition of Project emissions to regional airshed emissions is not expected to increase predicted maximum ambient concentrations. Therefore, the emissions will not have any adverse effects on the environment. It is concluded that predicted NO_2 ground-level concentrations in the area are dominated by existing baseline-background emissions sources.

As indicated previously, considerable heavy equipment will be used to clear the land thereby increasing the vehicular traffic in and around the Project site. Potential impact sources include fugitive dust emissions, vehicular/ heavy equipment exhaust and emissions from the diesel equipment used during construction.

Apart from this, impacts to air quality from these sources should not appreciably degrade the ambient air quality at the sites. Moreover, the anticipated construction phase for the Project is relatively short.

Blasting associated with quarry development can result in a concentrated plume of particulate matter, but the volume and time duration of such plumes are quite constrained. Even when blasts result in a visible plume, the contribution to 24-hour averages, as in the Air Quality Regulations, will be negligible. Much of the material in the initial plume is larger than the aerodynamic diameter of particles that can remain suspended in the air, and deposit within a relatively short distance (*e.g.*, 100 m) of the blast site. Nevertheless, a visible plume is often unacceptable to the public and regulators, and control is appropriate. Proper controlled blasting techniques are effective in reduction of the visible plume and other more serious potential effects.

Trucks moving off-site can also impact air quality by transporting mud and material on their tires that is deposited on public roads, where it can become airborne through the mechanical action of passing vehicles and the wind.

b. Mitigation

The anticipated mitigation measures for the potential air quality impacts during the Project involve both operational and engineered interventions. In order to limit the possible emissions, all vehicles and equipment will be turned off when not in use as well as prohibit vehicular and equipment idling. In addition the vehicles and equipment (generators) will be serviced and maintained in order to reduce any possible emissions. Water trucks will be used to spray water on the unpaved roads and cleared areas to reduce dust emissions. This will be further enhanced by the eventual upgrading of the road system. Trucks transporting materials will be covered to prevent any loose material from blowing away. Vehicular speeds on the Project site shall be limited to further reduce any possible fugitive dust emissions. Disturbed areas will be re-vegetated as soon as practicable to limit exposed areas of soil.

K. ELECTROMAGNETIC INTERFERENCE

Due to their large size, wind turbines can interfere with radio waves emitted from telecommunication and radar systems. In response to these potential conflicts, the Radio Advisory Board of Canada (RABC) and the Canadian Wind Energy Association (CanWEA) have issued a set of guidelines which describe the methodology for assessing electromagnetic interference (EMI).

EMI created by a wind turbine can be classified in two categories:

1. Obstruction - occurs when a wind turbine is placed between a receiver and a transmitter, creating an area where the signal is weakened and/or blocked; and,
2. Reflection - caused by the distortion between a signal and a reflection of the signal from an object. Included within reflection is a sub-category called Scatter. Scatter is a result of rotor blade movement.

The specific characteristics of a wind turbine will influence the type and magnitude of the interference. Furthermore, wind turbines affect different types of signals in various ways as some telecommunication signals are more robust to interference than others.

A preliminary investigation of the potential conflict between the proposed Project and communication systems has been completed. The results of the investigation are summarized as follows:

System	Result
Point-to-Point	There are no radio links that transect the Project. One communications tower is located within the 1.0 km consultation zone. Sprott will open a dialogue with the radio frequency licensee's to determine potential impacts and

	possible mitigative measures (if any).
Over-the-Air-Reception	6 FM and 4 TV transmitters within the 1.0 km consultation zone. Sprott will discuss the issue and possible remediation with the owners. Receivers are located within the 8.4 km consultation zone and an impact analysis is to be completed.
CBC Preliminary Report	No AM, FM or TV Transmitters within 5 km of the Project. 5 TV Transmitters are located within 89 km of the Project. Potential TV receivers are located within the 8.4 km consultation zone and an impact analysis is to be completed
Cellular Type Network	None within the consultation zone.
Satellite Systems	Receivers are located within the 1.0 km consultation zone. None within the projected cone. Sprott will discuss the issue and possible remediation with the owners.
Land Mobile Networks	At total of 7 assigned frequencies within the 1.0 km consultation zone. Sprott will discuss the issue and possible remediation with the owners.
Seismoacoustic Monitoring Equipment	None within the consultation zone.
Traffic and Defence Radars	Civilian and National Defense Radar analysis forthcoming, no issues expected
Weather Radars	None within the consultation zone.

a. Effects of the Project

Until such time that the EMI consultation is completed, Project related effects cannot be determined.

b. Mitigation

Depending on the effects of the Project, mitigation may include a field validation of reception before and after turbine installation. In the case of diminished reception, mitigation techniques for broadcasting reception include relocation of reception towers, purchase of a taller reception tower/antenna structures for TV/radio, or the purchase of cable/satellite TV/radio for affected receptors. Finally, mitigation methods can be applied in both the planning stages of wind power facility and after the installation of the wind turbines.

L. HEALTH & SAFETY OF RESIDENTS

a. Country Foods

No known country foods are harvested on a commercial scale within the Project boundaries. A determination of the exact nature and extent of private gardens was not undertaken for this Project as all residences with permanent and sustained gardens appear to be located at least 700 metres from any single turbine.

i. Effects of the Project

The known waste products from a wind power Project are associated with dust, vehicle emissions, and garbage resulting from normal operations. No significant quantities of chemicals are present, will be stored, or used to a degree which poses the potential to impact surface soils, surface water, or groundwater.

In addition, the Project site is situated entirely within a forested ecosystem, with active logging operations. Other than wildlife, no food sources are present that may support human populations. As the by-products of normal operations at the Project do not pose known risks of contamination within the food chain, impacts to either human and/or wildlife populations is not expected to occur as no feasible operable, or transport pathways are currently known to exist.

ii. Mitigation

As no impacts to community foods are expected no mitigation is deemed necessary.

b. Safety to Residents or Other Area Users

i. Ice Throw

Wind turbines can accumulate ice under certain atmospheric conditions, such as temperatures near freezing (0°C) combined with humidity, freezing rain, or sleet. Since changing weather conditions may then cause this ice to be shed, there are safety concerns that must be considered during Project development and operation.

Any ice that is accumulated may be shed from the turbine due to warmer temperatures, gravity and the mechanical forces of the rotating blades.

In the event of ice throw the motion of the fragment is governed by specific forces. The ice fragment has an initial velocity due to rotation, while in flight the motion is constrained by gravity and aerodynamic forces.

Due to certification requirements which outline load cases which must be used in the design of wind turbines (including iced blades) manufacturers incorporate ice build up on the blades as a load resulting in additional vibration caused by both mass and aerodynamic imbalance. (LeBlanc, 2007)

Leblanc (2007) used defined methodologies and analyses to determine the probability that an ice fragment will land on a certain target or in a particular area in the range of the turbines. The probability of impact is then multiplied by the probability of ice throw. The final result is the probability that a target fixed at a certain range from the turbine will be hit in one year. If targets are not fixed, such as cars on a roadway, then the probability must be multiplied again by the probability that the target will be in position. Mobile targets are discussed in the analyses.

The calculated probabilities results of this risk analysis are provided in terms of Individual Risk (IR), which is defined as the probability of being struck by ice fragment per year. (LeBlanc, 2007) The results of the Leblanc's (2007) are as follows:

1. Scenario A – Fixed Dwelling: Based upon a location of 300 metres from an individual turbine, calculated risk is 1 strike per 500,000 years;
2. Scenario B – Road: Based upon a road location 200 metres from a turbine, with a 100 vehicles travelling 60 km/h along a 600 metre section of road, during 5 days of icing events, calculated risk is 1 strike per 260,000 years;
3. Scenario C – Individuals: Based upon one ever-present individual within 300 metres of a turbine, who does not impinge within 50 metres of the turbine base, calculated risk is 1 strike per 137,500,000 years.

The calculated strike risk does not factor in the following characteristics at the Hampton Project:

1. The presence of forest vegetation providing additional shelter;
2. Topographic variations, and;
3. Dominant wind direction which in the Hampton Project case is from the NE to the SW, away from roads and dwellings.

ii. Effects of the Project

Although there is the risk of ice throw from the turbines on the Project, the analysis completed by Leblanc (2007) suggests that the safety risks to individuals associated with such an event are so low that the risk is almost non-existent.

iii. Mitigation

All commercial wind turbines include vibration monitors, which will automatically shut the turbine down when vibrations exceed a pre-set level. This vibration safety shutdown feature is also effective when excessive ice builds up on the turbine blades thus further limiting the risk of ice throw. In addition, Sprott commits to the installation of signs at public access points warning of the potential for ice throw. Operation and maintenance staff and contractors will be made aware of the risk of ice accumulation, throw, or falling as a function of Sprott Safety Guidelines.

M. DISCUSSION OF IMPACTS

a. Impact Matrix

An impact matrix is a qualitative environmental impact assessment method, used to identify the potential environmental impact of a Project on the environment. The Leopold matrix is the best known matrix methodology available for predicting the impact of a Project on the environment. (FAO, 1996) The system consists of a matrix with columns representing the various environmental factors to be considered, and rows representing various Project components that will interact with the environment. (Wikipedia, 2009) The use of this Matrix for the discussion of impacts was discussed with Steve Sanford (DOE) for use in this assessment during a meeting held at DOE offices on September 16, 2010.

The intersections are filled in to indicate the magnitude (from -10 to +10) and the importance (from 1 to 10) of the impact of each activity on each environmental factor. Measurements of magnitude and importance tend to be related, but do not necessarily directly correlate. Magnitude can be measured fairly explicitly, in terms of how much area is affected by the development and how badly, but importance is a more subjective measurement. While a proposed development may have a large impact in terms of magnitude, the effects it causes may not actually significantly effect the environment as a whole. (Wikipedia, 2009)

b. Limitations

The aforementioned Leopold matrix is not *selective*, and includes no mechanism for focusing attention on the most critical human concerns. (Burton et al., 1977) The principle of a mutually exclusive method is not preserved in the Leopold matrix, and there is substantial opportunity for double counting. (Burton et al., 1977) This is a fault of the Leopold matrix in particular rather than of matrices in general. (Burton et al., 1977)

The Leopold Matrix can accommodate both quantitative and qualitative data. It does not, however, provide a means for discriminating between them. In addition, the magnitudes of the predictions are not related explicitly to the 'with-action' and 'without-action' future states. (Burton et al., 1977)

Objectivity is not a strong feature of the Leopold matrix. Each assessor is free to develop his own ranking system on the numerical scale ranging from l to 10. (Burton et al., 1977) This typically results in extensive discussions regarding assessor rankings.

The Leopold matrix is not efficient in identifying interactions. However, because the results are summarized on a single diagram, interactions may be perceived by the reader in some cases. (Burton et al., 1977)

Synthesis of the predictions into aggregate indices is not possible, because the results are summarized in a 1215 (27 x 45) cell matrix, with two entries in each cell – one for magnitude and one for importance. Thus the decision maker could be presented with as many as 2430 items for each alternative proposal for action. (Burton et al., 1977)

c. Modifications for this assessment

As a result of the limitations explained by Burton et al. (1977), the Leopold matrix was modified for purposes of this assessment. The following matrix (Table 28) uses the same fundamental characteristics of the Leopold Matrix. However, instead of splitting each cell into magnitude and likelihood, each interaction between a *Project component* and E*nvironmental component* has been given one of three values:

- -1: Negative Effect: If this value is presented in a cell, it indicates that as a result of the Project component a negative effect will occur on the environmental component;
- 0: Neutral: If this value is presented in a cell, it indicates that the effect of the Project component on the environmental component will be neutral; and,
- +1: Positive Effect: If this value is presented in a cell, it indicates that as a result of the Project component a positive effect will occur on the environmental component.

These values do not take into account that the impact is temporary but only that it exists. The purpose of modifying the matrix this way is to reduce the required explanation for each cell. As each cell would require an explanation, the result would be 1215 items for discussion. However, as each cell now only contains one of three values, and each value can be easily interpreted by the reader, further explanation of each cell is not warranted as previous sections in the original environmental assessment should be used for reference.

The reader should note that for the purposes of this assessment, the Project has been broken into three timelines with specific durations:

1. Construction – duration of 2 years (7% of the total Project timeframe);
2. Operations – duration of 25 years (86% of the total Project timeframe); and
3. Reclamation – duration of 2 years (7% of the total Project timeframe);

As such the total estimated duration of the Project is 29 years.

d. Interpretation of the Table

The reader must note that in the interpretation of this matrix, they must keep in mind that the interaction between the *Project component* and the E*nvironmental component* is based upon the actual *Project component* listed in the column, and the outcome of that specific *Project component*. For example, the first *Project component* listed is Construction of Storage Yards.

The first *environmental component* is Agricultural Land. Within the matrix, the value given is 0. In this case the construction of a storage yard will not involve loss of land use for agricultural purposes, as the storage yard is constructed outside of agricultural lands, and as such there is no effect. Whereas, further down the column, the effect of Reclamation of Surface Soils is +1 (positive) as the outcome of this is that Pasture land may be brought back into production by the landowner. Furthermore, the reader must also note that in the consideration of whether a *Project component* effect is negative, neutral, or positive, consideration has been given to mitigation to be used. Mitigation for each VEC has been described in previous sections.

Table 28. Environmental Impact Matrix (modified Leopold Matrix)

Environmental Component →		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT												SOCIAL/CULTURAL ENVIRONMENT									
								FLORA				Fauna																	
Project Component ↓		Agricultural Land	Soils	Surface Water Quality	Ground Water Quality	Air Quality	Wetlands	Trees	Shrubs & Understory Vegetation	Aquatic Vegetation	Species at Risk - Vegetation	Birds (includes Species at Risk)	Bats	Ungulates	Carnivores	Small Mammals	Reptiles/Amphibians	Barriers to Movement	Corridor Creation	Residential	Noise	Historical Resources	Health & Safety (Public)	Recreation on the Lands	Scenic Qualities	Economics for Individual Landowners	Economics for community at large	Economics for Municipalities	
Construction																													**Mean**
General	Construction of storage yards	0	-1	0	0	-1	0	-1	-1	0	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.44
	Construction of temporary work space	0	-1	0	0	-1	0	-1	-1	0	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.44
	Erection equipment delivery	0	0	0	0	-1	0	-1	-1	0	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	-1	-1	-1	1	1	0	-0.41
Turbines	Construction of access roads, approaches, water crossings	0	-1	-1	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.59
	Construction of temporary work space(s)	0	-1	-1	0	-1	0	-1	-1	0	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.48
	Construction of Quarries	0	-1	-1	-1	-1	0	-1	-1	0	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.52
	Site grading	0	0	0	0	-1	0	0	0	0	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	-1	1	1	0	-0.30
	Excavation of foundations	0	-1	0	-1	-1	0	0	0	0	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.41
	Pouring of foundations	0	0	0	-1	-1	0	0	0	0	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.37
	Tower/turbine erection and insulating	0	0	0	0	-1	0	0	0	0	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.33
	Install Turbine Electrical & Padmount Transformers	0	0	0	0	-1	0	0	0	0	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.26
	Removal of excess soils	0	1	-1	0	-1	-1	0	0	0	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.30
	String Interconnection Conductors & Shield Wires	0	0	0	0	-1	0	0	0	0	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.26
	Reclamation of pad sites and access roads as required	0	1	1	0	-1	0	0	0	0	0	0	0	-1	-1	-1	0	0	-1	-1	-1	0	0	-1	0	1	1	0	-0.15
Gathering Lines	Install & Connect U/G & O/H Collector System	0	0	0	0	-1	0	-1	-1	0	0	0	0	-1	-1	-1	0	0	-1	-1	-1	0	0	-1	0	1	1	0	-0.30
Substation	Establishment of temporary work space	0	0	0	0	-1	0	0	0	0	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.26
	Removal of surface soils	0	-1	-1	0	-1	-1	-1	-1	-1	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.48
	Construction of access road and approaches	0	-1	-1	0	-1	-1	0	0	-1	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	-1	1	1	0	-0.44
	Grading of site	0	0	0	0	-1	0	0	0	0	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.26
	Installation of gravel pad	0	0	0	0	-1	0	0	0	0	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.26
	Transformers & control building installation, wiring, finishing	0	0	0	0	-1	0	0	0	0	0	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	0	-1	0	1	1	0	-0.26
	Reclamation of surface soils	0	1	1	0	-1	1	0	0	1	0	1	1	1	1	-1	0	1	-1	-1	-1	0	0	-1	1	1	1	0	0.22
	AVERAGE	0.00	-0.23	-0.18	-0.14	-1.00	-0.14	-0.36	-0.36	-0.09	0.00	-0.32	-0.32	-0.91	-0.91	-1.00	-0.05	-0.82	-1.00	-1.00	-1.00	0.00	-0.05	-1.00	-0.09	1.00	1.00	0.00	-0.33

Table 28. Environmental Impact Matrix (modified Leopold Matrix)

Environmental Component →		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT												SOCIAL/CULTURAL ENVIRONMENT										
								FLORA				FAUNA																		
Project Component ↓		Pasture Land	Soils	Surface Water Quality	Ground Water Quality	Air Quality	Wetlands	Trees	Shrubs	Aquatic Vegetation	Species at Risk - Vegetation	Birds	Bats	Ungulates	Carnivores	Small Mammals	Reptiles/Amphibians	Barriers to Movement	Corridor Creation	Residential	Noise	Historical Resources	Health & Safety (Public)	Recreation on the Lands	Scenic Qualities	Economics for Individual Landowners	Economics for community at large	Economics for Municipalities		
Operations & Maintenance																													**Weights**	**Mean**
Turbines	Production of electricty by turbines	0	0	0	0	1	0	0	0	0	0	-1	-1	0	0	0	0	-1	0	-1	-1	0	0	0	-1	1	1	1	98.000%	-0.07
	Weed control	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.286%	0.11
	Reclamation of disturbed soils	0	1	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0.286%	0.26
	Grading and road maintenance	0	0	0	0	0	0	0	0	0	0	-1	0	-1	-1	-1	0	-1	-1	-1	-1	0	-1	-1	-1	1	1	0	0.286%	-0.33
	Turbine maintenance	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	0	0	-1	-1	0	0	0	0	0	0	0	1	0	0.286%	-0.11
Power lines/Transformer Station	Facility maintenance	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	0	0	-1	-1	-1	0	0	0	0	0	0	1	0	0.286%	-0.15
	Testing of equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	0	0	0	0	0	0	0	1	0	0.286%	-0.04
	Line maintenance as required	0	0	0	0	0	0	0	0	0	0	-1	0	-1	0	0	0	-1	-1	-1	0	0	0	-1	0	0	1	0	0.286%	-0.19
	AVERAGE	0.00	0.01	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	-0.99	-0.98	-0.01	-0.01	-0.01	-0.00	-0.99	0.81	-0.99	-0.98	0.00	-0.00	-0.01	-0.98	0.99	1.00	0.98		-0.04
Decommissioning																														**Mean**
Turbines & Access	Removal of tower and turbine infrastructure	0	0	0	0	-1	0	0	0	0	0	0	1	-1	-1	0	0	0	1	-1	-1	0	0	-1	-1	1	-1	1	0	-0.14
	Removal of transformers	0	0	0	0	-1	0	0	0	0	0	0	1	-1	-1	0	0	0	1	-1	-1	0	0	-1	-1	1	-1	1	0	-0.14
	Partial excavation and removal of cement base to depth >1.5 meters	0	0	0	0	-1	0	0	0	0	0	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	-0.11
	Removal of gravel pads and gravel from access	0	0	0	0	-1	0	0	0	0	0	0	0	-1	-1	1	1	0	1	0	0	0	0	0	0	0	-1	1	0	0.00
	Recontouring of pad and access roads	0	0	0	0	-1	0	0	0	1	0	0	0	-1	-1	1	1	0	1	0	0	0	0	0	0	0	-1	1	0	0.04
	Reclamation of surface soils	0	1	1	0	-1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	-1	1	0	0.50
	Re-seeding/Re-vegetation	0	1	1	1	-1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0	0	0	1	0	-1	-1	0	0.50
Power Lines/ Transformer Station	Removal of above ground poles and lines	0	0	0	0	-1	0	0	0	0	0	0	1	1	1	1	1	0	1	1	-1	0	0	-1	1	1	-1	1	0	0.21
	Removal of transformer station and associated infrastructure	0	0	0	0	-1	0	0	0	0	0	0	1	1	1	1	1	0	1	1	-1	0	0	-1	1	1	-1	1	0	0.21
	Removal of gravel pads	0	0	0	0	-1	0	0	0	0	0	0	1	0	1	1	1	0	1	1	1	0	0	0	1	0	-1	1	0	0.25
	Removal of interconnection lines and infrastructure	0	0	0	0	-1	0	0	0	0	0	0	1	1	1	1	1	0	1	1	-1	0	0	-1	1	1	-1	1	0	0.21
	Removal of access roads	0	0	0	0	-1	1	0	0	1	0	0	1	1	1	1	1	0	1	1	1	0	0	0	1	1	-1	1	0	0.39
	Recontouring of pad and access roads	0	0	0	0	-1	0	0	0	1	0	0	1	1	1	1	1	0	1	1	1	0	0	0	1	0	-1	1	0	0.32
	Reclamation of surface soils	0	1	1	0	-1	0	1	1	1	0	1	1	1	1	1	1	0	1	1	1	0	0	0	1	0	-1	1	0	0.50
	Re-vegetation	0	1	1	1	-1	0	1	1	1	0	1	1	1	1	1	1	0	1	1	1	0	0	0	1	1	-1	1	0	0.57
	AVERAGE	0.00	0.27	0.27	0.13	-1.00	0.20	0.27	0.27	0.47	0.00	0.13	0.80	0.27	0.33	0.80	0.80	0.13	0.93	0.53	0.13	0.00	0.00	-0.33	0.47	0.47	-1.00	0.87	0.00	0.22

Table 28. Environmental Impact Matrix (modified Leopold Matrix)

LEGEND

	Negative Effect	-1
Neutral (No perceived effect)		0
	Positive Effect	1

Project Timeline	**2010 - 2039**	**% of Project Timeline**																													
Construction	2 years	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Operation	25 years	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%
Reclamation	2 years	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
TOTAL	**29 years**																														

Averages																													
Construction	0.00	-0.23	-0.18	-0.14	-1.00	-0.14	-0.36	-0.36	-0.09	0.00	-0.32	-0.32	-0.91	-0.91	-1.00	-0.05	-0.82	-1.00	-1.00	-1.00	0.00	-0.05	-1.00	-0.09	1.00	1.00	0.00	-0.33		-0.33
Operation	0.00	0.01	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	-0.99	-0.98	-0.01	-0.01	-0.01	-0.00	-0.99	0.81	-0.99	-0.98	0.00	-0.00	-0.01	-0.98	0.99	1.00	0.98	0.00		-0.04
Reclamation	0.00	0.27	0.27	0.13	-1.00	0.20	0.27	0.27	0.47	0.00	0.13	0.80	0.27	0.33	0.80	0.80	0.13	0.93	0.53	0.13	0.00	0.00	-0.33	0.47	0.47	-1.00	0.87	0.00		0.22

Weighted Average	**0.00**	**0.01**	**0.01**	**0.00**	**0.71**	**0.00**	**-0.00**	**-0.00**	**0.03**	**0.00**	**-0.86**	**-0.81**	**-0.05**	**-0.04**	**-0.02**	**0.05**	**-0.90**	**0.70**	**#REF!**	**-0.88**	**-0.91**	**0.00**	**-0.01**	**-0.10**	**-0.82**	**0.95**	**0.86**	**0.90**	**-0.02**	**-0.04**

The impact of different *Project component*s on a single *environmental component* has been tracked. In this example, we look at the outcome of all *Project components* on the *environmental component* Soils.

1. In this column, the average effect of the all *Project component*s on Soils, for the construction duration only, is -0.23. This suggests that overall, the construction duration for the wind Project will have a negative effect on Soils. As this value (-0.23) is closer to 0 (neutral) than -1 (negative), the perceived effect is borderline neutral due to reclamation practices and mitigation which can be used, with some overall negative impacts (i.e. loss of soil integrity due to use during construction);

2. Continuing in this column, the average effect of the all *Project component*s on Soils, for the Operations duration only, is 0.0. That suggests, that overall, the operation duration for the wind Project will have a neutral effect on Soils. This is because following construction, areas that are no longer required will be reclaimed. In addition, weed control and re-seeding of disturbed sites will have a positive impact on Soils;

3. In the Soils column, the average effect of the all *Project component* for the Decommissioning duration only, is 0.27. That suggests, that overall, the reclamation duration for the wind Project will have a positive effect on Soils. This is because following operations, areas that are no longer required will be reclaimed and put back into forestry production;

4. At the bottom of Table 28, the reader should note that the averages for each Project stage (i.e. Construction, Operations, Reclamation) are summarized for each *environmental component* (columns);

5. Finally a weighted average has been determined for the overall Project, for each *environmental component*. The Weighted Average is necessary as different life cycle stages account for different percentages of the total Project timeline. Continuing with the previous example, the average impact of Construction on Soils is -0.23; the average impact of Operation on Soils is 0.0; and the average impact of Decommissioning on Soils is 0.27. However, both the Construction and Decommissioning stages each account for 7% of the total Project timeline (14% of the total Project timeline). Whereas the Operation stage accounts for 86% of the total Project timeline. As such, impacts associated with the Operation stage, are weighted accordingly as these impacts will be experienced for 86% of the total Project timeframe.

6. The resulting average impact of the overall Project on Soils is therefore calculated as 0.01. As such, the effect of the Project is considered neutral.

7. For Operation stages, a Weighted Average within the category is also necessary. This is due to the fact that the production of the wind energy by spinning turbine blades will likely account for 98% of operational activities on the site. The remaining components listed under Operational will account for 2% of the total time frame. As such, impacts associated with the production of electricity by spinning turbines are weighted accordingly as these impacts will be experienced for 98% of the total Project timeframe.

e. Discussion of Effects

i. Construction Phase

The results of the effects input into Table 28 indicate that throughout the Construction phase, impacts from the *Project components* on *environmental components* are negative; as one might expect. This is due to the extent of equipment, materials, labor, and construction requirements affecting most of the environmental components listed. The average impact across all *environmental components* is estimated at -0.33, suggesting an overall negative impact, with a slight skewness towards neutral.

The greatest negative impact on the Physical Environment will be associated with Air Quality due to the amount of emissions associated with construction from machinery, particulates and dust from roads and soils displacement during construction.

The greatest impacts on the Biological Environment will be on wildlife (as a result of displacement due to activity), establishment of barriers to movement for all wildlife, and corridor creation for wildlife. Neutral impacts will be associated with loss of vegetation as much of the impacts associated with vegetation loss will be mitigated.

The greatest impacts on the Social/Cultural Environment will be associated with effects to Residents, Noise, and Recreation of the area. All of these components will be negatively affected as a result of increased activity. For example, it is not anticipated that Safety or Health concerns will result directly from construction, however the increase in activity may increase the probability of an accident over what currently exists in the Project area. Economic effects are considered positive due to revenues and wages to local contractors, and effects to Historical resources are considered neutral as none were present or expected.

ii. Operations Phase

The results of the perceived effects input into Table 28 indicate that throughout the Operations phase, the overall impacts from the *Project components* on *environmental components* are considered neutral, with a slight skew negative (-0.08).

With that in mind, weighted averages suggest that the greatest impacts on the Physical

Environmental will be associated with Air Quality but will be positive. This is due to the lack of emissions associated with Project during operation, and the offset of equivalent emissions that would have occurred in the absence of the Project. This positive effect is more regional in nature.

The greatest negative impacts on the Biological Environment will be associated with Birds and Bats due to expected mortalities. Furthermore, spinning turbines will create barriers to movement to only Birds and Bats, and likely create corridors to movement for Birds and Bats. Limited negative effects to Small Mammals may occur as a result of road creation creating barriers to movement Neutral impacts will be associated with loss of vegetation as much of the impacts associated with vegetation loss will already be experienced during construction, and interim reclamation will re-establish disturbed areas. Neutral effects to other wildlife species are expected.

The greatest impacts on the Social/Cultural Environment will be associated with effects to Residents, Noise, Recreation, and Scenic Qualities of the area. All of these components will be negatively affected as a result of turbine operations. Economic effects are considered positive due to operational revenues associated with power sales, taxes, or other financial agreements to local Landowners, the Community at Large, and Municipalities.

iii. Decommissioning Phase

The results of the perceived effects input into Table 28 indicate that throughout the Decommissioning phase, impacts from the *Project components* on *environmental components* are positive; as one might expect. This is due to the fact that the re-establishment of ecosystem components will result from the reclamation process, affecting most of the environmental components listed. The average impact across all *environmental components* is estimated at 0.23, suggesting an overall positive impact, with a slight skewness towards neutral.

The greatest negative impacts on the Physical Environment will be associated with Air Quality due to the amount of emissions associated with construction from machinery, particulates and dust from roads and soils displacement during reclamation. In contrast, the greatest positive impacts will be associated with the restoration of the lands within the Project boundaries.

All impacts on the Biological Environment are expected to be positive as the removal of equipment and reclamation of the ecological components will result.

The greatest impacts on the Social/Cultural Environment will be associated with negative effects to Recreation, Scenic Qualities, Economics for Landowners, Economics for Community at Large, and Economics for Municipalities. All of these components will be negatively affected as a result of increased activity. For example, economic effects are considered negative due to loss of operational revenues associated with power sales, taxes, or other financial agreements.

iv. Overall Effects

The bottom of Table 28 summarizes the Weighted Averages of all *Project components* on individual *Environmental components.*

Within the Physical Environment, the greatest overall effect is associated with changes in Air Quality (+0.71). This is due to weighting of the regional effects of the reduction in Greenhouse Gas Emissions (GHG) from the Project when one considers if the production of the same amount of power over 25 years resulted from standard practices of Coal burning in the region. Over the timeframe of the Project, other effects are considered neutral.

Within the Biological Environment, the greatest overall effects are associated with negative impacts to Birds (-0.86) and Bats (-0.81). The Project is also expected to result in Barriers to Movement (-0.90) and Corridor Creation (-086). This is also due to weighting of the Operations Phase in the calculation of these averages. All other impacts effects are considered neutral.

Within the Social/Cultural Environment, the greatest overall effects are associated with negative impacts to Residential (-0.88), Noise (-0.90), Recreation (-0.95) and Scenic Qualities (-0.82). In contrast, significant positive impacts are associated with economic effects to local Landowners (+0.92), the Community at Large (0.86), and Municipalities (+0.84).

The overall Project effects are a weighted average of the effects of the Project on all components during Construction, Operation, and Reclamation. Overall impacts during Construction are -0.33, during Operation are -0.15, and during Decommissioning are +0.23. Due to weighting of the means, the overall Project effect is -0.13, negative, but almost neutral.

Table 29. Summary of Environmental Effects with Negative Outcomes

Project Activities	Environmental Components	Impacts	Mitigation	Residual Effects	Level of Residual Impacts
Construction	**Soil**	Removal of soils	Effective soil stripping and replacement in non essential areas	None	Low
	Air Quality	Increase in emissions at local level due to increased traffic Increase in Dust	Dust control implemented	None	Low due to lack of residents in area
	Vegetation	Removal of vegetation	None	None	High
	Birds	Removal of Habitat	Avoidance of critical habitat identified in EA; Clearing of vegetation outside nesting seasons	Habitat loss	High
	Bats	Removal of Habitat	Avoidance of critical habitat	Habitat loss	High
	Ungulates	Removal of Habitat	Avoidance of critical habitat Avoidance of clearing during reproductive periods	Habitat loss	High
	Carnivores	Removal of Habitat	Avoidance of critical habitat	Habitat loss	High
	Movement of Species	Removal of Habitat Increase in noise causing spp to avoid area	Avoidance of critical habitat	Habitat loss	High
	Residents	Increase in noise and disturbance due to increases in construction traffic	Avoid primary access near residents; Dust control; Maintain open communications and dialogue with effected residents;	None	Low
	Noise	Increase in noise and disturbance due to increases in construction traffic	Operations during normal working hours;	None	Low
	Recreation	Loss of recreation use of the area (i.e. hunting; ATV)	Consultation with public and local recreation groups;	None	Low

Project Activities	Environmental Components	Impacts	Mitigation	Residual Effects	Level of Residual Impacts
Operations	**Birds**	Bird strikes	Monitor and complete carcass searches. If large number of species or individuals being struck, mitigate in consultation with Canadian Wildlife Service. Mitigation may involve shut down periods, higher wind speed startup.	Complete monitoring and mitigation as required	Environmental assessment suggest impacts expected to be Low.
	Bats	Bat strikes	Monitor and complete carcass searches. If large number of species or individuals being struck, mitigate in consultation with Canadian Wildlife Service. Mitigation may involve shut down periods, higher wind speed startup.	Complete monitoring and mitigation as required	Environmental assessment suggest impacts expected to be Low.
	Residents	Noise Shadow flicker	Setbacks as per federal and provincial requirements maintained.	None	Low
	Noise	See Residents	See Residents	See Residents	See Residents
	Recreation (i.e. Hunting)	Loss of hunting habitat around turbines	Loss of hunting areas mitigated by fact new access will open previously inaccessible areas.	Ongoing	Low
	Scenic Qualities	Visual impacts to landscape	None available	Ongoing	Low – Moderate depending upon specific observer.
Decommissioning	**Air Quality**	Increase in emissions at local level due to increased traffic Increase in Dust	Dust control implemented	None	Low due to lack of residents in area
	Health & Safety of Residents	Increase in traffic at local level due to equipment requirements for decommissioning	All municipal, provincial, and federal transport regulations followed.	None	Low due to lack of residents in area

6. Consultation Summary

A. Public Consultation

Sprott believes that open, honest and transparent relationships are essential to their success. Sprott also believes that communities have a right to know about its activities in those communities. To this end Sprott attempts to structure its community involvement program to:

- Ensure all stakeholders have the opportunity to learn about operations, and projects, and are able to provide input;
- Create a positive relationship with stakeholders through community involvement and community investment;
- Work within the Project timeline;
- Resolve issues in a timely, friendly manner; and
- Do the right thing and be seen doing the right thing.

Community involvement activities associated with the Project to date include:

- Newsletters were sent to landowners and members of the community on November 12, 2009; March 15, 2010; and July 31, 2010 (Appendix VI*);*

- Representatives from Sprott provided a newsletter update to Landowners on November 12, 2009 to provide all preliminary information on the Project and to afford the landowners an opportunity to provide feedback on the Project;

- On February 9, 2010, Jeff Jenner, President of Sprott, presented by way of Power Point™ titled "Wind Energy in Annapolis County" to the Annapolis County Council and to Landowners. (Appendix VI*)* The purpose was to summarize wind development in Nova Scotia, discuss potential economic outcomes to the County, provide an update on the Project, and to provide comments on the Annapolis Wind Energy Bylaw;

- On February 22, 2010, Jeff Jenner, President of Sprott, presented by way of Power Point™ titled "Wind Energy Development Near Bridgetown" to the Annapolis County Council and the Bridgetown Town Council. (Appendix VI*)* The purpose was to summarize wind development in Nova Scotia, discuss potential economic outcomes to the County, provide an update on the Project, and to provide comments on the Annapolis Wind Energy Bylaw. In addition, information on the visual zone of influence of the

Project, and three visual representations of how the Project would look from various vantage points were presented;

- On March 22, 2010, Jeff Jenner, President of Sprott, presented by way of Power Point™ titled "Wind Energy Development Near Bridgetwon" to the community of Bridgetown. (Appendix VI*)* The purpose was to summarize wind development in Nova Scotia, discuss potential economic outcomes to the County, provide an update on the Project, and to provide comments on the Annapolis Wind Energy Bylaw. Alternatives to the Wind Energy Bylaw were also discussed. In addition, information on the visual zone of influence of the Project, and three visual representations of how the Project might look from various vantage points were presented;

- A Landowner Open House was held in Bridgetown, at the Bridgetown Curling Club on September 14, 2010. This provided landowners an opportunity to view the poster boards to be used a subsequent Public Open House, collect handouts, and discuss with Sprott representatives the status of the Project. All attendees were provided the opportunity to ask questions, in the public setting, or privately if they wished. Nineteen (19) landowners were in attendance;

- On September 14, 2010, Jeff Jenner, President of Sprott, presented by way of Power Point™ titled "Hampton Mountain Wind Power Project Update, The Annapolis County Commission" to the aforementioned Council. Also in attendance were Sprott representatives Don Bartlett, COO; Robert McCallum, Environmental Consultant; and Michael Parker, Environmental Consultant. During that presentation, Mr. Jenner introduced the Project members, provided an update on environmental assessment activities completed to date; an update on activities still pending; and a Project timeline, including milestone dates. Following the presentation, Mr. Jenner, and other Sprott representatives fielded questions from council members. At the submission date of this assessment, meeting minutes had yet to be posted on the Council website;

- On September 15, 2010, Jeff Jenner, President of Sprott, presented by way of Power Point™ titled "Hampton Mountain Wind Power Project Update, The Bridgetown Town Council" to the aforementioned Council. Also in attendance was Sprott representatives Don Bartlett, COO. During that presentation, Mr. Jenner introduced the Project members, provided an update on environmental assessment activities completed to date; an update on activities still pending; and a Project timeline, including milestone dates. Following the presentation, the Sprott representatives fielded questions from council members.

- A public Open House was held in Bridgetown, at the Lions Hall (Photo 12) on September 15, 2010. This provided landowners, residents and other interested parties an opportunity

to view and discuss with Sprott representatives (5 in attendance) information on the Project and wind power in general. The Open House was advertised in the *Annapolis County Spectator* for the two issues prior to the Open House (September 2, and 9th, 2010 editions). In addition, an ad was placed in the *Bridgetown Reader* during the week prior to the Open House. (Appendix VI) Finally, public ad notices were placed at various locations throughtout Bridgetown and Hampton, 2 weeks prior to the Open House;

- At least 54 people attended the Open House (as indicated by signatures on the sign in sheet provided at the front door) (Photo 13);
- Attendees were encouraged to fill out comment cards. Only 7 comment cards were received. 6 encouraged the Project, and 1 was against the Project.

Photo 12. Public Open House venue used on September 15, 2010.

Photo 13. Attendance at Open House.

B. Mi'kmaq Consultation & Traditional Use

The following summarizes consultation which has been completed and the outcomes based upon issues identified during consultation(s).

1. McCallum Environmental Ltd. searched a listing of First Nation reserves in proximity to the Project. The closest First Nation is the Bear River First Nation Band, located approximately 43 km south west of the Project. On May 10th, 2010, McCallum Environmental Ltd. contacted the First Nation and left a message with the Band administrator, indicating the nature of the Project, approximate location, and reason for call. A subsequent phone call wall placed May 14th to the First Nation. At that time, the administrator stated the Chief prefers that consultation take place with the Mi'kmaq Environmental Assessment Technical Committee;
2. On May 19, 2010, Jeff Jenner, President of Sprott, and Robert McCallum met with the members of the Mi'kmaq Environmental Assessment Technical Committee, at its offices in Halifax, Nova Scotia. At that meeting, Mr. Jenner verbally provided a Project description to the committee, and discussed Project details, and Sprott Power Corp. more generally. Robert McCallum discussed the activities conducted on the Project to that time (i.e. environmental assessment work in progress, consultation completed to date, etc.). The Committee suggested that Sprott contact the Confederacy of Mainland Mi'kmaq Environmental Services to discuss the completion of a Traditional Environmental Knowledge (TEK) study;
3. On June 1, 2010, Robert McCallum forwarded, via email, digital geographic Project information to Melissa Nevin, *Consultation Researcher,* Kwilmu'kw Maw-Klusuaqn Negotiation Office Mi'kmaq Rights Initiative, (851 Willow Street, Truro, Nova Scotia, B2N 6N8). Due to technical issues with the data, final GIS data was subsequently provided to Ms. Nevin on June 8, 2010 for review;
4. On July 8, 2010, Robert McCallum discussed consultation requirements with Helen MacPhail at the Nova Scotia Environment (NSE). At that time Ms MacPhail referred Mr. McCallum to the consultation guidelines. She stated that NSE will refer the Project to Aboriginal Affairs during the consultation process and that further requirements should be discussed with Jay Hartling, Senior Strategist, Provincial Consultation, Office of Aboriginal Affairs;
5. On July 13, Robert McCallum discussed consultation requirements with Ms. Hartling. Robert McCallum indicated that the Project is located entirely within private land, and that no impacts resulting from the Project would be expected to impact First Nation rights outside of the Project boundaries. Ms. Hartling agreed that in that case consultation with the Mi'kmaq was not required;
6. On August 3, 2010, Ms. Nevin responded by email that their "office has requested formal consultation as per the Mi'kmaq-Nova Scotia-Canada Consultation Terms of Reference, and we will be forwarding our concerns on this Project to the Province in the near future.";
7. As a result of the email mentioned in #6 (above), Mr. McCallum contacted Ms. Hartling at the Office of Aboriginal Affairs. Ms. Hartling indicated that the Department of

Environment will look at feedback received during the consultation process and decide if a response is necessary but that position of the Aboriginal Affairs on this Project was that no consultation was required;

8. On August 24, 2010, Mr. McCallum contacted Helen MacPhail at the Nova Scotia Department of Environment (NSDOE). Ms. MacPhail stated they had received a letter from the Mi'kmaq regarding consultation, and that the letter stated general concerns with duties of consultation and was not related specifically to the Hampton Mountain Project. She stated that DOE would not require consultation or a completed Traditional Use Study, but would defer to the Department of Aboriginal Affairs for their opinion on the matter.

Based upon the above noted consultation with the Mi'kmaq, the NSDOE, and the Office of Aboriginal Affairs, no further consultation was warranted or subsequently completed. As the Project is situated on private land, and impacts resulting from the Project will not result in adverse effects to Mi'kmaq rights on lands outside the Project, no Traditional Use Study of the Project lands was completed.

C. Maritime Aboriginal Peoples Council

On June 14, 2010, Robert McCallum, acting on behalf of the Hampton Mountain Project, met with Roger Hunka, Director of Intergovernmental Affairs, and Joshua McNeely, Ikanawtiket Environmental, at the Maritime Aboriginal Peoples Council (MAPC) offices in Truro, Nova Scotia.

That meeting has been summarized by Robert McCallum as follows:

- Mr. Hunka and Mr. McNeely explained the purpose and function of the Council;
- They provided historical and background information on the Aboriginal peoples of Eastern Canada and a map of the traditional lands was reviewed;
- Mr. Hunka explained some of the beliefs and positions of the members that the Council represents;
- Mr. Hunka spoke about energy development Projects, generally, and about some of the current government policies, as they relate to Aboriginal peoples, and energy developments in Canada;
- Mr. Hunka discussed Species at Risk, Biodiversity, and other environmental policies in Canada and some of the positions on those policies;
- Mr. Hunka discussed how the Aboriginal persons they represent tend to use the lands in the area of the Project (i.e. for hunting);

- Robert McCallum provided a brief summary of his past work experience in oil and gas, wind energy, and with First Nations in Alberta, B.C., and Saskatchewan;
- Mr. Hunka provided numerous and extensive reading and reference materials. The title of materials as follows:
    - *Community Harvest Guidelines, 2008, 2009;*
    - *Aboriginal Community Species at Risk Reference Library* – on CD;
    - *Species at Risk – leave no footprint;*
    - Copies of the Quarterly Newsletters they provide;
    - *Winter Skate – SARA Update;*
    - *Taliaq – "Species at Risk in Nova Scotia Community Education Guide";* 2006;
    - Background information on IKANAWTIKET Environmental;
    - *Maritime Aboriginal Peoples Council – The Maritime Region Aboriginal Leaders Intergovernmental Council of Aboriginal Affairs Peoples Continuing to Reside on Traditional Homelands (*2009);
    - *KOQAJA'TAQATINEN – Commision on Indian Act Grievances and Petitions* (2001), Volume 1 – Report; Volume 2 – Verbatim Testimony;
    - *MI'KMAQ Fisheries – Towards a Better Understanding;*
    - *The Mi'kmaq Treaty Handbook;*
    - *Native Council of Nova Scotia – Community Information Guide;*
    - Numerous Conservation/Harvest Effort Recording Booklets and species tags (for information purposes only);
- Following the above noted points, Robert McCallum discussed the Project specifically and provided a map of the new Project lands;
- Robert McCallum, Mr. Hunka, and Mr. McNeely discussed some of the environmental studies that have begun and some of the other consultations that are occurring;
- Robert McCallum, Mr. Hunka, and Mr. McNeely discussed how the Project could potentially support their work at the Council through education of it's constituents (for lack of a better term);
- Robert McCallum, Mr. Hunka, and Mr. McNeely discussed how the Project could provide potential employment opportunities;
- MAPC requested that the Project review lighting requirements and check for innovations (i.e. from Europe) to reduce impacts to birds and bats;
- McCallum Environmental Ltd. provided the following:
    1. A summary of timelines of the Project for inclusion in their quarterly newsletter provided to the people MAPC represents;

2. A map of the lands for inclusion in the MAPC quarterly newsletter. The intent is to provide information to those hunting/fishing or using the lands in general in the area.

- Mr. Hunka stated the MAPC would like a financial commitment from the Project to support their work at the Council through education of it's constituents. Mr. Hunka specifically requested a donation of $0.50/MWH/day (i.e. at 2.3 MW = $1.15/day/turbine) to IKANAWTIKET Environmental. IKANAWTIKET is a non-profit registered organization;
- To date no further discussions have occurred.

7. Cumulative Effects

Although not required by Nova Scotia Environment, the assessment of the cumulative effects associated with the addition of the Project to the existing development in the area will be addressed in this section. The reason is that it is anticipated that a second Phase of the Project (~15 MW) will be developed in the future. As such, the effects of that second Phase need to be considered.

GIS analysis was used to quantify the cumulative effects of each Project activity on the selected Valued Ecosystem Components (VECs).

The Cumulative Effects Assessment (CEA) will follow the framework prepared for the Canadian Environmental Assessment Agency and outlined in the *Cumulative Effects Assessment Practitioners Guide*, and will address scoping of the Project, analysis of its effects, identification of mitigations, evaluation of its significance and plans for follow-up.

A. Scoping

Scoping included identification of regional issues of concern, Valued Ecosystem Components, the potential impacts and effects associated with the program, and the spatial and temporal boundaries for the assessment. Table 32 outlines the issues identified during assessment of cumulative effects, the VECs and the potential impacts the program may have over the defined area and time period.

B. Analysis of Effects

Two methods were be used in the analysis of cumulative effects. Spatial analysis, using a

Geographic Information System (GIS) was used to assess the cumulative effects of the activities associated with the program on each VEC. Specific information on the cumulative effects on species at risk, vegetation and wildlife was collected in the field in spring and summer of 2010 to provide additional information to the baseline. The data is to be used for monitoring species of conservation concern and other indicators of change in VECs.

Spatial analysis involved initial classification of land cover and habitat suitability. The areas impacted by existing disturbances and the proposed program were layered over land cover. These existing and proposed disturbances were quantified by the relative area impacted within the regional area. Land cover classes were used to identify habitat suitability for VEC by separating the regional area into 4 land cover types. The impacts of the proposed program on selected VECs including species at risk, vegetation and wildlife, were then analyzed relative to the proportion of suitable habitat affected by the Project

C. Spatial Boundaries

Spatial boundaries were defined as the area where all potential impacts associated with the proposed development could potentially be observed. Physical disturbances and stimuli caused by all phases of development were considered, some which may extend for distances into adjacent habitat.

Ultimately the spatial boundaries of the Cumulative Effects Assessment include the boundaries of the Project lands. GIS analysis indicates that the total Project area encompasses approximately1837 hectares. Within this Project area the existing disturbances are present:

Table 30. Calculations of Existing and Project Disturbance (hectares)

Total Area Available within Project Area	1837
Agricultural Disturbance	184
Clearcuts	12
Homesteads	12
Existing Roads	9
Project Access Roads	14.8
Project Turbines	12
Quarries	1.2
Substation	0.9
Natural Conditions Remaining	1271
% Natural Conditions Remaining	84%

For the purpose of analysis, the areas directly affected by proposed disturbances were defined as the disturbed portion of the turbine foundations, crane pads, the access roads, distribution lines (if they were outside the boundary of the access road), substation, and temporary disturbances such as staging areas, laydown yards, or quarries.

Existing disturbance (which is existing agricultural, roads, transmission towers, fire tower, homesteads) accounts for 184 hectares (10%) of the total disturbance within the Project area.

Residential disturbance includes the presence of a home/dwelling, driveway, and area around the home/dwelling. Residential development is rural in nature and no concentrated residential developments are present within the Project area. As such residential impacts only account for 12 hectares (1%) of the total land base.

As the Project area is treed, the dominant land use is forestry. Active logging which shows distinct boundaries, within the Project accounts for 12 hectares (1%) of the land use.

Existing forestry roads are present throughout the Project lands. These are usually limited to 3 metre width and are randomly dispersed throughout. In addition, a local ATV/Snowmobile club has a series of roads and trails throughout the area. Roads and trails only account for 9 hectares (0.5%) of existing disturbance.

When all the above noted impacts are calculated, only natural areas remain. These included tracts of forests, wetlands, or stands of trees or other vegetation within the Project. These areas account for 80% of the land base. These forested natural areas are continuous, and provide suitable habitat, travelling corridors, thermal and security cover for wildlife, and are representative of forest systems throughout the Project area.

D. Temporal boundaries

The operational lifespan of the Project has been estimated at 29 years. Cumulative effects caused by the program must therefore consider not only the current conditions and immediate effects of the proposed program, but must also include those associated with the ongoing operations and maintenance of the wells over their lifespan until final decommissioning and reclamation, and recovery of VECs to pre-disturbance conditions.

E. Other Actions

Identification of other actions, which may interact with the selected VECs, involved the consideration of past and future actions within both the defined regional boundaries and the surrounding landscape. Past actions are those which are no longer active yet continue to influence VECs (Hegmann et al. 1999). Past actions within the regional Project area and surrounding landscape, which may still affect the selected VECs include:

1. Agricultural activities including seeding to tame pasture, haying and fire suppression;

2. Recreational operations within the Project boundaries;
3. Forestry operations within the Project boundaries;

While these may produce minor effects both past and present add to the habitat fragmentation and effects on VECs.

Future activities include those which are planned or may be expected as an inevitable result of the success of the proposed Project.

Currently the following Projects are known to be in the planning stages:

1. Logging operations by landowners. The extent of these operations is unknown.

Projects that may be reasonably expected in the future may include:

2. Expansion of the Hampton Mountain Wind Power Project. The current Project may be expanded by an additional 15 MW. At present this Phase II component is to be located east of the Phase I component (which is being discussed in this document), and likely on the east side of Ramsey Lake. Only the land base for the Phase II component has been determined at this time. Currently there is no layout or estimation of total yield. Therefore, for the purposes of this assessment, the estimated area of disturbance is:

Table 31. Estimate of Hampton Mountain Wind Power Project – Phase II Disturbance

Phase I disturbance (hectares)	28.9
Total MW	25.2
Disturbance/MW (Hectares)	1.15
Possible Phase II MW	15
Total Disturbance Estimate for Phase II (Hectares) = Disturbance/MW x Phase II MW	17.25

3. Creation of other wind power Projects by other unknown proponents;
4. Further logging activities resulting in habitat fragmentation;

F. Evaluation of Significance

For determination of the significance of the cumulative effects of the program on each VEC, it is

necessary for thresholds to be defined or suggested based on professional knowledge.

For the purpose of this assessment the levels of significance of the cumulative effects of the program on VECs were classified as insignificant, low, moderate, highly significant but positive, and Significant. The determining of significance levels of the cumulative effects of the program on each VEC took into account numerous factors, but 3 key factors were used for the following discussion and validation, including:

(1) The effectiveness of mitigation;
(2) The contribution of the program across the regional area; and,
(3) The magnitude of change due to the program relative to existing conditions.

An impact matrix (a qualitative environmental impact assessment method) has been used to identify the potential cumulative impacts of Projects identified in *Section E* (above).

Within the following matrix (Table 32**)** each interaction between a *Project* and e*nvironmental component* has been given one of three values:

- -1: Negative Effect: If this value is presented in a cell, it indicates that as a result of the Project component a negative effect will occur on the environmental component;
- 0: Neutral: If this value is presented in a cell, it indicates that the effect of the Project component on the environmental component will be neutral; and,
- +1: Positive Effect: If this value is presented in a cell, it indicates that as a result of the Project component a positive effect will occur on the environmental component.

The table below is slightly different from the *Interaction Matrix* provided in the first section of this report. The values in the column under the heading Phase I in Table 32 are taken directly from that Interaction Matrix and are the "weighted average" values found at the bottom of page 2 within that table. For purposes of this cumulative effects analysis, those values were rounded up or down. The Forestry Operations values are qualitative estimates based upon the experience of the assessor. Finally, the values found in the column Cumulative Impact are the median of the values in the preceding 4 columns. The reason a Median value was used is because the Median is the middle of the distribution: half the scores are above the median and half are below the median. The median is less sensitive to extreme scores. In addition, if one uses the mean, any values of 0 (zero) don't count to the mean and the final data is therefore skewed positively or negatively, but never neutrally (unless all values are 0).

Table 32. Significance of Cumulative Effects on Environmental Components.

		Project Type			Cumulative Impact	Significance of Cumulative Projects on VEC
		Phase I	Forestry Operations	Phase II		
Environmental Component	Agricultural Land	0	0	0	0.00	Insignificant
	Soil Erosion	0	0	0	0.00	Insignificant
	Surface Water Quality	0	-1	0	0.00	Insignificant
	Ground Water Quality	0	0	0	0.00	Insignificant
	Air Quality	0	0	0	0.00	High but positive
	Wetlands	0	-1	0	0.00	Insignificant
	Trees	-1	-1	-1	-1.00	Insignificant
	Shrubs	-1	-1	-1	-1.00	Insignificant
	Aquatic Vegetation	0	0	0	0.00	Insignificant
	Species at Risk - Vegetation	0	0	0	0.00	Insignificant
	Birds	-1	-1	-1	-1.00	Moderate
	Bats	-1	-1	-1	-1.00	Moderate
	Ungulates	0	0	0	0.00	Insignificant
	Carnivores	0	0	0	0.00	Insignificant
	Small Mammals	0	0	0	0.00	Moderate
	Reptiles/Amphibians	0	0	0	0.00	Insignificant
	Species at Risk - Wildlife	0	0	0	0.00	Moderate
	Barriers to Movement	-1	-1	-1	-1.00	Significant
	Corridor Creation	-1	-1	-1	-1.00	Significant
	Residential	-1	-1	-1	-1.00	Significant
	Noise	-1	-1	-1	-1.00	Significant
	Historical Resources	0	0	0	0.00	Insignificant
	Paleontological Resources	0	0	0	0.00	Insignificant
	Health & Safety (Public)	0	0	0	0.00	Insignificant
	Recreation (i.e. hunting)	0	0	0	0.00	Moderate
	Scenic Qualities	-1	-1	-1	-1.00	Significant
	Economics for Individual Landowners	1	1	1	1.00	High but positive
	Economics for community at large	1	1	1	1.00	High but positive
	Economics for Municipalities	1	1	1	1.00	High but positive

G. Discussion of Significance of Cumulative Effects

A. Insignificant Effects

Of the 29 identified valued components in Table 32, fifteen (15) will experience insignificant cumulative effects. These components will of course experience some effect within different life cycle stages, however standard industry mitigation is deemed appropriate to offset long term cumulative effects. Or in specific cases (i.e. Soils), effects are too site specific and isolated geographically to act cumulatively.

B. Moderate Effects

Of the 29 identified valued components in Table 32, five (5) will experience moderate cumulative effects. These can be either neutral or negative. VECs which will experience moderate negative cumulative affects include vegetation, birds, bats, small mammals, species at risk (specifically birds). VECs to experience moderate/neutral effects would be hunting. For example, during construction, hunting activities will be restricted. But following construction, hunting may continue but the success/failure may be dependent upon the return of prey species.

In these cases, impacts will occur, however the extent is expected to be limited and not adverse, and the magnitude of effects would be considered moderate.

C. Negative Effects

Of the 29 identified valued components in Table 32, four (4) will experience significant negative cumulative effects. The creation of corridor effects is expected on migratory species such as birds. Roads may result in corridor creation and barriers to movement for small mammals only. Those effects would be isolated geographically due to the limited movement of small mammals and cumulative effects would be expected within isolated populations. Any thresholds which are exceeded will likely be determined by monitoring of the existing Project for birds and bats, in conjunction with data collected during environmental assessment work completed for the Phase II lands.

Negative effects will occur to the visual landscape, to nearby residents and to ambient noise levels. Currently, no data is available which indicates how wind power Project visual thresholds are defined or exceeded. Therefore it is assumed that these values are determined by residents. The disclosure of this Project and others during public consultation meetings should allow residents to make informed decisions on the final magnitude of impact.

D. Positive Effects

Of the 29 identified valued components in Table 32, four (4) will experience significant positive cumulative effects. The first is air quality. Although there are short term impacts to air quality during construction components, the life cycle reduction in emissions at the regional and provincial levels due to decreased reliance on power production from coal are deemed to be positive.

The remaining three (3) are economic in nature. The first economic repercussions include use of the local community for construction of the Project and the direct economic influx to those members directly.

The economic impacts of a development are almost never contained within the boundaries of a single municipality. If even one employee lives outside the municipality, some of the economic benefits and/or costs leak beyond the municipal boundaries and not all the benefits of a development will be contained within one municipality. There are several measures of economic impacts:

(1) Employment levels (jobs)
(2) value added (or gross regional product)
(3) aggregate wages and salaries
(4) wealth (including property values)
(5) business output (sales volume or spending).

Each of these measures reflects a particular dimension of improvement in the economic well-being of area residents, which is usually the major goal of economic development efforts.

There are also very different types of impacts that occur over time. In the initial construction phase, labour and materials will be used. After completion, ongoing employment and other long-term impacts will be felt.

Value Added components may include the sum of wage income and corporate profit generated in the area. It will also include dividends to landowners with turbines on their property. Thus, while value added is the most appropriate measure of impact on overall economic activity in a geographic area. Another measure of wealth in a community is property value. This is because when property values rise in a community as a result of increased economic activity, the rise may be a direct consequence of increased aggregate personal income or investment of business profits. Typically, the effects of the expenditures fall into three categories: direct, indirect, and induced impacts. Direct effects are the immediate payments to primary firms such as consultants, contractors, and the labor employed to develop and build the Project. The indirect effects result from firms linked to the primary firms to complete their contract, which would accrue to firms such as fuel suppliers, equipment rental companies, accountants, and lending banks. The final

category, induced effects, encompasses the dollars spent by the firms and employees involved in the Project as a result of the increased income. Examples are every day purchases from increased income such as groceries or an additional employee hired. Aggregated together, this ripple through the economy is known as the multiplier effect. The size of the effect varies depending on the size and diversity of the economy.

It is also important to note that economic impacts also lead to financial impacts, which are changes in government revenues and expenditures. Economic impacts on total business sales, wealth or personal income can affect municipal revenues by expanding or contracting the tax base. Impacts on employment and associated population levels can affect municipal expenditures by changing demand for public services.

8. Conclusions

The data presented within this assessment indicates there are no significant environmental concerns associated with the Hampton Mountain Wind Power Project and no significant impacts, that cannot be mitigated, are expected.

Standard construction mitigation methods will be implemented during all phases of the building of the Project to ensure there are no significant impacts of the Project on Valued Ecosystem Components (VEC). These methods were included in the development of the Environmental Protection Plan (EPP) which is included as part of this assessment.

There are no areas of cultural significance identified during assessments of historical resources. As well there are no adverse effects anticipated in regards to environmental changes on health and socio-economic conditions, physical and cultural heritage areas, traditional land use, and traditional structures or sites.

The magnitude of disturbance and risk associated with the Project are all considered minor given the abundance of similar VEC within the Project area and the mitigation techniques and technologies currently available.

The data presented within this assessment indicates there are no significant environmental concerns and no significant impacts expected that cannot be effectively mitigated through well established and acceptable industry practices.

9. Glossary

Balance of Plant (BOP): the infrastructure of a wind farm Project, in other words all elements of the wind farm, excluding the turbines. Includes civil works, SCADA and internal electrical system. It may also include elements of the grid connection.

System Interconnection Study (SIS): A study that evaluates the impact of new generation to the interconnected transmission system, to confirm that it will have no negative reliability impact.

Wake Loss: Wind turbines extract energy from the wind and downstream there is a wake from the wind turbine, where wind speed is reduced. As the flow proceeds downstream, there is a spreading of the wake and the wake recovers towards free stream conditions. The wake effect is the aggregated influence on the energy production of the wind farm, which results from the changes in wind speed caused by the impact of the turbines on each other.

10. References

Agent Consortium. 2001. *Constraints Analysis.* Department of Geography, University of Zurich. Project No. ESPRIT / LTR /24 939

Andren, H. 1994. Effects of habitat fragmentation on birds and mammals in landscapes with different proportions of suitable habitat: a review. Oikos 71:355-366

Bentz, J.A., A. Saxena and D. O'Leary. 1994. *Biophysical Inventory of Shoreland Area Hay – Zama Lakes, Alberta.* Geowest Environmental Consultants Ltd.

Buckmaster, Glenn, Todd, Melissa, Smith, Kirby, Bonar, Beck, Barbara, Beck, James, and Richard Quinlan. October 1999. *Elk Winter Foraging Habitat Suitability Index Model, Version 5.*

Burton, I, Dr. John E. Cantlon, Peter L. Cook, Rob Coppock, Dr. Norbert Dee, Prof. J. E. Dooley, Prof. Frank Fenner, Dr. François N. Frenkie, Prof. R. E. Munn, Prof. Yasuo Shimazu, and Dr. Peter Wathern. 1977. *Scope 5 – Environmental Impact Assessment.* SCOPE Working Group Participants, Toronto, October 1977. http://www.icsuscope.org/downloadpubs/scope5/contents.html

COSEWIC. 2008. COSEWIC assessment and status report on the Canada Warbler *Wilsonia Canadensis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 35 pp.

COSEWIC. 2007. COSEWIC assessment and update status report on the Peregrine Falcon Falco

peregrinus (*pealei subspecies – Falco peregrinus and pealei anatum/tundrius – Falcon peregrinus anatum/tundrius*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii +45 pp.

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

Davis MacIntyre & Associates Limited. (October 2010). Hampton Moutain Wind Power Project: Archaeological Resource Impact Assessment.

Environment Canada/Canadian Wildlife Service. 2006. *Wind Turbines and Birds. A Guidance Document for Environmental Assessment.*

Food and Agriculture Organization of the United Nations (FAO), 1996. *Environmental impact assessment and environmental auditing in the pulp and paper industry Environmental impact assessment and environmental auditing in the pulp and paper industry*. FAO Forestry Paper - 129. ISBN: 103794. 100 pp. http://www.fao.org/DOCREP/005/V9933E/V9933E00.HTM

LeBlanc, J. 2010. *Geographic distribution of Smallmouth bass, Micropterus dolomieu, in Nova Scotia: History of early introductions and factors affecting current age range*. DFO Can. Sci. Advis. Sec. Res. Doc. 2010/028. iv. +25p.

LeBlanc, M. P. (2007). Recommendations for Risk Assessment of Ice Throw and Blade Failure in Ontario. Garrard Hassan.

MacMillan, J. 2010. Personal communication. Email dated August 13th, 2010. Nova Scotia Department of Fisheries and Aquaculture. Inland Fisheries Division. Pictou, Nova Scotia.

MacMillan J.L., A. J.McNeill, R.G. Heighton, and M.S.Ridgway. 2002. *Life history of smallmouth bass populations in Nova Scotia based on tournament monitoring*. Pages 535-544 in D.P. Philipp and M.S. Ridgway, editors. Black bass: ecology, conservation,and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Market & Opinion Research International. (March 2008). Economic Impacts of wind farms on Scottish Tourism.

McCurdy, K. 2010. Personal communication . October 21, 2010.

McNeill. 1995. *An overview of Smallmouth bass in Nova Scotia*. North American Journal of Fisheries Management. 15:680-687.

Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of recreational trails on breeding bird communities. Ecological Applications. 8(1):162-169.

MTRI. 2008. *Species at Risk in Nova Scotia. Identification and Information Guide*. Mersey Tobeatic Research Institute. 89 pp.

National Wetlands Working Group. 1997. *The Canadian Wetland Classification System. Second Edition.* Wetlands Research Centre, University of Waterloo, Waterloo, Ontario.

NatureServe. 2008. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

Newell R. 2005. *Provincial (Nova Scotia) Status Report on Northern White Cedar Thuja occidentalis.* Nova Scotia Department of Natural Resources. 25pp.

NFO World Group. (2003). Investigation into the Potential Impacts of Wind Farms on Tourism in Wales. Wales Tourist Board.

NOVA WAM. 2010. *Nova Scotia Wet Areas Mapping and Flow Accumulation Channels.* Nova Scotia Department of Natural Resources. http://www.gov.ns.ca/natr/forestry/gis/wamdownload.asp. Website accessed May 2010.

Renecker, L.A. and R.J. Hudson. 1999. Bioenergetics and resource use, mammals of Alberta. Lone Pine Publishing, Edmonton, AB.

Shank, C.C. 1979. Human-related behavioural disturbance to northern large mammals: a bibliography and review. Report prepared for Foothills Pipe Lines (South Yukon) Ltd., Calgary

Stewart, B., B. Whitman and J. McCracken. 2009. *O Canada Warbler, We Stand on Guard for Thee*. Bird Watch Canada. No. 46. ps 4- 6.

SSHD. 2010. *Significant Species and Habitats Database.* Nova Scotia Department of Natural Resources. http://gis4.natr.gov.ns.ca/website/nssighabnew/. Website accessed May 2010.

Wikipedia. 2009. Leopold Matrix. http://en.wikipedia.org/wiki/Leopold_matrix

With, K. A., & Crist, T. O. (December 1995). Critical thresholds in species' responses to landscape structure. Ecology.

Yahner, R. H. 1988. Changes in wildlife communities near edges. Conservation Biology. 2(4):333-339.

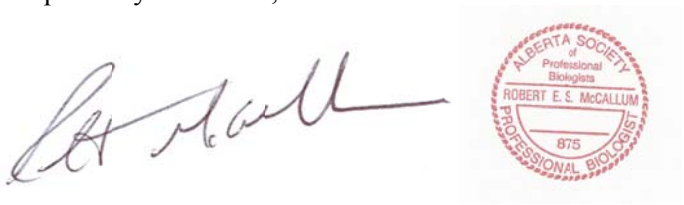
11. Certification

The undersigned has considered relevant factors and influences pertinent within the scope of the assessment.

The undersigned has no past, present, or contemplated interest in the assessed Project outcomes.

I have reviewed the information as submitted and completed this report in conformity with the Code of Ethics and the Duties of Professional Biologists and good industry practice.

Respectfully submitted,



Robert McCallum, P.Biol
President
McCallum Environmental Ltd.

The undersigned has considered relevant factors and influences pertinent within the scope of the assessment and has completed and provided relevant information in accordance with the methodologies described.

Respectfully submitted,

Michael Parker
East Coast Aquatics Inc.