5.1.2 Public Usage Areas and Health Care & Emergency Services

Public usage areas near the Property Boundary consist of the following lands:

- Chapel Gully Trail, located on the northern most Property Boundary near the former Town of Canso;
- Canso Islands National Historic Park, located 2 km north of Canso;
- Black Duck Cove Provincial Park, located in Little Dover approximately 4.5 kms from the Property Boundary;
- Whitman House and Museum located within the Town of Canso proper (Town of Canso, n.d.); and
- Stan Rogers Folk Festival Grounds located within Town of Canso proper.

Other recreational facilities include the Canso SportsPlex, which houses a pool, arena and several sports fields (Town of Canso, 2012), a Lions Club and Legion. Other public usage areas near the Property Boundary include a number of churches, the library, a pub, a pharmacy, a gas station, and the wharf and marina.

The Fanning Education Centre, a school currently incorporating primary to grade 8, is located in Hazel Hill in eastern Guysborough County, approximately 1.9 km from the Property Boundary. The Fanning Education Centre, a school operating under the Strait Regional School Board (SRSB), will serve students from the Town of Canso previously attending Canso Academy, which permanently closed as of March, 2012 (GRDA, 2012).

There are several emergency and health services buildings located in the Town of Canso: a fire hall, a small hospital (Eastern Memorial), and a special care home (Seaside Manor). The Guysborough Antigonish Strait Health Authority (GASHA) operates within the Guysborough County area and runs 2 larger hospitals; the Guysborough Memorial Hospital is located in the Town of Guysborough, approximately 48 km away by road from the Property Boundary, and the St. Mary's Memorial Hospital is located in the Town of Sherbrooke approximately 80 km away (GRDA, 2012). All hospitals offer emergency services and are accessible to Project workers should such a need arise.

5.1.3 Labour and Employment Rates

Employment rates for April 2012 in the North Shore Economic Region, which includes Guysborough County, indicates that unemployment is 14% higher in Guysborough County than the provincial average (at 11%) (Statistics Canada, 2012). Similarly, the employment rate for the North Shore is approximately 3% lower than the provincial average at 55.9% (Statistics Canada, 2012).

The Industry sector in the District of Guysborough is dominated by agriculture and other resource-based industries. Manufacturing, health care, social services, retail trade,

educational services and construction are also primary sectors in the area surrounding the Property Boundary (Statistics Canada, 2006c). Within the Town of Canso, the primary industry is health care and social services, followed by agriculture and other resource-based industries, retail trade and educational services (Statistics Canada, 2006c). Table 5.4 outlines in greater detail the 2006 Labour Force of the District of Guysborough and the Town of Canso.

Table 5.4: Labour Force by industry in the Municipal District of Guysborough and the Town of Canso, 2006

Industry	Total MD Guysborough	Industry	Total Town of Canso
Agriculture, forestry, fishing and hunting	335	**Agriculture, forestry, fishing and hunting**	45
Mining and oil and gas extraction	50	**Mining and oil and gas extraction**	0
Utilities	0	**Utilities**	0
Construction	125	**Construction**	10
Manufacturing	260	**Manufacturing**	0
Wholesale trade	35	**Wholesale trade**	0
Retail trade	175	**Retail trade**	40
Transportation and warehousing	95	**Transportation and warehousing**	10
Information and cultural industries	25	**Information and cultural industries**	0
Finance and insurance	20	**Finance and insurance**	0
Real estate and rental and leasing	20	**Real estate and rental and leasing**	10
Professional, scientific and technical services	40	**Professional, scientific and technical services**	15
Management of companies and enterprises	0	**Management of companies and enterprises**	0
Administrative and support, waste management and remediation services	35	**Administrative and support, waste management and remediation services**	25
Educational services	155	**Educational services**	30
Health care and social assistance	185	**Health care and social assistance**	55
Arts, entertainment and recreation	20	**Arts, entertainment and recreation**	0
Accommodation and food services	80	**Accommodation and food services**	10
Public administration	95	**Public administration**	35
Other	80	**Other**	15

Source: Statistics Canada, 2006c

The majority of residents living in the District of Guysborough work in trades, transport and equipment operation (21%), followed by primary industry (20%), sales and services

(14%) and business, finance and administration (12%) (Statistics Canada, 2006a). Within the Town of Canso, sales and services occupations predominate at 31%, with primary industry and trades and transport and equipment operators following at 18% and 13%, respectively (Statistics Canada, 2006b). Table 5.5 outlines in greater detail occupations of the total experienced labour force in the District of Guysborough and Town of Canso.

Table 5.5: Labour force by occupation in the District of Guysborough and the Town of Canso

Occupation	MD Guysborough	Town of Canso
Management	115	20
Business, finance and administration	265	30
Natural and applied sciences and related occupations	65	0
Health occupations	105	30
Social science, education, government service and religion	135	15
Art, culture, recreation and sport	35	0
Sales and service	310	105
Trades, transport and equipment operators	465	45
Primary industry	435	60
Processing, manufacturing and utilities	230	30

Source: Statistics Canada, 2006a&b

In 2009, there was a total of 415 businesses registered in Guysborough County (Department of Finance, 2010). Of these businesses, 34% fell under the agriculture, forestry, fishing and hunting category, while 11% fell under retail trade (Department of Finance, 2010). The next most numerous business types are construction (9%), health care and social assistance (6%), and accommodation and food services (6%) (Department of Finance, 2010).

A review of the relevant businesses located in close proximity to the Property Boundary is outlined in below and reveals sparse business resources in the Town of Canso:

- Taylor's Market;
- Seabreeze Campground and Cottages;
- Last Port Motel;
- Canso Pharmacy (Guardian);
- Al's Pub; and
- Wilson's Gas Stop (NSDERDT, 2012)

There are other notable communities within the District of Guysborough that offer amenities. A review of the Nova Scotia Business Directory reveals a number of businesses in Mulgrave and the Town of Guysborough. These are two of the four largest communities in Guysborough County and are within close proximity to the Property Boundary (approx. 102 km and 48 km away by road, respectively). Area businesses include construction companies, machine and material equipment sales, auto services, sand and gravel sales, restaurants, accommodations and medical clinics (NSDERDT, 2012).

The Town of Canso and The District of Guysborough have sufficient local businesses to provide many services to personnel working on the Project. Several local businesses offer both equipment and services required for the construction phase of the Project. Thus, Canso and the District Guysborough's sales and service, restaurants and hotel businesses would see increased economic activity as a result of the Project. Furthermore, both Antigonish and Port Hawkesbury are located within reasonable distance to the Property Boundary (113 km and 109 km by road, respectively) and offer additional resources and amenities, if required.

To summarize, resource-based industries appear to dominate in terms of both the number of businesses and labour force indicators for the District of Guysborough. However, retail trade, manufacturing, construction, health care and social assistance and "tourism services" are also primary industries in the area surrounding the Property Boundary. As a result, there will be ready access to local skilled labour and required hospitality services during the Project's development. The Municipal District of Guysborough is poised to realize numerous economic benefits from the Project:

- Directly economic benefits from the jobs created during the Project's construction and maintenance phases;
- Indirectly economic benefits from the business services supporting the project;
- Induced economic impacts from workers spending earned money on food, accommodation, transportation, entertainment) in the region.

5.1.4 Economic Effects and Mitigation

The economic impacts in the Project Area will be diverse and are expected to provide positive economic spinoffs for local businesses leading to increased taxation revenue for the Municipality. As outlined in the *Wind Turbine Facilities Municipal Taxation Act* (2006), municipalities will receive tax revenues per MW on an annual basis and, as such, the royalty will annually increase as the Consumer Price Index (CPI) rises (Nova Scotia Government, 2006). Based on a 2% annual increase in CPI, the $5,500/MW wind turbine facility tax rate from 2006-2007 would increase to approximately $6,598/MW by the time of the Projects' commissioning date in 2014.

According to Clear Sky Advisors Inc. (2011), a wind energy Project provides approximately 14.1 person-years of employment (PYE) per MW of nameplate capacity,

10.5 PYE realized during the development and construction of a wind farm. For a 13.8 MW wind farm, approximately 145PYE could be needed, sourced from a variety of trades, such as electricians, welders, heavy machine operators, cement and aggregate extraction and production workers, truck drivers, crane operators, labourers, engineers, and scientists. Local resources will be used to the greatest extent possible based on availability and economically feasibility. Since manufacturing and construction are major sectors in Guysborough County, it is expected that resources will be readily available within the surrounding communities. Due to the Project being a reasonable distance from Halifax, professional services from scientists, engineers and large general contractors would also likely be accessible.

During the construction phase of the Project there could be 30-40 persons on-site, as well as off-site employment opportunities. Types of jobs will consist of:

- Direct employment involved in construction and maintenance activities;
- Indirect employment consisting of supplied commodities and services to the Project; and
- Induced employment derived from the spending of those directly and indirectly employed by the wind farm (Gagnon et al., 2009).

The existing local economy in the Canso area suffers from high unemployment rates and minimal business opportunities. Hiring and spending of local workers may induce the creation of new jobs and services in the region (Gagnon et al., 2009). For a detailed overview of activities, skills and equipment required for the site preparation, construction, operation and maintenance, and decommissioning phases see Section 2.3.

5.2 Land Use and Value

5.2.1 Existing Land Use and Value

Presently, the area surrounding the Property Boundary is undeveloped barren lands, forest and scattered residential and recreational areas (e.g. The Chapel Gully Trail, Stan Rogers Festival Grounds). The Property Boundary proper is wholly located on municipal land that is currently not being used for alternate economic activities.

5.2.2 Land Use and Value Effects and Mitigation

There will be no impact on other economic activities in the surrounding area since the Project is located on land belonging to the Municipality, on which presently no economic activities are taking place.

The impact of a wind project on property values is a local concern. It is important to note that a person's desire to live near a wind project is completely subjective making it

difficult to generalize wind development impacts on property values. There are very few peer-reviewed, comprehensive, and statistically rigorous studies conducted on the effect of wind developments on property values. Thus, it's difficult to make any definitive conclusions on such effects.

The most comprehensive study of the impact of wind projects on property values was completed by Hoen et al. (2009) where residential home sales near 24 wind project developments were examined. Using various methods of analysis, the authors found no impact on property values as a result of *area stigma*, *scenic stigma*, or *nuisance stigma* in relation to wind farms (Hoen et al., 2009).This study also points to the shortcomings of several studies, notably regarding statistical methods and data gathering, small study samples, few site visits, as well as the fact that only two peer-reviewed studies have been published in academic journals on this topic (Hoen et al., 2009). The study ultimately concludes that no widespread and statistically observable impact can be drawn, indicating the complete subjectivity of a person's decision to live near a wind development (Hoen et al., 2009).

Ultimately, each wind development is different, making it difficult to accurately predict effects on property values for those residing near the Project. It is also important to note that only six (6) wind turbine locations are being considered; furthermore, the economic climate in the surrounding area is such that housing costs and property values are already considerably lower compared to other counties (Property Valuation Services Corporation, 2011). These factors should be considered when examining any potential effects of the Project on area property values. Nonetheless, a minimum 1000 m buffer from turbine to dwelling should assist in mitigating any such effects.

5.3 Recreation and Tourism

5.3.1 Existing and Planned Recreation and Tourism

Existing outdoor recreation in the area surrounding the Project includes hunting, fishing, all-terrain vehicle use, and hiking. In terms of tourist attractions, the Stan Rogers Festival Grounds, the Chapel Gully Trail and Grassy Island National Historic Site are all located in close proximity to the Property Boundary.

The Chapel Gully Coastal Trail is located just north of the Property Boundary, less than 100 m away from the nearest turbine. The trail consists of a wilderness hiking loop 5 km in length that begins at a salt marsh and leads to tree covered barrens along the coast and back to a salt marsh. The trail can be used year round, and several picnic sites are scattered along its route; it is used for hiking, birding and cross country skiing by both residents and visitors to the area.

Grassy Islands National Historic Site is located north of the Property Boundary, approximately 2 km away. It consists of two separate sections: a Visitor Centre on the Canso waterfront and an interpretive trail on Grassy Island, reachable by boat

approximately 15 minutes away from the mainland (Parks Canada, 2011). The Grassy Island Site is representative of early European fishing ports in North America (Parks Canada, 2011).

The Stan Rogers Folk Festival occurs on an annual basis (usually for several days during the month of July) on designated land located in the Town of Canso approximately 1.9 km away from the Property Boundary.

The 2010 Nova Scotia Visitor Exit Survey Community Report outlines the total trips (stopped or stayed) to communities in Nova Scotia, to particular tourist regions, as well as capture rates of communities within tourist regions (Nova Scotia Department of Economic and Rural Development and Tourism, 2011). The communities of the Eastern Shore, including Canso and Guysborough among others, were examined. Table 5.7 below shows the total trips (stopped or stayed) that were made to these communities as well as their capture rate, which is the percentage of parties that stopped in a community (short stay or overnight) out of the total number of parties who visited the tourism region.

Table 5.7: Communities visited on the Eastern Shore, 2010

Region/Community	Total Trips (% who stopped or stayed)	Capture Rate (%)
Eastern Shore	7%	
Canso	2	29
Guysborough	1	21
Isaacs Harbor	1	9
Liscomb	1	12
Middle Musquodoboit	1	16
Musquodoboit Harbour	2	37
Sheet Harbour	2	24
Sherbrooke	2	24

Source: Nova Scotia Department of Economic and Rural Development and Tourism, 2011

Table 5.7 above demonstrates tourism in Canso is not a major economic driver but also suggests that the tourism sector in the Eastern Shore, in general, is less robust when compared with other regions. When comparing other regions from the same exit survey, the Fundy Shore and Annapolis Valley saw a 37% total trip percentage, while HRM saw a 79% total trip percentage (NSDERDT, 2011).

5.3.2 Recreation and Tourism Effects and Mitigation

As Canso does not have a particularly strong tourism sector, it is not expected to be negatively affected by construction and operation activities associated with the Project. In terms of impacts from the Project on landscape aesthetics and viewplanes, tourists visiting the area will be able to see wind turbines. A Viewplane Analysis has been completed for the area surrounding the Property Boundary. Turbines will be visible from

certain locations in the Town of Canso, the Stan Rogers Folk Festival grounds and also from the neighbouring community of Hazel Hill; hikers using the Chapel Gully trail will also be able to see turbines. For more information on the Viewplane Analysis, see Section 6.1.

It is difficult to determine with certainty how tourists will react to a wind development. The attitude of tourists visiting the area will be entirely subjective; the presence of a wind turbine could deter, but potentially also attract tourists.

5.4 Human Health

There are some occupational health and safety concerns with wind developments, including shadow flicker, electromagnetic fields, air quality, and ice throw/shedding.

5.4.1 Shadow Flicker

A shadow flicker assessment will be completed per the terms and conditions of the EA upon successful award of the RFP. Of note regarding shadow flicker, distance from the turbines is a factor, and with a 1000m set back from residence, this greatly lessens the impact shadow flicker may have to receptors.

5.4.2 Electromagnetic Fields

Electromagnetic fields (EMFs) are created by a combination of an electrical charge and a magnetic field which can occur naturally or as a result of human activities (i.e. cell phone usage, radio towers). According to the Canadian Wind Energy Association (CanWEA) (2011), there are four potential sources of EMF associated with wind energy developments: “the associated transmission line, wind turbine generators, generator transformers, and underground cables” (CanWEA, 2011, p.20). Wind turbines are not considered to be a significant source of EMF, and studies have been inconclusive in terms of health side effects from EMF (SCENIHR, 2007).

The World Health Organization (WHO) concluded in a June 2007 statement that; “there are no substantive health concerns related to electric fields at levels generally encountered by the public”. Additionally, Health Canada has reviewed the current scientific findings regarding exposure to EMF and concluded; “Research has shown that EMF from electrical devices and power lines can cause weak electric currents to flow through the human body. However, these currents are much smaller than those produced naturally by your brain, nerves and heart, and are not associated with any known health risks” (Health Canada, 2010). Health Canada further states; “You do not need to take action regarding daily exposures to electric and magnetic fields at extremely low frequencies. There is no conclusive evidence of any harm caused by exposures at levels found in Canadian homes and schools, including those located just outside the boundaries of power line corridors” (Health Canada, 2010).

Transmission lines associated with wind power projects are the largest of the components for EMF strength; however, levels diminish rapidly with distance. For example, for the size of transmission line being proposed, the typical level could be 33 mG underneath the line. At the 40 m distance it will have diminished to 3 mG, 100 times less than a hairdryer. Because this Project's wind turbine collector system will interconnect with transmission lines directly adjacent to the substation, any additional EMF associated with transmission lines is extremely minimal.

5.4.3 Air Quality

Although wind turbines do not produce harmful emissions, dust may affect local air quality during construction of the wind development. Equipment and trucks may contribute to the creation of dust and vehicular emissions on-site.

5.4.4 Ice Throw and Ice Shedding

Ice throw and ice shedding can occur when ice forms or accumulates on turbine blades, during or after an ice event (Massachusetts Department of Environmental Protection, Massachusetts Department of Public Health, 2012). Both events pose a safety risk to people and equipment within the Property Boundary. Ice throw will very seldom exceed the distance twice the total height of the turbine (plus blade length) (Massachusetts Department of Environmental Protection, Massachusetts Department of Public Health, 2012). Using proper setbacks and on-site safety awareness, hazards associated with ice throw and shedding can be minimized. Typically turbines are designed to detect ice and automatically shut down during periods of icing, allowing ice to melt or directly fall off instead of being thrown (CanWEA, 2011).

5.4.5 Human Health Effects and Mitigation

No mitigation is required for EMF as wind turbines are not a significant source of EMF and are viewed as having few negative health effects (CanWEA, 2011; SCENIHR, 2007).

Dust control measures will be used to mitigate air quality issues during construction of the Project; equipment will be maintained to reduce emissions. Dust control will be documented within the Environmental Protection Plan.

Minimal ice occurrence is expected in the Property Boundary; furthermore, ENERCON turbines use a blade heating system to prevent ice build-up as a preemptive measure based on operating conditions.

Based on performance changes due to ice build-up, the wind turbines will automatically slow or shut down during icing events, effectively mitigating serious hazards from ice throw. Signage will be placed on the Property Boundary to increase awareness of

hazards, and site personnel will be trained and educated on the risks of ice throw/shedding.

If ice events occur, activities in and around turbines will be prohibited until ice has melted. Within the designated buffers from residences, it is not expected that ice throw or ice shed will impact those living in close proximity to the Property Boundary. The closest turbine is approximately 800 m from a public road and, thus, will not impact the driving public.

Due to the close proximity of the Chapel Gully Trail to the Property Boundary (less than 100 m away), certain measures may be taken in consultation with the local community, such as potential decommissioning of a portion of the trail, to reduce risk from ice shedding/ice throw. The Proponent will consult with the turbine manufacturer to determine exact buffer distance required to mitigate ice throw. Further, warning signs will be posted on the trail indicating potential ice shedding/throw from the turbines during icing events.

5.5 Radar/radio Interference

5.5.1 Electromagnetic Interference Study

Wind turbines are large enough to potentially interfere with radio waves emitted from telecommunication radar systems. In response to the potential for interference, the Radio Advisory Board of Canada (RABC) and CanWEA have issued a set of guidelines which describe the methodology and provide guidance for assessing electromagnetic interference (EMI) caused by wind turbines. In these guidelines, areas surrounding communication transmission systems (consultation zones) have been specified based on system type and function (RABC and CanWEA, 2005). If a potential turbine location is within a consultation zone, the owner of the communication system should be contacted to assess how the potential interference will impact both parties (RABC and CanWEA, 2012).

EMI created by wind turbines can be classified in two categories:

- 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
- Reflection: Caused by the distortion between a raw signal and a reflection of the signal from an object. Scatter is a sub-category of reflection, caused by the rotor blade movement (RABC and CanWEA, 2005).

The specific characteristics of a wind turbine will influence the type and magnitude of the interference. Other factors that influence interference include blade dimension and design, tower height, diameter of the supporting tower, as well as the material used for blade and tower construction. Furthermore, wind turbines affect different types of

signals in various ways, as some telecommunication signals are more robust to interference than others.

An abbreviated EMI analysis was completed to investigate radio frequencies registered within a study area extending 100 km from the Project's center and identify consultation zones in accordance with the RABC and CanWEA guidelines. Location information and frequency details were obtained from the Technical and Administrative Frequency Lists (TAFL) database, which is administered by Industry Canada.

The TAFL database returned over 1,000 registered frequencies with locations within 100km from the Project's centre.

The RABC/CanWEA guideline recommendations for point-to-point systems distinguish between two types of consultation zones. To avoid problems due to close proximity of the tower, a 1 km consultation zone should be applied around all towers (microwave and low capacity links) and stations (receiver or transmitter). There are no registered users found in the database within 1km of the Property Boundary.

According to the Canadian Broadcasting Corporation guidelines (2008), the following buffers are recommended:

- 2 km buffer for all television stations. There are no registered users in this consultation zone;
- 2 km buffer for FM radio broadcasting transmitters. There are no registered users in the consultation zone;
- 5 km buffer for omni-directional AM radio broadcasting transmitters. There are no registered users in this consultation zone; and
- 15 km around directional AM radio broadcasting transmitters. There are no AM radio transmitters within this consultation zone.

Land Mobile Networks and other Base Stations are used by police services, farmers, emergency services, military and other private companies to communicate with moving units or mobile users located in an area. Cellular type networks refer to mobile telephone systems that use frequency or phase modulation similar to FM radio between 800 and 1900 MHz. The RABC/CanWEA guidelines recommend a 1 km consultation zone around such transmission sources. According to the TAFL database, the closest networks or stations are at least 10km away from the Property Boundary.

Land mobile networks operated by police services and military are not listed in the Industry Canada TAFL database.

NAV CANADA, a private company that provides civil air navigation services for Canada, operates all of the civilian air traffic control Radars. The RABC/CanWEA guidelines have recommended that:

- An 80 km radius consultation zone be applied around NAV CANADA Primary Surveillance Radars (PSR) – Port Hawkesbury Airport is 42 km; and
- A 10 km consultation zone around Secondary Surveillance Radars (SSR) – there are no registered users within 10km of the Property Boundary.

The RABC/CanWEA guidelines have also recommended that a minimum 10 km radius consultation zone be applied around any major civilian airfield to avoid the possibility of a collision between planes and wind turbines. There are no civilian airports within 10km of the Property Boundary.

A consultation zone of 15 km should be applied to all VHF omnidirectional radio range (VOR) – a type of short-range radio navigation system for aircraft, enabling aircraft to determine their position and stay on course by receiving radio signals transmitted by a network of fixed ground radio beacons, with a receiver unit (RABC and CanWEA, 2005). There are no VOR beacons within 15 km of the Property Boundary.

An EMI Study proposal has been received from Genivar, and a full study will be commissioned upon execution of the PPA. Please see Appendix G for a copy for the proposal. The following systems will be investigated:

- Point-to-Point Systems (microwave links, fixed-link systems);
- Over-the-Air Reception;
- Cellular Type Networks;
- Satellite Systems;
- Land Mobile Networks;
- Air Defense Radars, Vessel Traffic Radars and Air Traffic Control Radars; and
- Weather Radars.

5.5.2 Electromagnetic Interference Effects and Mitigation

Specific mitigation will be determined after the EMI Study is completed by Genivar, and all system owners have been contacted and the full extent of impacts determined.

5.6 Transportation

5.6.1Transportation Study

A full study will be commissioned upon execution of the PPA; the transportation route has not yet been determined.

The following permits may need to be obtained:

- Work Within Highway Right of Way permit, if needed, for construction of new access roads and if removing access signs and guard rails:
    - Any guard rail and signage removed may not be able to be re-used; new rail and signs will be erected if required; and
    - Any guard rail or sign removed will be replaced immediately; if not achievable, the Proponent will make arrangements to ensure the safety of the travelling public is protected until erected.
- Overweight Special Moves Permit from Service NS and Municipal Relations to transport oversized and overweight components. Turbine components such as the nacelle, hub, blades and tower sections will typically range in weight from 15,000-108,000 kg with total lengths ranging from 12 – 60 m. Exact weights and lengths will be dependent on the machine make and model and will be included within any permit application prior to transporting components on public roads. In some cases, due to the size and weight of the components, transporting may need to occur on Sunday. Permits may specify, for safety reasons, for RCMP assistance;
- Road weight restrictions, especially Spring Weight Restrictions, for heavier equipment and materials that will be transported to the site; and
- Access points will be designed with proper height and width to accommodate large trucks and will adhere to commercial stopping sight distances.

5.6.2 Transportation Effects and Mitigation

Notices will be placed in public areas to inform local residents of signage removal or road infrastructure alterations. Removed signage and guardrails will be immediately replaced and appropriate temporary signage will be provided, as necessary, to ensure travelling public safety. Major transportation effects are not expected as a result of proposed transportation routes and component transportation activities.

To the extent possible, transportation through the City of Halifax, if required, will avoid high traffic times (7-9 am and 3-6 pm; Monday to Friday). All travel will be conducted using safe work practices for transporting oversized loads.

Transport of equipment will be via a minimum number of vehicles to minimize impacts to road-way flow and impacts on air quality due to exhaust. As previously stated, to transport heavy and oversized turbine components, a Special Move Permit will be obtained from Service Nova Scotia and Municipal Relations, as specified under the Weights and Dimensions of Vehicles Regulation under Section 191 of the *Motor Vehicle Act* (1989). Further, upgrades will be made to roads and overhead wires, branches, and signs if conflicts arise. For areas requiring modifications, these will be completed to regulatory department specifications, and any areas requiring reinstatement will also be completed as requested.

During the Project's construction phase, trucks and other vehicles will be frequently visiting the site resulting in increased vehicular sound. To mitigate this effect, vehicles will only be visiting and working on-site during normal daytime hours of operation and will avoid high-traffic times of day to reduce local traffic congestion.

5.7 Cultural and Heritage Resources

5.7.1 Archeological Resource Impact Assessment

An Archaeological Resource Impact Assessment was completed for the Project in June 2004 and can be found in Appendix H. The purpose of the assessment was to determine the potential for historic and pre-contact archaeological resources within the Property Boundary and included a field component, which focused on areas slated for turbine and access road construction (AMEC, 2006). The results of the study showed the presence of historic resources in several locations; however, none are located in areas close enough to the proposed turbines (2012 layout) or access road to be impacted by Project activities. No additional archaeological features were encountered during the field reconnaissance (AMEC, 2006).

No First Nations resources were encountered during the assessment; several coves along the shorelines may have been ideal sites for settlement and accessing marine resources, but these areas were outside the Property Boundary (2006 and 2012 layouts) and were not considered during the assessment (AMEC, 2006). Turbines located in the southwest corner of the Property Boundary were not assessed due to access issues, but the area was considered low potential for archaeological resources due to the presence of wetlands and low lying areas (AMEC, 2006). All of the archaeological sites found were located along the shore of Chapel Gully to the east of proposed turbine locations; the only archaeological site determined to be significant was located close to a turbine that is no longer under consideration (Appendix H) (AMEC, 2006).

5.7.2 Cultural and Heritage Resources Effects and Mitigation

Areas identified during the field assessment to contain historical resources are located along the shoreline and off the Property Boundary, within the designated buffer area (Appendix H). Therefore, it is not expected that the Project will have negative impacts on known archaeological resources.

As the southwest corner of the Property Boundary was not assessed due to access constraints, it is recommended that an archaeological reconnaissance of this area be conducted prior to ground disturbance to mitigate impacts on cultural and heritage resources not identified during the initial archaeological resource impact assessment. In the event that archaeological resources are discovered during Project construction, activities would be halted and qualified staff would be engaged to re-assess the area. It

is unlikely that resources will be disturbed since most are expected to be located along shorelines, to which a 140 m buffer has already been applied.

5.8 Mi'kmaq Ecological Knowledge Study

A Mi'kmaq Ecological Knowledge Study (MEKS) is required for the Project; a proposal has been received from Membertou Geomatics Consulting and a full study will be commissioned upon execution of the PPA. Please see Appendix I for a copy of the MEKS proposal.

6. OTHER CONSIDERATIONS

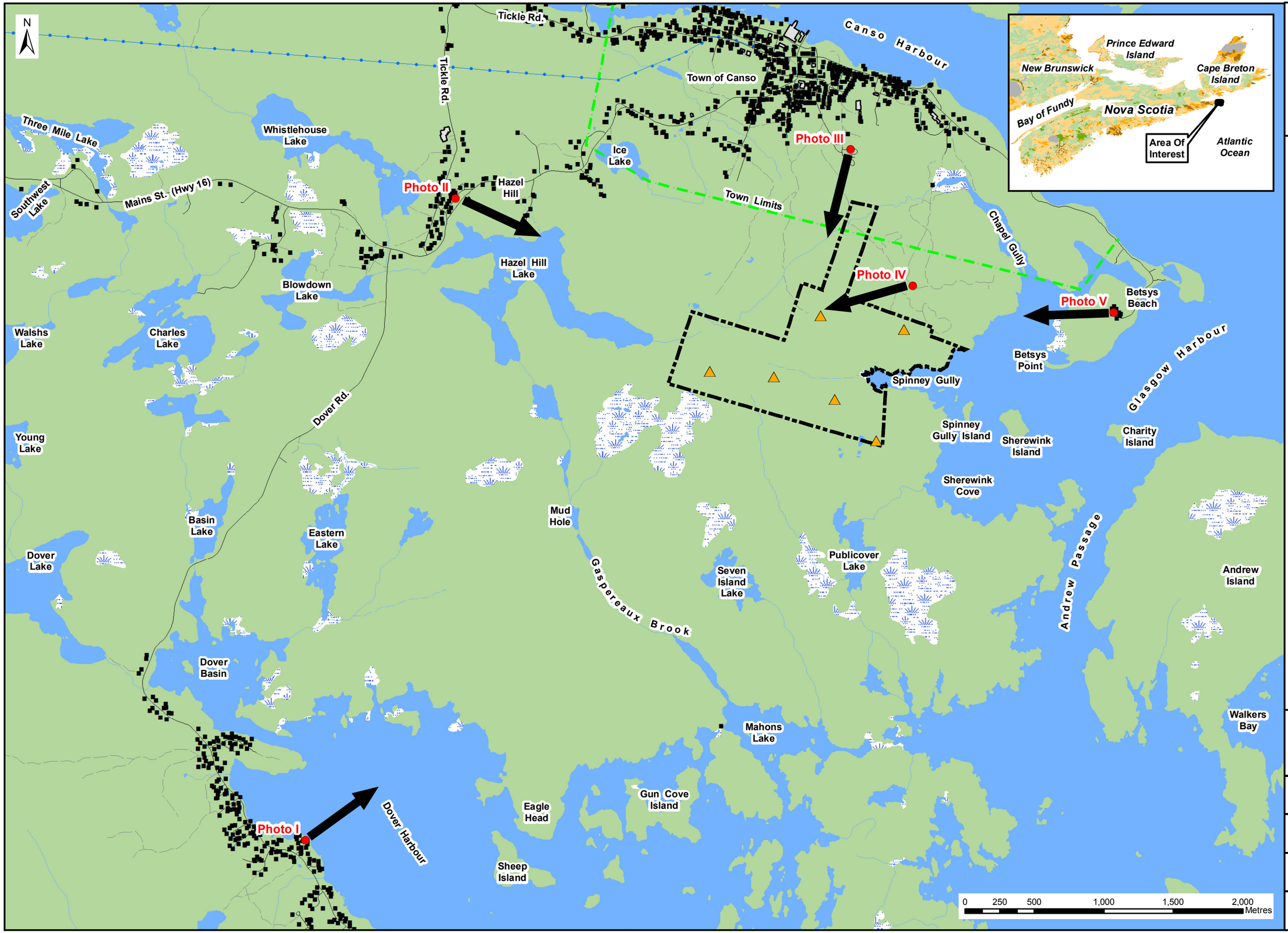
6.1 Visual Impacts

6.1.1 Predicted View Plane

To assess the potential impact on visual aesthetics in the local area, a visual impact assessment (VIA) was completed based on the preliminary layout.

Photographs were collected around the Property Boundary in May 2012, with magnetic bearings and a GPS waypoint recorded at each photo location. Geographical Information System (GIS) software was used to plot the photo locations and construct bearing lines to assist in the construction of a 3D view generated using the GIS. A 3D surface was then constructed using the provincial Digital Elevation Model (DEM) points from the Nova Scotia Topographic Database (NSTDB), which supports 5 m contour intervals. Proposed turbine locations and specifics regarding the height of the turbines were used to position and model the proposed turbines. Each selected viewing site was rendered using the viewer location (photo GPS point, elevation and bearing line), resulting in an accurate 3D view. The resulting computer generated view was then merged with the digital photographs using an image of the proposed turbine, duplicated and scaled to match each turbine in the rendering.

Photos were taken from five locations as shown in Drawing 6.1. Simulated results are provided in Figures 6.1-6.5.



Notes:

1. Reference: Project Site Boundary Supplied By Client. Digital Topographic Mapping By Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. GPS Points Taken Are Typically to +/-5m Accuracy.

Legend:

- Project Site Boundary
- Proposed Turbine
- Photo Location
- Building
- Municipal Boundary
- Major Roads and Highways
- Roads
- Access Roads / Trails
- Existing Transmission Lines
- Large Structure
- Mapped Stream
- Indefinite Stream
- Water Body
- Mapped Wet Area

Visual Assessment Locations

Strum Environmental

Date: June 2012	Project #: 12-4375
Scale: 1:25,000	Drawing #: **6.1**
Drawn By: H. Serhan	
Checked By: A. Walter	

Predicted View

Actual View

Figure 6.1: View looking northeast into the Property Boundary.
Photo location: Adjacent to Civic # 30, Co-op Road, Little Dover.

Predicted View

Actual View

Figure 6.2: View looking southeast into the Property Boundary. Photo location: Front Street, Hazel Hill.

Predicted View

Actual View

Figure 6.3: View looking south/southwest into the Property Boundary. Photo location: Stan Rogers Festival Grounds, Canso.

Predicted View

Actual View

Figure 6.4: View looking southwest into the Property Boundary
Photo location: Observation Platform on the Chapel Gully Trail.

Predicted View

Actual View

Figure 6.5: View looking west into the Property Boundary.
Photo location: Betsy's Beach, Glasgow Harbour.

6.1.2 Effects and Mitigation

Aesthetic value is primarily a function of individual perceptions and preferences and, as such, perceived impacts will vary greatly among community members and visitors to the area.

To minimize the changes to the visual landscape, the following measures will be implemented:

- Turbines will all consist of the same make, model, and colour;
- Turbines will be located a minimum of 1,000 m from existing residences; and
- Screening opportunities (i.e. tree planting) for nearby residences may be considered where post-construction evaluation identifies a significant concern.

Potential impacts to the visual landscape will be further evaluated, as a VEC, in Section 8.

6.2 Acoustic Impacts

6.2.1 Sources of Sound

Sound from wind turbines comes from two general sources: the mechanical equipment, and the sound from the interaction of the air with the turbine parts, primarily the blades (NSDE, 2008). In modern turbine designs, much of the mechanical noise is mitigated through the use of noise insulating materials. Aerodynamic noise, however, is a product of the turning of turbine blades and is, thus, an unavoidable aspect of wind power operations. Turbines can emit noises of different frequencies, and an individual's perception of the noise can depend on their hearing acuity and their tolerance for particular noise types (Committee on Environmental Impacts of Wind Energy Projects, National Research Council, 2007). Furthermore, the propagation of sound from the turbine source to a receptor, such as a residential dwelling, is influenced not only by the sound power level emitted from the turbine, but also by local factors such as distance to the receptor, topography, and weather conditions (Hau, 2006). For example, increases in wind speed result in increases in ambient, natural noise (from vegetation movement) that can mask the sounds emitted from the turbine(s) (as cited in Committee on Environmental Impacts of Wind Energy Projects, National Research Council, 2007).

Apart from noise generated during the operation of the wind power projects, noise is also produced during the construction, maintenance, and decommissioning phases. This noise is often associated with such activities as equipment operation, blasting, and the movement of traffic to and from the facility (Committee on Environmental Impacts of Wind Energy Projects, National Research Council, 2007). Equipment expected to be used within the Property Boundary will include: back hoes, bulldozers, flatbed trailers, cranes, dump trucks, ready mix trucks, and smaller maintenance vehicles.

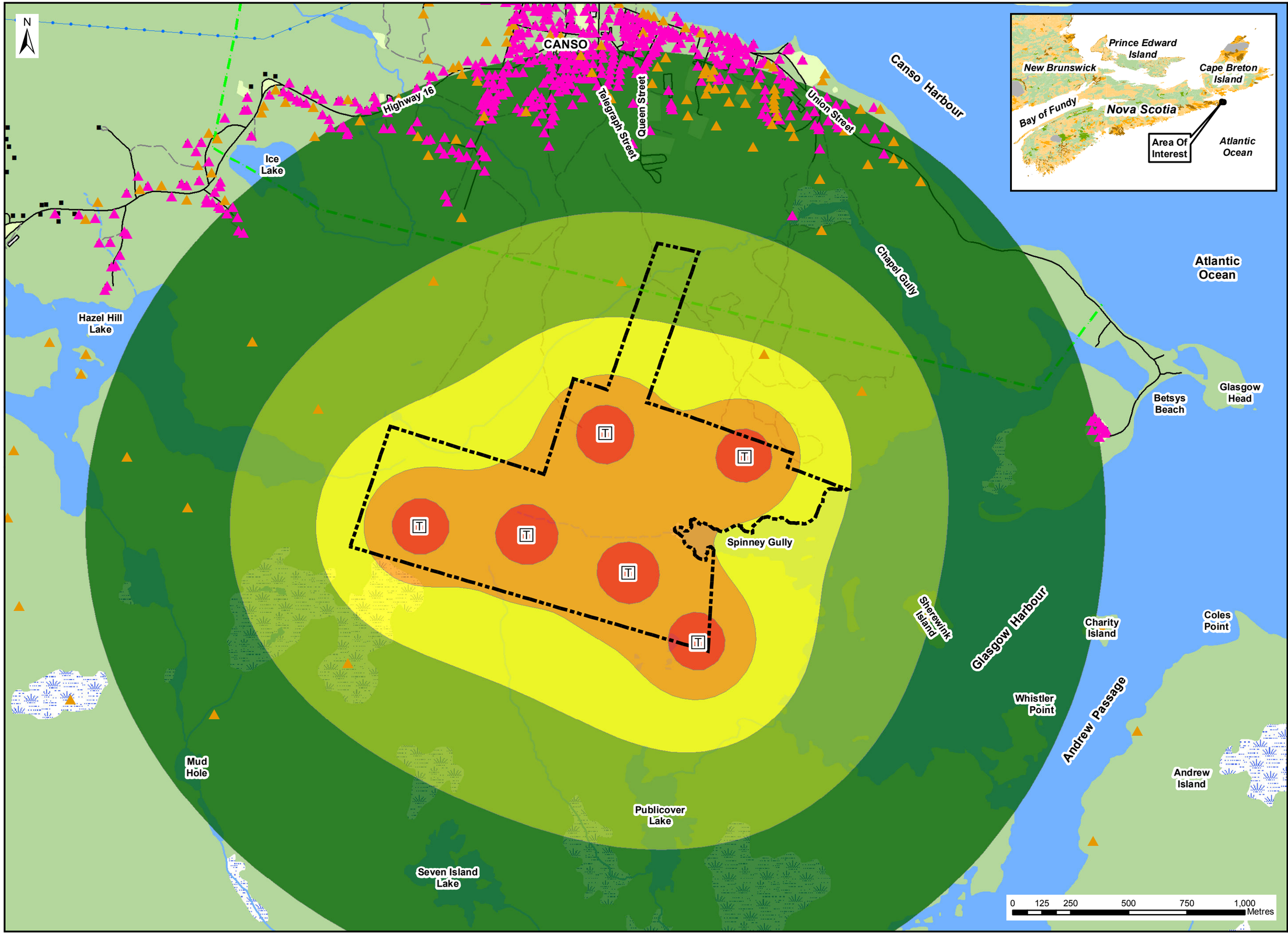
6.2.2 Acoustic Assessment

An acoustic assessment was conducted for the Project to predict sound levels using 6 turbine locations. The model followed ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method and calculations, and was based on the following input information:

- UTM coordinates for the wind turbine and transformer locations;
- 1/1 Octave bank sound power level data for the wind turbines and transformer;
- Tonality and uncertainty analysis for the proposed wind turbines;
- UTM coordinates for receptors (all properties within a 2.5 km radius of the Property Boundary, including vacant sites, were evaluated – 218 receptors in total);
- Topographic data for the surrounding area; and
- Meteorological tower data.

As there are no specific sound guidelines for wind farms in Nova Scotia, sound level limits from the Ontario Ministry of the Environment (MOE) publication, "*Noise Guidelines for Wind Farms*", dated October 2008, were used. Predicted off-site sound levels were evaluated against the MOE guideline of 40 decibels (dBA). Mapping illustrating the predicted sound levels relative to receptors is provided in Drawing 6.2. The results of the Acoustic Assessment can be found in Appendix J.

The acoustic analysis indicated that the operation of the proposed turbines will comply with the MOE guidelines for all occupied receptor locations. Seven vacant lot receptor locations exceed the MOE guidelines; however, three of these vacant lot receptors are privately held properties, two are identified as Crown Lands and the remaining two are owned by Nova Scotia Department of Natural Resources and none contain dwellings. ENERCON did not provide the Project team with a guarantee letter indicating tonal audibility; therefore, a 5 db tonal penalty was applied to each wind turbine as per the MOE guidelines, effectively increasing the predicted sound level.



Notes:

1. Reference: Site Plan Supplied By Client. Wet Areas Mapping and Wetland Inventory By Nova Scotia Department of Natural Resources (NS DNR). Digitial Topographic Mapping By Nova Scotia Geomatics Centre,
2. Projection: NAD83(CSRS), UTM Zone 20 North.

Legend:

- Project Site Boundary
- Proposed Turbine
- Buildings
- Municipal Boundary
- Major Roads and Highways
- Roads
- Access Roads / Trails
- Existing Transmission Lines
- Large Structures
- Mapped Stream
- Indefinite Stream
- Water Bodies
- Mapped Swamp
- Cleared Area

Acoustic Receptors

- Occupied
- Vacant

Acoustic Analysis

dBA

- 35
- 40
- 45
- 50
- 55

Canso Wind Farm Acoustic Analysis With 5 dBA Penalty

Strum Environmental

Date: June 2012	Project #: 12-4375
Scale: 1:15,000	Drawing #: **6.2**
Drawn By: H. Serhan	
Checked By: A. Walter	

6.2.3 Effects and Mitigation

Most of the potential effects with regards to noise generation from wind power developments are related to annoyance and unpleasantness individually felt by residents in the vicinity of the development. The degree of this annoyance is a function of both the acoustic properties of the sound and of the attitude of the person hearing the sound. For instance, what one individual may find to be a soothing sound, another may find unpleasant (Sathyajith, 2006). Furthermore, the effects of certain types of noise, especially low-frequency vibrations which may even be inaudible, are poorly understood (Committee on Environmental Impacts of Wind Energy Projects, National Research Council 2007). Most authorities agree however, that there is currently no evidence to suggest that sound emitted from wind turbines has any direct health effects to those exposed to it (Colby et al., 2009; CMHO, 2010). Table 6.1 summarizes the potential effects related to sound arising from the Project. Mitigation measures are provided below.

Table 6.1: Potential Acoustic Effects

Potential Effect	Source of the Effect	Project Phase*		
		C	M/O	D
Increased sound levels	Site equipment (back hoes, bulldozers, flatbed trailers, cranes, dump trucks, ready mix trucks, and smaller maintenance vehicles)	✔	✔	✔
	Turbine operation		✔	

The following measures will be implemented to minimize or eliminate impacts to the acoustic environment:

- Placement of wind turbines a minimum of 1,000 m from all established residential dwellings;
- Incorporation of noise considerations into the design of Project infrastructure, as can be provided by manufacturer of selected turbine make and model;
- Site preparation and construction activities will be planned to occur between the hours of 0700 hrs and 1900 hrs; and
- Development and implementation of an EPP for all phases of the Project will include specific mitigative measures related to the acoustic environment, such as provisions for post-construction monitoring and noise complaint response protocol. EPP will be approved by NSE prior to start of construction.

Potential impacts to the acoustic environment will be further evaluated, as a VEC, in Section 8.

7. PUBLIC CONSULTATION

7.1 Open House Event

A community open house event was held to inform the public on the Project and to hear local comments and concerns. The open house was held June 17, 2012 from 2 to 4 pm. To inform residents of the event, a newsletter was printed and delivered to all mailboxes in the Municipality of the District of Guysborough on June 14, 2012 as well as posted on the Project website (See section 7.3). An advertisement was also placed in the Guysborough Journal on June 13, 2012. Please see Appendix K and L for copies of the newsletter and advertisement, respectively.

Information gathered at the registration desk indicated that at least 27 people attended the open house.

The open house featured posters detailing information on the Proponent, benefits to the area, the EA process and overview of sound and visuals associated with the Project. Please see Appendix M for copies of posters displayed at the open house. Attendees could voice comments and concerns in a number of ways, including:

- Speak one-on-one with members of the Project team and MODG councilors;
- Read Project related posters and the newsletter, as well as wind energy information from CanWEA;
- Fill out a an open house feedback form on quality of the open house and comments or concerns about the Project; and
- Fill out an open house feedback form on potential business services and employment interests that may be available for Project construction

Of the 27 attendees, 14 people filled out open house feedback forms and 2 filled out potential business/employment services forms. Four (4) attendees provided written comment on the quality of the open house and 9 attendees provided written comment on the Project in general. Comments were very positive in both respects; those who commented on the open house indicated that it was informative but could have had more notice or could have been held within the Town of Canso itself. Of those who commented on the Project in general, all were supportive of the Project but a couple voiced concerns on issues such as wildlife and access routes. Many commented on the positive effects the Project would have on the Town of Canso and surrounding communities. For a list of comments made at the open house please refer to Appendix N.

The local Guysborough-Sheet Harbour MLA, Jim Boudreau, was in attendance at the open house and provided a letter of support for the Project (Appendix O). Letters of support from other members, community groups and proprietors can be found in Appendix O.

Please see figures below for photos from the open house event.

Figure 7.1: Open House Event

Figure 7.2: Open House Event

7.2 Website

A website for the Project has been developed as part of the website for the Municipality of the District of Guysborough and can be accessed at: http://www.municipality.guysborough.ns.ca/business/sablewind . The website currently provides an overview of the Project, news items, the Sable Wind Newsletter and a FAQ document. The website also allows the interested public to pose questions to the Project team and to access relevant documents as they are posted.

7.3 Community Liaison Committee

The feedback form distributed at the open house was used to solicit interest in a Community Liaison Committee (CLC). Of the 14 people that filled out a form, seven (7) persons have expressed interest in participating in a CLC.

Upon award of the RFP and signing of the PPA, the Proponent will make further contact with interested parties to form the official CLC and conduct a kick-off meeting.

7.4 First Nations Consultation

The Project team has been in contact with the following First Nations communities and organizations:

Eric Christmas
Mi'kmaq Energy Advisor
Kwilmu'kw Maw-klusuaqn Negotiation Office
851 Willow Street
Truro, NS
B2N 6N8

Chief Michael Gerard Julian
Paw'tnkek First Nation (Afton)
RR#1 Afton
Antigonish, NS
B0H 1A0

Chief Kenneth Basque
Chapel Island First Nation
B0x 538

Chapel Island, NS
B0E 3B0
On May 22, 2012 Heather Holland sent an e-mail to Twila Gaudet, Consultation Liaison Officer, Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO), and provided both a brief overview of the Project and requested a meeting to further discuss the Project. On May 25, Heather Holland sent a follow-up e-mail to Eric Christmas, Energy Advisor of KMKNO, to provide a brief Project overview and further requested a meeting to discuss the Project in greater detail. Eric replied on May 25, agreeing to a meeting and proposed May 28 or 29 as possible meeting dates. Due to the schedules of the Project team, it was agreed that the meeting would take place the morning of June 19, 2012.

On June 5, 2012, Barry Carroll sent a letter to Chief Julian, Paw'tnkek First Nation, and the Chief of Chapel Island First Nation, informing them of the Project and inviting the communities to ask questions about the Project. Barry offered for the Project team to meet with the communities upon their request to provide more information. Copies of the letters are included in Appendix P.

On June 19, 2012, representatives from the Project team met with Eric Christmas, KMKNO, to provide an overview of the Sable Wind Project including:

- Project team;
- Project size and site;
- Project benefits;
- EA process;
- MEKS;
- First Nations and community engagement;
- Provincial renewable energy targets; and
- RFP process

The Project was discussed in more detail, including benefits to the municipality. Eric said that he and the Mi'kmaq are aware of the economic challenges facing the local area and felt this would be a very positive and beneficial Project. Eric advised that the local Chiefs may be interested in learning more about the Project and offered to send them a copy of the slide deck that was reviewed. Eric advised that the meeting was a scoping session and that a more formal consultation process would begin upon award of the RFP.

Communications with Mi'kmaq communities will be ongoing for the duration of the Project to share information with all stakeholder groups and to hear and address concerns of all local Mi'kmaq communities.

8. EFFECTS OF UNDERTAKING ON THE ENVIRONMENT

8.1 Identification of Valued Ecosystem Components (VECs)

Based on the discussion and findings in Sections 4 and 5, the following VECs have been identified:

- Wetlands;
- Flora SAR;
- Mammal SAR;
- Avifauna;
- Noise;
- Visual Aesthetics;
- Local economy;
- Property values;
- Tourism and recreation;
- Human health;
- Radar and radio interference; and
- Cultural and heritage resources.

To ensure all relevant issues and concerns related to the proposed Project are identified, an interaction matrix was used to evaluate the interactions between the Project phases and VECs (Table 8.1).

Table 8.1: Interaction Matrix

PROJECT PHASES / ACTIVITIES	Wetlands	Flora SAR	Mammal SAR	Avifauna	Sound	Visual Aesthetics	Local Economy	Property Values	Tourism and	Human Health	Radar and Radio Interference	Cultural and Heritage Resources
Site Preparation/ Construction:												
Surveying and Siting/Land Clearing	X	X	X	X	X		X					X
Road Construction/Upgrades	X	X	X	X	X		X					X
Equipment Delivery			X	X	X		X					
Foundation Construction	X	X	X	X	X		X					X
Tower & Turbine Assembly			X	X	X		X					

Temporary Storage	X	X										
Operation & Maintenance	X	X	X	X	X	X		X	X	X	X	
Decommissioning:												
Turbine & Associated Equipment Removal	X		X	X	X		X					
Site Re-instatement	X		X	X	X		X	X				
Accidents / Malfunctions	X	X	X	X						X		

8.2 Environmental Effects Analysis Methodology

The completion of the environmental effects analysis involves consideration of the following elements:

- Description of potential negative environmental effects;
- Mitigation measures;
- Residual effects;
- Significance of residual environmental effects; and
- Monitoring or follow up programs.

This EA is structured to include proposed mitigation to reduce or eliminate potential adverse environmental effects. The determination of significance of adverse environmental effects is based on post-mitigation (residual) effects rather than unmitigated potential effects. The significance of residual effects of the Project will be determined using the following criteria, based on federal and provincial EA guidance and as described in Table 8.2:

- Value of the resource affected;
- Magnitude of the effect;
- Geographic extent of the effect;
- Duration and frequency of the effect;
- Reversibility of the effect; and
- Ecological and/or social context.

The expectation for and significance of residual effects determines the need for a monitoring and/or follow-up program.

Table 8.2: Identification and Definition of Environmental Impacts

Attribute	Options	Definition
Scope (Geographic Extent)	Local	Impact restricted to area within 1 km of the Property Boundary
	Regional	Impact extends up to several km from the Property Boundary
	Provincial	Impact extends throughout Nova Scotia
Duration	Short-term	Impacts last for less than 1 year
	Medium-term	Impacts are significant for 1 to 10 years
	Long-term	Impacts are significant for greater than 10 years

Attribute	Options	Definition
Frequency	Once	Occurs only once
	Intermittent	Occurs occasionally at irregular intervals
	Continuous	Occurs on a regular basis and regular intervals
Magnitude	Negligible	No measurable change from background in the population or resource; or in the case of air, soil, or water quality, if the parameter remains less than the standard, guideline, or objective
	Low	Impact causes <1% change in the population or resource (where possible the population or resource base is defined in quantitative terms)
	Moderate	Impact causes 1 to 10% change in the population or resource
	High	Impact causes >10% change in population in resource

The potential level of impact (i.e. adverse environmental effect) after mitigation measures (i.e. residual effects) was identified based on NRCan's criteria and definitions provided in "Environmental Impact Statement Guidelines for Screenings of Inland Wind Farms Under the *Canadian Environmental Assessment Act*" (NRCan, 2003), as shown in Table 8.3.

Table 8.3: Definition of Significant Residual Environmental Impact

Significance Level	Definition
High	Potential impact could threaten sustainability of the resource and should be considered a management concern. Research, monitoring, and/or recovery initiatives should be considered.
Medium	Potential impact could result in a decline in resource to lower-than-baseline but stable levels in the study area after project closure and into the foreseeable future. Regional management actions such as research, monitoring, and/or recovery initiatives may be required.
Low	Potential impact may result in slight decline in resource in study area during life of the project. Research, monitoring, and/or recovery initiatives would not normally be required.
Minimal/None	Potential impact may result in slight decline in resource in study area during construction phase, but should return to baseline levels.

8.3 Effects Assessment

Potential effects of the Project on the identified VECs are further analyzed in Tables 8.4-8.6 to identify and evaluate the significance of residual effects, based on the criteria listed in Tables 8.2 and 8.3. Mitigation measures are also summarized and accidents and malfunctions are considered for each phase.

Table 8.4: Environmental Effects Analysis – Site Preparation/Construction Phase

Environmental Component	Potential Impact	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Wetlands	• Loss of wetland habitat/function. • Disturbance of hydrologic regime and sedimentation. • Invasive species colonizing wetland	• Avoid wetland habitat to the extent possible. • Where possible, establish a 30 m buffer • Development and implementation of EPP • Compensation for altered wetland habitat through the provincial permitting process. • Clean equipment prior to and after working on-site	Scope: Local Duration: Short-term Frequency: Once Magnitude: Low	No residual effect on wetland function anticipated.	**Minimal/None**
Flora SAR	• Removal of vegetation. • Loss of rare flora.	• Pre-construction survey with special focus on flora SAR within the finalized Project footprint (i.e. turbines, access road locations) • Avoidance of habitat containing rare species. • Limit clearing to footprint of development. • Development and implementation of EPP. • Re-establish native vegetation, where possible, following construction.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Low	Very small proportion of vegetation loss expected. No Flora SAR loss expected.	**Minimal/None**

Environmental Component	Potential Impact	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Mammal SAR	• Removal or disruption of habitat.	• Avoid important habitat areas. • Minimize Project footprint. • Development and implementation of EPP. • Restore habitat to the extent possible following construction.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible-Low	N	**N/A**
Avifauna	• Removal or disruption of habitat. • Sensory disturbance. • Mortality. • Use of construction lighting	• Avoid important habitat areas to the extent possible (wetlands, mature trees). • Minimize vegetation clearing. • Complete vegetation clearing outside of nesting season, to the extent possible. • Development and implementation of EPP. • Limit site activities to designated workspaces. • Reduce or avoid construction lighting.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Low	N	**N/A**
Sound	• Increased noise due to construction activities.	• Operate site during normal working hours. • Keep community informed regarding periods of significant noise. • Develop a noise complaint response protocol.	Scope: Local Duration: Short-term Frequency: Intermittent Magnitude: Negligible	N	**N/A**

Environmental Component	Potential Impact	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Accidents and Malfunctions	• Accidental release. • Failure of erosion and sediment /control measures.	• Development and implementation of EPP, including a spill prevention plan. • Development and implementation (as necessary) of contingency plans.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible-Low	N	**N/A**
Socio Economic Component	Potential Impact	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Local Economy	• Trades and construction jobs	• n/a	Scope: Regional Duration: Medium-Term Frequency: Intermittent Magnitude: High	Increased employment and income in the area.	**High**
Property Values	• Decreased property values near wind farm even before it is operational.	• Inform community about the positive effects of the wind development to reduce *anticipation stigma* and reduced property values. • Use a minimum 1 km buffer between homes and turbine construction/operation to reduce effects on property value.	Scope: Regional Duration: Medium-Term Frequency: Intermittent Magnitude: Unknown	Potential residual decrease in property values.	**Low**
Routes and Transportation	• Potential removal of signage and minor road infrastructure adjustments during turbine component	• Notices will be placed in public areas to inform local residents to the extent possible regarding traffic flow. • Temporary signage regarding road infrastructure alterations	Scope: Local/Regional Duration: Short-Term	No residual effects on routes and transportation. Potential traffic wait times on	**Low/None**

	transportation. • Traffic flow on public roads • Increase loads and oversized loads impacting public roads • Increased traffic and sound associated with larger vehicles	will be places to ensure public safety. • Use of roads during daytime hours only and not during peak traffic times. • Traffic control personnel will be located roadside to help direct high traffic during times when road signs are removed. • Contact Department of Transportation and Infrastructural Renewal for permits and best practices.	Frequency: Intermittent Magnitude: Low	public roads for safe flow of vehicles	
Tourism and Recreation	• Decreased tourism and recreation in surrounding area due to construction activities.	• Project is in a low tourism area and far from larger tourist centres, thus few impacts are expected and little mitigation is required. • Avoid peak tourist events (i.e. Stan Rogers Folk Festival)	Scope: Regional Duration: Short-Term Frequency: Once Magnitude: Negligible	Minimal to no decrease in tourism and recreation activities.	**Minimal**
Human Health	• Increased health problems of local residents.	• Operate site during normal working hours. • Keep community informed of periods of significant noise. • Use dust control measures for air quality issues.	Scope: Local Duration: Short-Term Frequency: Intermittent Magnitude: Low	Minimal health issues.	**Low**
Cultural and Heritage Resources	• Disruption of cultural and heritage resources due to construction activities.	• Conduct an archaeological reconnaissance of areas not previously assessed before construction. • If cultural and heritage resources are found, Project construction will halt and qualified staff will be engaged to re-assess the area.	Scope: Local Duration: Short-Term Frequency: Once Magnitude: Low	Minimal damage and loss of cultural and heritage resources.	**Minimal/None**

Table 8.5: Environmental Effects Analysis – Operation/Maintenance Phase

Environmental Component	Potential Impact	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Wetlands	• Invasive flora colonizing in wetlands. • Change to wetland function.	• Development and implementation of EPP. • Minimize the need for routine vegetation clearing. • Employ culvert and ditch maintenance programs. • Clean equipment prior to and after work	Scope: Local Duration: Short-term Frequency: Intermittent Magnitude: Negligible	N	**N/A**
Flora SAR	• Ongoing vegetation management.	• Development and implementation of EPP. • Minimize the need for routine vegetation clearing.	Scope: Local Duration: Short-term Frequency: Intermittent Magnitude: Negligible	N	**N/A**
Mammal SAR	• Increase in site activity.	• Development and implementation of EPP. • To the extent possible, plan operation and maintenance activities to avoid sensitive habitats and minimize time on-site.	Scope: Local Duration: Short-term Frequency: Intermittent Magnitude: Negligible	N	**N/A**
Avifauna	• Mortality. • Sensory disturbance. • Lighting (turbines and associated infrastructure)	• Development and implementation of EPP. • To the extent possible, plan operation and maintenance activities to avoid sensitive habitats and minimize time on-site. • Avoid routine vegetation	Scope: Local Duration: Long-term Frequency: Continuous Magnitude: Moderate	It is expected that birds and bats will avoid the immediate area of the turbines (but not the broader area), which will	**Medium**

		clearing during nesting season. • Lighting on administration building(s) and substation will be "on-demand" lighting. • Lighting on turbines will be minimized, strobe and approved by both Transport Canada and CWS.		reduce the number of bird collisions. Bird fatalities due to turbine collisions are not expected to be significant.	
Sound	• Turbine blade sweeping noise • Generator noise	• Development and implementation of EPP which will include provisions for post-construction monitoring and a noise complaint response protocol.	Scope: Local Duration: Long-term Frequency: Intermittent Magnitude: N/A	While there will be an increase in sound as a result of the Project, the sound assessment indicates acceptable sound levels for receptors.	**Residual effect will vary depending on the individual perception**
Visual Aesthetics	• Turbines visible from public places and residential dwellings.	• Initial public awareness efforts. • Turbines will all consist of the same make, model and colour • Turbines will be located a minimum of 1000 m from existing residences • Screening opportunities (i.e. tree planting) for nearby residences may be considered where post-construction evaluation identifies a significant concern.	Scope: Local-Regional Duration: Long-term Frequency: Continuous Magnitude: Low-Moderate	Turbines will be visible to residents	**Residual effect will vary depending on individual perception**

Accidents and Malfunctions	• Accidental release. • Failure of erosion and sediment control measures • Failure of turbines and/or associated equipment	• Development and implementation of EPP, including a spill prevention plan. • Development and implementation (as necessary) of contingency plans. Including regular contact with area first responders.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible-Low	N	**N/A**
Socio-Economic Component	Potential Impact	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Local Economy	• Economic spinoffs from wind farm. • Increased tax revenue from turbines will likely increase local infrastructure projects.	n/a	Scope: Regional Duration: Long-Term Frequency: Intermittent Magnitude: Low	tax revenue in the area.	**High**
Property Values	• Decreased property values near operational wind farm.	• Maintain open dialogue between Project team and community to address property value issues as they arise. • Use a minimum 1 km buffer between homes and turbines to mitigate effects on property values. • Forest covered area will reduce visual impacts and effects on property values.	Scope: Regional Duration: Medium-Term Frequency: Intermittent Magnitude: Moderate	Potential decrease in property values.	**Low**
Tourism and Recreation	• Increased wind-based tourism and recreation in	n/a	Scope: Regional Duration: Long-Term	Increased tourism and economic	**Low**

	surrounding area.		Frequency: Continuous Magnitude: Low	spinoffs.	
Human Health	• Increased health problems of local residents.	• Maintain open dialogue between Project team and community to address health issues as they arise. • Use a minimum 1km buffer between homes and turbines to mitigate effects on residents' health.	Scope: Local Duration: Long-Term Frequency: Intermittent Magnitude: Moderate	Minimal health issues.	**Low**
Radar/radio Interference	• Impacts on electromagnetic generators and users	• Licensees of all possibly conflicting communication systems will be notified to assess interferences and mitigate if required. Contact outstanding stakeholders to determine extent of impact.	Scope: Local Duration: Long-term Frequency: Continuous Magnitude: Low	Minimal interference with broadcasting reception and communication systems.	**Low**

Table 8.6: Environmental Effects Analysis – Decommissioning Phase

Environmental Component	Potential Impact	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Wetlands	• Disturbance of hydrologic regime and sedimentation	• Development and implementation of EPP. • Avoid wetland habitat to the extent possible. • If wetland habitat is removed as a result of construction, it will be re-established after decommissioning.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Low	N	**N/A**
Flora SAR	• Removal of vegetation.	• Development and implementation of EPP. • Re-establish vegetation. • Limit access to existing roads only and limit time on-site.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Low	N	**N/A**
Mammal SAR	• Increase in site activity.	• Avoid critical habitat, limit access to existing roads only and limit time on-site.	Scope: Local Duration: Short-term Frequency: Intermittent Magnitude: Negligible	N	**N/A**
Avifauna	• Sensory disturbance.	• Limit access to existing roads only. • Limit time on-site. • Avoid activities during breeding/nesting season, to the extent possible. • Restore habitat to the extent possible following decommissioning.	Scope: Local Duration: Short-term Frequency: Intermittent Magnitude: Negligible	N	**N/A**
Sound	• Increased noise	• Operate site during normal	Scope: Local	N	**N/A**

Environmental Component	Potential Impact	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
	due to construction activities.	working hours. • Keep community informed regarding periods of significant noise. • Develop a noise complaint response protocol.	Duration: Short-term Frequency: Intermittent Magnitude: Negligible		
Accidents and Malfunctions	• Accidental release. • Failure of erosion and sediment control measures	• Development and implementation of an EPP, including a spill prevention plan. • Development and implementation (as necessary) of contingency plans.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible-Low	N	**N/A**
Socio-Economic Component	Potential Impact	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Local Economy	• Employment of local people.	n/a	Scope: Regional Duration: Short-Term Frequency: Once Magnitude: High		**High**
Tourism and Recreation	• Decreased tourism and recreation in surrounding area due to decommissioning activities.	• Project is in a low tourism area and far from larger tourist centres, thus few impacts are expected and little mitigation is required. • Avoid peak tourist events (i.e. Stan Rogers Folk Festival)	Scope: Local Duration: Short-Term Frequency: Once Magnitude: Negligible	Minimal to no decrease in tourism and recreation activities.	**Minimal/None**

Human Health	• Increased health problems of local residents.	• Activities to occur during normal working hours. • Keep community informed of periods of significant noise. • Use dust control measures for air quality.	Scope: Local Duration: Short-Term Frequency: Intermittent Magnitude: Low	Minimal health issues.	**Low**
Cultural and Heritage Resources	• Disruption of cultural and heritage resources from decommissioning activities.	• Refer to findings from archaeological reconnaissance study conducted before Project construction to ensure historical resources are not disrupted during decommissioning.	Scope: Local Duration: Short-Term Frequency: Once Magnitude: Low	Minimal to no disruption of cultural and heritage resources.	**Minimal/None**

9. EFFECTS OF THE ENVIRONMENT ON THE UNDERTAKING

Environmental factors that have the potential to have damaging effects on wind turbines include:

- Extreme wind (typically associated with hurricanes);
- Hail;
- Ice storms/ice formation;
- Heavy snow;
- Lightning; and
- Fire.

Such extreme events may occur in Nova Scotia and, therefore, must be considered in terms of the potential adverse effects on the Project.

Modern wind turbines are equipped with a number of mechanisms to reduce damage caused by extreme weather and are designed to shut down when certain thresholds are detected (CanWEA, 2011). Further, best practices and industry standards will be applied to the operation of the Project to manage risks of damage from extreme events. Table 9.1 demonstrates potential effects resulting from environmental events and the mitigation associated with each.

Table 9.1: Effects of Environmental Events and Associated Mitigation

Environmental Event	Effect	Mitigation
Hurricane/extreme winds	Damage to blades	Turbine engineering design equipped to shut down
Hail	Damage to blades	Turbine maintenance according to best practices and industry standards
Ice storms	Ice formation, potential ice throw	• Turbine engineering design equipped to shut down; • Appropriate safety protocol for wind farm site; • Restrict use of wind farm site; • Signage to indicate potential falling ice
Heavy snow	Damage to turbines	Turbine engineering design equipped to shutdown
Lightning strike	• Potential fire during operation • Damage to electrical systems	• Turbine engineering design equipped with built-in grounding system; • Appropriate safety protocol for wind farm site
Fire	Fire during construction due to materials and machinery	• Appropriate safety protocol for wind farm site; • Fire prevention plan; • Evacuation plan; • Local training of first responders

More detail on ice formation and ice throw is provided in Section 5.5.4.

The primary mitigating measure employed during the construction and operation of the Project will be education and training of personnel. Environmental and safety orientations will be conducted prior to start of construction, and all staff will be informed of potential effects of damaging environmental factors on the Project. Long term staff responsible for the operation and maintenance of the wind farm will be trained and briefed on the design and operation of the turbines and educated on applicable operating procedures, safety protocols and evacuation plans.

10. CUMULATIVE EFFECTS ASSESSMENT

Concerns are sometimes raised about the long-term changes that may occur not only as a result of a single action but of the combined effects of each successive action on the environment (Canadian Environmental Assessment Agency, 2010).

Cumulative effects have been assessed for the Project by taking into consideration the potential residual effects identified in Section 7, as well as potential effects associated with activities that have taken place in the past, those that currently exist, and those that will imminently take place in the surrounding area.

10.1 Activities Near the Project

The Project is located within a rural setting in Nova Scotia with limited commercial/industrial development within close proximity to the Property Boundary. The nearest towns include Canso (1.9 km), Little Dover (4.8 km), Guysborough (40 km) and Hazel Hill (1.9 km).

Activities that could potentially interact cumulatively with the Project are evaluated in Table 10.1.

Table 10.1: Potential interactions with the Project

Activity	Status of Activity	Location of Activity	Potential Cumulative Effect Expected	Cumulative Effect Interaction
Agricultural practices	Historical and ongoing	Land bordering the Property Boundary and within the local community.	No	N/A
Small businesses and local economy	Historical and ongoing	Various locations in the local area	Yes	• Increase in jobs and economic opportunities

Activity	Status of Activity	Location of Activity	Potential Cumulative Effect Expected	Cumulative Effect Interaction
Stan Rogers Folk Festival	Historical and ongoing	Canso (1.9 km)	Yes	• Increased sound in local community during festival

10.2 Significance of Cumulative Effects

10.2.1 Birds, Other Wildlife, and Habitat

Wildlife fatality, in particular avifauna, has been identified as a residual effect of the Project. However, avifauna mortality, as a result of collisions with overhead power lines, vehicles and buildings, is well documented as well. Evidence cited by Erickson et al. (2001), NAS (2007) and Manville (2009) in NWCC 2010, state that, although only general estimates are available, the number of birds killed in wind developments is substantially lower, relative to estimated annual bird casualty rates from a variety of other anthropogenic factors including vehicles, buildings and windows, power transmission lines, communication towers, toxic chemicals (including pesticides), and feral and domestic cats (NWCC, 2010). Therefore, the incremental contribution of the Project to avifauna mortality is unlikely to result in a population based cumulative effect.

10.2.2 Sound Impacts

The sound analysis indicates that acceptable sound levels are expected to be produced during the operational phase of the Project. Although there are other sources of noise during particular times of the year (i.e. the Stan Rogers Folk Festival), the Project is only expected to contribute an incremental increase in sound overall during these times. Therefore, the cumulative effect of the Project with other activities on sound is not considered significant.

10.2.3 Small Businesses and Local Economy

It is expected that approximately 30-40 people may take an active role in the Project during the construction phase. In addition, local business can expect to see spinoff, and the Municipality of the District of Guysborough shall benefit from increased tax revenues. Therefore, a positive cumulative economic effect is expected for the local area.

11. FOLLOW UP MEASURES

11.1 Bird and Bat Post-Construction Monitoring

In order to determine any effects that the Project has on avifauna, a 1-2 year follow up study will be carried out. This will consist of carcass searches around

the turbines and repetition of the baseline bird studies where possible. A monitoring plan will be developed in discussion with CWS, DNR and NSE.

11.2 Environmental Protection Plan

An EPP will be developed and approved by NSE prior to start of construction of the Project. The EPP will detail best practices and mitigative measures to be employed during construction to minimize environmental impacts.

11.3 Future Studies

The Proponents recognize the need for follow up studies prior to start of construction of the Project to address remaining issues around specific VECs. Please note that these studies will only be required following successful award of the RFP. Table 11.1 details future studies required and timing of each but are dependent on RFP award and seasonal constraints.

Table 11.1: Future Studies Required for the Project

Future Study	Timing	Scope
MEKS	2012/2013	Entire Property Boundary + 5km buffer area
Archaeological Screening and Reconnaissance	2012/2013	Areas of disturbance (turbines and roads)
Field confirmation for wetlands, watercourses and rare plants	2012/2013	Micro-siting of plant species within turbine pads, roads and associated buffers; Potentially as well as micro-siting of potentially impacted wetlands in relation to Project infrastructure to determine total area of impacts and applicability of NSE Wetland Policy.
Pre-construction Bird Monitoring	2012/2013	Four seasons of bird surveys and migration season acoustic work to determine species presence relative to turbine locations and habitat.
Pre-construction Bat surveys	2013	Acoustic and population studies to determine bat species and habitat use of Project Area.
Transportation Study	2012/2013	Determine access routes
Radar/Telecommunications assessment	2012/2013	Agency consultations, onsite surveys to determine potential impacts of Project on radio communications and radar sytems

12. OTHER APPROVALS

In addition to the EA Approval, several other permits and/or approvals will be required prior to the start of construction. A list of potential permits and approvals can be found in Table 12.1

Table 12.1 List of Permits/Approvals Potentially Required

Approval/Notification/Permit Required	Government Agency
Wetland Alteration Approval (for areas that are not exempt from the Policy)	Nova Scotia Environment
Watercourse Alteration Approval	Nova Scotia Environment
Environmental Protection Plan	Nova Scotia Environment
Notification of Blasting (if required)	Nova Scotia Environment
Concrete Batch Plant (if required)	Nova Scotia Environment
Special Move Permit	Service Nova Scotia
Access Permit	Nova Scotia Transportation and Infrastructure Renewal
Work within Highway Right-of-Way	Nova Scotia Transportation and Infrastructural Renewal
Final design locations and height of turbines	NAV Can and DND
Lighting design for navigational purposes	Transport Canada
Methodology to conduct post-construction bird/bat impact assessments	CWS
Scientific permit to collect bird carcasses	CWS

13. CONCLUSIONS

In accordance with NSE's Guide for Wind Proponents the studies, regulatory assessments and valued ecosystem component evaluations described within this document have been considered both singularly and cumulatively. These bodies of work indicate that there are no significant environmental concerns or impacts that may result from the Project that cannot be effectively mitigated or monitored. Best practices and standard mitigation methods will be implemented during all phases of the Project, as described within Section 4 and 5 to ensure methods and practices are comprehensively adhered to. An environmental protection plan will be developed, approved by NSE, and communicated to all employees working on the Project.

Although turbine locations have not yet been finalized, an optimized layout has been evaluated for 2.3 – 3 MW machines, up to a maximum total nameplate capacity of 13.8 MW. A maximum of 6 turbines are to be located within the Property Boundary. Where possible, the layout will accommodate buffers applied to VEC's.

Several studies recommended by NSE guidelines have been completed; any outstanding studies are not expected to impact the conclusions of the EA, but they could impact final turbine placement. These additional studies will be provided to NSE as soon as they have been finalized.

Impacts on the surrounding residents have been considered and with a buffer of at least 1 km, it was found that the majority of issues have been mitigated (i.e. sound, visual, land value, etc.).

The land which is being proposed for the Project currently does not have significant economic value. Therefore the Project is expected to bring significant economic benefits to the surrounding communities; in addition, the Municipality of the District of Guysborough will benefit from increased tax revenues.

Nova Scotia is a champion in renewable energy development, both in Canada and worldwide, with a target of 25% electricity generated by low impact renewables by 2015. Furthermore, Nova Scotia is the only jurisdiction in North America with absolute caps on greenhouse gas (GHG) emissions from the electricity sector (Renewable Electricity Plan, Nova Scotia Energy, April 2010). The Sable Wind Project will contribute to Nova Scotia's efforts in meeting its renewable energy and greenhouse gas emission targets.

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15. APPENDICES