5. SOCIO-ECONOMIC CONDITIONS AND EFFECTS MANAGEMENT

5.1 Economy

The Project Area is sparsely populated by the small communities of Waterville, Vaughan, New Russell, Leminster, and Smiths Corner. A number of lakes are located inside or near the Project boundary including South Canoe Lake, Card Lake as well as Lewis Lake to the west and Falls Lake to the east. Most of these lakes have varying water levels throughout the year due to hydro power activities, rain and evaporation controlling lake levels. There are no known commercial fisheries on any of the lakes within the project boundaries nor immediately adjacent to the Project.

The Project Area is located on land in Lunenburg County (Municipal District of Chester) and borders Hants County (Municipal District of West Hants). The largest towns in Lunenburg County include Bridgewater (pop. 7,944), Lunenburg (pop. 2,312), Chester (pop. 2,292), New Ross (pop. 1,700) and Mahone Bay (pop. 904)). In Hants County, the largest towns are Windsor (pop. 3,709) and Hantsport (pop.1,191) (Statistics Canada, 2006). The nearest towns to the Project Area are New Ross (10.5km5 km), Chester (30 km) and Windsor (31 km). The municipalities and towns therein will economically benefit from the Project, especially by means of tax revenues in the Municipal District of Chester, as well as job creation and economic spinoffs (i.e. hospitality services, shopping and entertainment) in the area. The Project would provide a boost to local construction employment and give local labourers an opportunity to work in the area. Due to the close proximity to Hants County and the communities within that county close to the Project, demographics for Hants County are presented within the EA registration document.

5.1.1 Demography

Population has risen slightly in Hants County and the Municipal District of West Hants and has declined in Lunenburg County and the Municipal District of Chester - this trend is in contrast to a 3.8% population growth in the Halifax Regional Municipality (HRM) (Statistics Canada, 2006). Population decline in Lunenburg and increase in HRM is likely a result of rural-urban migration towards greater employment opportunities in the HRM. Table 5.1 below outlines demographic statistics for the Counties of Lunenburg and Hants and the Municipal Districts of Chester and West Hants.

Table 5.1 Population in Lunenburg and Hants County and MDs of Chester and West Hants, 2006

Population Statistics	Lunenburg County	Hants County	MD of Chester	MD of West Hants
Population in 2006	47,150	41,182	10,741	13,881
Population in 2001	47,591	40,513	10,781	13,780
Population change from 2001-2006 (%)	-0.9	1.7	-0.4	0.7

Total private dwellings in 2006	24,786	17,277	6,161	6,101
Land area (km^2)	2,907.93	3,049.08	1,120.75	1,238.12
Population density (per $km^{2)}$	16.2	13.5	9.6	11.2

Source: Statistics Canada, 2006

The age distribution in Lunenburg and Hants Counties reveals an older population in Lunenburg County where the median age is 46 years compared to the median age of Hants County (41.1), the Province of Nova Scotia (41.8), and HRM (39.0) (Statistics Canada, 2006). Similarly, the Municipal District of Chester has an older median age (46.5 years) than West Hants (42.3 years) (Statistics Canada, 2006). Comparing rural and urban median age in Nova Scotia, there are younger segments living where there are more job opportunities (i.e. HRM). A breakdown of age distribution in Lunenburg and Hants Counties and in the Municipal Districts of Chester and West Hants is outlined in Table 5.2 below.

Table 5.2: Age in Lunenburg and Hants County and MDs of Chester and West Hants, 2006

Age Statistics	Lunenburg County	Hants County	MD of Chester	MD of West Hants
0 - 14 years	6,555 (13.9%)	7,475 (18.1%)	1,510 (14.1%)	2,350 (16.9%)
15 - 64 years	31,645 (67.1%)	28,040 (68.1%)	7,215 (67.2%)	9,550 (68.8%)
65+ years	8,950 (19%)	5,670 (13.8%)	2,020 (18.8%)	1,980 (14.3%)
Total Population	**47,150 (100%)**	**41,182 (100%)**	**10,470 (100%)**	**13,880 (100%)**

Source: Statistics Canada, 2006

Comparing costs, Lunenburg County's average housing cost is $24,742 higher than that of Hants County and $15,183 higher than the provincial average (Statistics Canada, 2006). Following this trend, the Municipal District of Chester has a high average housing cost at $209,559; $75,376 higher than the average cost in the Municipal District of West Hants (Statistics Canada, 2006). As for median earnings for full-time, full year earners, Nova Scotians ($36,917) have lower earnings than the national median ($41,401) (Statistics Canada, 2006). Lunenburg and Hants Counties fall below the provincial median earnings while the Municipal District of Chester median earnings are higher (Statistics Canada, 2006). Table 5.3 below outlines the housing costs and median earnings for our areas of interest.

Table 5.3: Household Costs (2006) and Median Earnings for Full-Time, Full Year Earners (2005)

Jurisdictions	Average Housing Cost	Median Earnings
Lunenburg County	$173,183	$34,802
Hants County	$148,441	$36,146
Municipal District of Chester	$209,559	$38,710
Municipal District of West Hants	$134,183	$34,561
Province of Nova Scotia	**$158,000**	**$36,917**

Source: Statistics Canada, 2006

5.1.2 Public Usage Areas and Health Care & Emergency Services

Public usage areas near the Project Area consist of a Provincial Picnic Park at Card Lake, a Rotary Kids Camp on Mockingee Lake, and a Community Hall in Upper Vaughan. Public usage areas in the nearby town of New Ross include fair grounds, fire halls, a church, a community centre, a family resource centre, and a school.

Of importance to the health and safety of Project workers, the Town of Windsor and the nearby community of Vaughan have fire halls on Highway 14 and the Municipal District of Chester has seven volunteer fire departments, with operations close to the Project Area in New Ross and Chester. The volunteer fire department offers fire, medical, first response, motor vehicle collision, and water rescue services (Municipality of the District of Chester Fire & Emergency Response, 2011). High-angle rescue services in the area are offered by fire departments in HRM and Kentville. Health services in the region include South Shore Health providing hospital-based services to Lunenburg and Queens Counties, the Hants Community Hospital (Capital Health) in Windsor, and the Chester Community Clinic (South Shore Health, 2011; Capital Health, n.d.). Ultimately, health and emergency services exist in the area and are accessible to Project workers if the need should arise.

5.1.3 Labour and Employment Rates

Employment and unemployment rates for January 2012 in the Annapolis Valley (includes Hants County) and Southern (includes Lunenburg County) Economic Regions indicate that the unemployment in the Southern Region (9.7%) was higher than the provincial average (8.2%) but was lower in the Annapolis Valley (7.5%) (Statistics Canada, 2012). With regard to employment rates, the Annapolis Valley (53.1%) and Southern (53.5%) regions had similar rates which were lower than the provincial rate (57.9%) (Statistics Canada, 2012).

A review of businesses located in close proximity to the Project Area is outlined in Table 5.4 below and reveals few existing businesses.

Table 5.4: Local Businesses and Proximity to Property Boundary

Business	Distance and direction to Property Boundary*
Lakeside Variety Irving - Irving gas station, Kwik Way convenience store and NSLC	5 km northeast, on corner of Highway 14 and New Ross Road
Kaizer Meadow Environmental Management Centre	2.5 km southeast, on Kaizer Meadow Road
Rainbow Net and Rigging Limited (fishing equipment cleaning)	4 km southeast, on Kaizer Meadow Road
Falls Lake Resort (build, buy, rent cottages) and Falls Lake Department of National Defense Recreation Centre (for former military and RCMP staff only)	5 km Northeast, off New Ross Road
Sherwood Golf Course	1 km south, off Highway 14
L.E Elliott Lumber Saw Mill	10 km southwest

Christmas Tree Farms	Surrounding Project Area
Small, family-owned excavation, trucking and tree trimming businesses	Surrounding Project Area

*All distances measured from the nearest Project Boundary

The next largest town within proximity to the Project is New Ross (pop. 1,700), approximately 10.5 km south west of South Canoe Lake. Businesses of interest in New Ross include:

- L.E Elliott Lumber Saw Mill headquarters;
- Canadian Bread Atlantic Bakery Outlet;
- Ross Farm Museum, a living heritage farm that is open year round to tourists;
- Home Hardware;
- Clover Farm Grocery Store;
- NSLC;
- Vittles Café;
- Professional Centre with Hair Salon and Christmas Tree Interpretation Centre;
- Blacksmith;
- Gas Station;
- Outdoor power equipment store;
- HC Sanders and Sons Limited, tree farming;
- Auto Service Station; and
- Credit Union.

The primary economic sector in the area immediately surrounding the proposed Project Area is forestry and Christmas tree farming as well as, but to a lesser extent, cottage tourism, hunting, and fishing.

Evaluating the experienced labour force and sectors of employment in Lunenburg County, the highest proportion of residents work in manufacturing (17.3%), followed by retail trade (12.7%), health care and social assistance (11.1%), and construction (8.2%). Specifically in the Municipal District of Chester, the largest proportion of total experienced labour force works in manufacturing (17.2%), followed by health care and social assistance (11.4%), construction (11.3%), and retail trade (10.4%). Manufacturing ranks high due to marine manufacturing, shipbuilding, machine shops, metal works, production of house building materials, plastics and aerospace businesses in the towns of Chester and Lunenburg (Town of Lunenburg, 2012; Chester Area NS, 2010a).

Located near the Project Area, the Town of Chester has numerous shops, restaurants, and accommodation, making it ideal to support wind farm workers. As a result, Chester's retail, restaurants, and hotel businesses would see economic spinoffs from the Project. It is important to note that industry categories in the 2006 Census appear to separate activities that would fall under the category of 'tourism services', notably categories such as 'retail trade', 'accommodation and food services', 'arts, entertainment and recreation', and 'information and cultural industries'. If these

categories were grouped together under 'tourism services', they would make up the largest proportion of the labour force in Lunenburg County (21.2%) and the Municipal District of Chester (19.9%). Table 5.5 below outlines in greater detail the 2006 labour force of Lunenburg County and the Municipal District of Chester, by industry.

Table 5.5: Labour Force by Industry in Lunenburg County and the Municipal District of Chester, 2006

Industry	Total Lunenburg County	Industry	Total MD Chester
Total experienced labour force 15 years +	21,495	**Total experienced labour force 15 years +**	4,860
Manufacturing	3,715	**Manufacturing**	840
Retail trade	2,740	**Health care and social assistance**	555
Health care and social assistance	2,385	**Construction**	550
Construction	1,765	**Retail trade**	505
Agriculture, forestry, fishing and hunting	1,435	**Public administration**	290
Accommodation and food services	1,250	**Education services**	275
Administrative support, waste management and remediation services	1,175	**Accommodation and food services**	255
Education services	1,150	**Agriculture, forestry, fishing and hunting**	230
Public administration	1,135	**Administrative support, waste management and remediation services**	220
Other services	985	**Professional, scientific and technical services**	205
Professional, scientific and technical services	695	**Other services**	190
Transportation and warehousing	645	**Wholesale trade**	185
Wholesale trade	630	**Arts, entertainment and recreation**	130
Arts, entertainment and recreation	475	**Transportation and warehousing**	125
Finance and insurance	440	**Finance and insurance**	110
Information and cultural industries	365	**Information and cultural industries**	80
Real Estate	305	**Real Estate**	50
Mining and oil and gas extraction	115	**Mining and oil and gas extraction**	40
Utilities	80	**Utilities**	15

Source: Statistics Canada, 2006

According to the 2006 Census, Hants Counties' largest proportion of experienced labour force work in retail trade (11.9%), followed by manufacturing (10.8%), construction

(10.7%), and health care and social assistance (9.8%). Specifically, in the Municipal District of West Hants, the largest proportion of experienced labour force works in construction (12.2%), followed by retail trade (11.5%), manufacturing (11.2%), and health care and social assistance (10.4%). When grouping categories of 'retail trade', 'accommodation and food services', 'arts, entertainment and recreation', and 'information and cultural industries' into a 'tourism services' category, this comprises 19% of Hants and 18% of West Hants' labour forces.

In terms of local skills, a list of trades workers in Vaughan has been provided to the Project team outlining the presence of experienced welders, carpenters, construction workers, heavy equipment operators, contractors, electricians, mechanics, and general labourers (provided by the local MLA). For the Town of Windsor in particular, major industries include agriculture (from surrounding areas), stone monument manufacturing, and service industries (Town of Windsor, 2012). Like Chester, Windsor is also located near the Project Area and is well suited to accommodate Project workers and to receive economic spinoffs. Table 5.6 below outlines in greater detail the 2006 labour force of Hants County and the Municipal District of West Hants by industry.

Table 5.6: Labour Force by Industry in Hants County and the District Municipality of West Hants, 2006

Industry	Total Hants County	Industry	Total MD West Hants
Total experienced labour force 15 years +	19,560	**Total experienced labour force 15 years +**	6,410
Retail trade	2,320	**Construction**	780
Manufacturing	2,105	**Retail trade**	740
Construction	2,085	**Manufacturing**	715
Health care and social assistance	1,925	**Health care and social assistance**	665
Transportation and warehousing	1,390	**Education services**	405
Public administration	1,350	**Professional, scientific and technical services**	400
Other services	1,350	**Transportation and warehousing**	380
Education services	1,210	**Other services**	375
Agriculture, forestry, fishing and hunting	970	**Public administration**	340
Accommodation and food services	950	**Agriculture, forestry, fishing and hunting**	300
Administrative support, waste management and remediation services	930	**Wholesale trade**	295
Wholesale trade	885	**Accommodation and food services**	250
Professional, scientific and technical services	825	**Administrative support, waste management and remediation services**	210
Finance and insurance	565	**Finance and insurance**	165

Arts, entertainment and recreation	265	**Mining and oil and gas extraction**	120
Mining and oil and gas extraction	260	**Arts, entertainment and recreation**	90
Real Estate	230	**Information and cultural industries**	75
Information and cultural industries	195	**Real Estate**	70
Utilities	95	**Utilities**	35

Source: Statistics Canada, 2006

In brief, major employment sectors in the study area are retail trade, manufacturing, construction and health care and social assistance, and when combining particular categories, 'tourism services' becomes the primary industry. As a result, there will be ready access to local skilled labour and required hospitality services for wind farm development. The Municipal Districts of Chester and West Hants are both poised to economically benefit from job creation (matched with existing skill sets) and economic spinoffs from workers' spending on food, accommodation, and arts and entertainment in the region.

5.1.4 Economic Effects and Mitigation

Economic impacts in the study area will be diverse and will include job creation, economic spinoffs to local businesses, and increased revenue for municipalities. As outlined in the *Wind Turbine Facilities Municipal Taxation Act*, 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 at the Projects' commissioning 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 100 MW wind farm, approximately 141 PYE 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 sourced to the greatest extent possible and economically feasible. Since manufacturing and construction are major sectors in Lunenburg and Hants Counties, it is expected that resources will be readily available within the surrounding communities. Due to Project proximity to Halifax, professional services from scientists, engineers and large general contractors would be easily accessible.

A study from the Universite de Moncton outlines a $200 million required investment and expenditure for a 100MW wind farm; this is similar to the proposed Project (Gagnon, Leclerc, & Landry, 2009). During the construction phase of the Project there will likely

be 100-150 on site and off site employment opportunities, with approximately 4-5 jobs being created for the longer term operations and maintenance phase of the Project.

Types of jobs will consist of:

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

Spending from Project 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 sections 2.4.

5.2 Land Use and Value

5.2.1 Existing Land Use and Value

Presently, the area surrounding the Project Area is primarily used for forestry and Christmas tree farming activities. The property on which the wind farm is proposed to be built is almost entirely owned by Timberland Holdings (approx. 747 ha owned by Atlantic Star Forestry; lease agreement pending), an affiliated company of MBPP, and is currently not being used for other economic activities due to undesirable lumber market conditions.

5.2.2 Land Use and Value Effects and Mitigation

There will be no impact on forestry and Christmas tree activities since the majority of land within the Project boundary is owned by Timberland Holdings and is not currently being used for such activities.

The impact of wind farms on property values is a very local concern. Recently, media coverage in Canada, especially from Ontario, has raised concerns about reduced property values as a result of nearby wind farm developments. In this coverage, a reduction in property values is claimed to be as a result of perceived ill environmental and health effects as well as the visual esthetics of turbines. It is important to note that a person's desire to live near a wind farm is completely subjective making it difficult to generalize wind development impacts on property values. Notably, few peer-reviewed, comprehensive, and statistically rigorous studies have been conducted on the effect of wind developments on property values, signaling a need for more research on the topic.

One study looking at wind development proximity and property values shows that before Project approval, property values decreased as a result of fear of unknown effects – this is known as *anticipation stigma*. However, once operational, property values rebounded due to a greater understanding of wind development effects (Hinman, 2010). As a result, Hinman (2010) refutes the existence of *wind farm area stigma theory* and emphasizes that no general conclusions be made from studies on this topic, simply that findings should be interpreted as site-specific. The most comprehensive study of the impact of wind farms on property values was completed by Hoen et al. (2009) where residential home sales near twenty-four wind 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 states 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 South Canoe Wind Project. Nonetheless, a large 1,200m buffer from turbine to dwelling should assist in mitigating effects on property values. Comparing buffer sizes, HRM passed a by-law on August 16, 2011 requiring all wind turbines be at least 1 km from a residential dwelling (upgraded from 550 m). The 1.2 km setback is the largest proposed buffer from resident to turbine of any wind project currently with an Environmental Assessment published on the Nova Scotia Environment website.

5.3 Recreation and Tourism

5.3.1 Existing and Planned Recreation and Tourism

Existing outdoor recreation in the area includes hunting, fishing (i.e. trout fishing in Card Lake), snowmobiling, ATVing, and hiking and boating (non-motorized) along trails and waterways near Card Lake Provincial Park (Trail Peak, 2010). There are wildlife associations serving the area, notably the Hants West Wildlife Association in Hantsport, the Lunenburg County Wildlife Association, the Lunenburg Rod and Gun Club, and the Big Game Society of Nova Scotia in Windsor (Nova Scotia Federation of Anglers and Hunters, 2012). For hiking, New Ross offers the New Ross Community Trail and New Ross Lions Park near Ross Farm Museum on Highway #12 and un-official trails located on the Project Area are used by recreationists in the area (Chester Area NS, 2010b; Trail Peak, 2010). The area is also home to the Shore Riders ATV Club in Chester Basin and the Hants Sno-Dusters snowmobilers club in Falmouth (Shore Riders ATV Club, 2012; Hants Sno-Dusters, 2011).

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 Hantsport and Windsor in the Fundy Shore Annapolis Valley Region were examined as well as the communities of Chester, Hubbards, Lunenburg, Mahone Bay and New Ross in the South Shore Region. 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 in Nova Scotia, 2010

Region/Community	Total Trips (% who stopped or stayed)	Capture Rate (%)
Fundy Shore and Annapolis Valley	37%	
Hantsport	2%	4%
Windsor	5%	14%
South Shore	27%	
Hubbards	1%	4%
Chester	7%	24%
Mahone Bay	11%	42%
Lunenburg	13%	49%
New Ross	0%	2%

Source: NSDERDT, 2011

The data shows tourism in Hantsport, Windsor, Hubbards, and New Ross is not a major economic driver. Although New Ross is home to the Ross Farm Museum, there are no hotels, motels, or bed & breakfasts to accommodate overnight tourists. Comparatively, communities such as Chester, Mahone Bay, and Lunenburg were more popular destinations. While visiting the area closest to the Project, the primary tourism activity appears to be cottage vacationing and lake activities.

5.3.2 Recreation and Tourism Effects and Mitigation

The popular tourist towns of Chester, Mahone Bay and Lunenburg are not located close enough to the Project Area to have their tourism sectors negatively affected by construction and operation activities. From Card Lake, the Town of Chester is 31 km away, Mahone Bay is 46 km away, and Lunenburg is 55 km away. Most cottages are located on lakeshores and will reside within the planned buffer zone (from shoreline to wind turbine) and not be affected by the wind development.

In terms of impacts of the Project's architecture on landscape aesthetics and viewplanes, some tourists visiting or cottageing in the area will be able to see wind turbines. A Visual Impact Study has been completed for surrounding areas to the public areas around the Project Area. The most predominate view will be from the New

Russell Road. Turbines will be visible from Card Lake Provincial Park; however, the closest turbine is more than 2 km away. For information on the Visual Impact Study, see Section 6.1.

A 2002 study from MORI (Market & Opinion Research International) interviewed tourists visiting Argyll and Bute, Scotland and asked them about their attitudes towards the presence of wind farms in the area. Of those who knew about the surrounding wind farms (40% of those interviewed), 43% felt that wind farms had a positive effect on the area, 43% felt it made no difference, and 8% felt it had a negative effect (MORI, 2002).

It is difficult to determine with certainty how tourists will react to a wind development; however, Project construction likely will not negatively impact larger tourist centres such as Chester and Windsor. The attitude of tourists visiting the local area will be entirely subjective; the presence of turbines may deter or attract tourists to the local area.

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

Shadow flicker can occur when rotating blades cast flickering shadows during times of direct sunlight. The magnitude of shadow flicker is determined by the position and height of the sun, wind speed and direction, geographical location, time of year, cloud cover, turbine hub height and rotor diameter, and proximity to the turbine (CanWea, 2011).

A shadow flicker assessment was completed for the proposed Project to assess the potential impact on surrounding shadow receptors. The analysis was conducted using the WindPRO version 2.7 software package. For the purpose of this assessment, a layout using 50 potential turbine locations to represent a worst case scenario was modelled.

A list of 119 receptors, within 2 km of the Project Area, was developed using GIS data from the Nova Scotia Geomatics Centre and aerial imagery. For modelling purposes, the receptor list is considered to be conservative as no distinction has been made between habitable dwellings and barns, sheds, or outbuildings.

Based on the modelling results, all receptors are predicted to comply with the industry standard of no more than 30 minutes of shadow flicker on the worst day, and no more than 30 hours of shadow flicker per year. Receptor R, located approximately 1,368 m from the nearest turbine, is expected to experience the most shadow flicker; with a maximum of 22 minutes per dayand19:16 hours per year.

Modelling results are summarized in Appendix G.

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 CanWea, there are four potential sources of EMFs 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 EMFs and studies have shown little negative health effects from EMFs (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 further states; “You do no 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.

The 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.

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 can occur when ice accumulates on turbine blades and is thrown off while the turbine is operational. Ice shed occurs when ice falls off an idling turbine. Both events can pose a safety hazard to people and equipment on site. Ice can be thrown as far as 100 m and very seldom will the distance exceed twice the total height of the turbine (tower height plus blade length). With proper setbacks and on-sight safety awareness, hazards are minimized (Colby, 2008; Mass. DEP & MBPH, 2012). A study for the Chatam-Kent Public Health Unit cites Chatam-Kent’s minimum setback regulation of

250 m from a residential dwelling and 600 m from residential or institutional zones qualifies as a generally accepted safety with safe levels of incident probability (Colby, 2008). Typically, during periods of icing, the turbine will detect the ice and automatically shut off, allowing ice to melt and directly fall off instead of being thrown (CanWea, 2011).

5.4.5 Human Health Effects and Mitigation

Based on the predictive shadow flicker modelling, the expected worst case results at all receptor locations are significantly less than the industry standards used for this assessment. Therefore, no mitigation related to shadow flicker is recommended.

No mitigation is required for EMFs as wind turbines are not a significant source of EMFs and have few negative health effects (CanWea, 2011; SCENIHR, 2007).

Dust control measures will be used to mitigate air quality issues during the construction phase of the wind development and equipment will be properly maintained to reduce vehicular emissions. For more information on dust control measures, please see section 4.1.3.

The Project Area is anticipating minimal ice occurrence. If icing conditions are detected during operation, the turbine would automatically shut off, thus mitigating serious hazards from ice throw. As recommended in a study conducted for the Massachusetts Department of Environmental Protection (2012), signage will be placed on site to warn recreationists of ice shedding hazards and site workers will be educated on such risks to properly ensure safety. Further, if an ice event were to occur, activities within close proximity to the turbines will be restricted until ice has melted. It is not expected with the 1200m setback distance from a residence, that ice throw or ice shed will impact the general public. Additionally, the closest turbine is approximately 950 m to a public road will not impact the safety of the driving public.

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 the Canadian Wind Energy Association (Can WEA) have issued a set of guidelines which describe the methodology and provide guidelines 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. If a potential turbine location is within a consultation zone, the owner should be contacted to assess how the potential interference will impact both parties.

EMI can be created by a wind turbine and 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.

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.

For the South Canoe Project, an Electromagnetic Interference (EMI) study was completed to identify possible EMI concerns and assist with further layout design and Project development. The scope of the EMI analysis was 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 Radio Advisory Board of Canada (RABC) and Canadian Wind Energy Association (CanWEA) guidelines. Location information and frequency details were obtained from the Technical and Administrative Frequency Lists (TAFL) database, which is administered by Industry Canada, and from email communications with the Royal Canadian Mounted Police (RCMP), Department of National Defence, Canadian Coast Guard, Environment Canada, NAV CANADA and Industry Canada.

The following systems were investigated:

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

5.5.2 Electromagnetic Interference Effects and Mitigation

The TAFL database returned over 6,000 registered frequencies with locations contained in the study area (100 kilometers from the Project's center). Consultation zones were identified for 2 microwave links, 1 microwave linked station and two fixed and base stations that intersect Project lands. The study suggested that licensees of all possibly conflicting communication systems should be notified to assess interferences and mitigate if required.

The study found that television reception from local broadcasters may be affected by the wind farm, causing signal degradation or signal interruption. The Project Team will notify the local community about potential television reception issues in a Project Newsletter and on the Project website and will invite the public to notify the Project Team of issues as they arise. If a potential issue has been brought to the Project Team's attention additional assessment of the issue may be required. Appropriate mitigation will be used to deal with such issues (i.e. relocation of reception tower, purchase of taller reception tower/antenna for TV/radio, purchase of satellite/cable TV/radio for affected receptors).

CTV, the owner of the microwave fixed link tower mentioned above, has been consulted and no impacts are likely to occur. With regard to base stations and land mobile systems, NSPI owns the two radio stations that fall within the consultation zones and has been consulted. The radio stations (Card Lake to Big Falls Lake Dame, South Canoe Lake to Big Falls Lake Dam) are used for monitoring lake water levels and hydro generating facilities in the area. Preliminary analysis has been completed charting a line of sight from the two locations to Big Falls Lake Dam and the results indicate no significant interference.

NAV CANADA has provided comments on the South Canoe Wind Project stating no major objections. Turbines are marginally visible to Halifax Radar and Moncton Radar but the impact is deemed manageable with appropriate mitigation measures. It is important to note however that NAV CANADA reviewed earlier the original turbine layout and will need to be re-consulted based on the optimized layout. The proponents expect that NAV CANADA will have no issue with the optimized layout, since turbines were moved (west and south) further way from both Halifax and Moncton. To view NAV CANADA's response, please see Appendix H.

Responses indicating no expected interference have been received from the Department of National Defense (Radio Communications), Coast Guard and Environment Canada.

With regard to outstanding communications with particular groups, the Department of National Defense (Radar) is conducting a more detailed analysis and a meeting is being sought between DND and the Project Team to discuss these results. The Project Team will work with DND to address any issues they may have. Transport Canada will also be given the final layout in order to complete a lighting plan. Responses on potential conflicts from the RCMP and Industry Canada are pending.

5.6 Transportation

5.6.1 Transportation Study

A detailed transportation study was completed to determine appropriate routes and means for equipment and materials to be delivered to the Project Area (please see

Appendix I). As the turbine manufacturer has not yet been selected, the origin of the components is currently unknown. It is anticipated that as many resources and components as possible will be purchased from local suppliers and manufacturers. As such, the transportation study assessed transporting tower components from the DSTN facility in Trenton, Nova Scotia. It is important to note that this decision has not been made, as an economic feasibility study must first be completed as part of the turbine selection process.

A survey of proposed routes for transporting turbine components was conducted assuming tower manufacturing in Trenton, Nova Scotia and all other components arriving by rail or water to Halifax, Nova Scotia. A survey of routes from Trenton and Halifax to the Project Area revealed few slight road modifications, mostly involving the removal of signage and guardrails on Route 14. A meeting was held with the Nova Scotia Transportation and Infrastructure Renewal (TIR) to review the proposed routes and discuss any required modifications. At this meeting, TIR accepted the proposed transportation routes for the turbine components and found that all components adhered to oversized and overweight allowances.

In addition, the following permits will need to be obtained and factors will need to be considered:

- 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, if that is the case new rail and signs will be erected.
    - Any guard rail or sign removed are to be replaced immediately, if not achievable, the Proponent will make arrangements to ensure the safety of the travelling public is protected.
- 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 - 60m. 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, some may only be transported on Sundays and where required for safety, require RCMP assistance.
- Road weight restrictions, especially Spring Weight Restrictions, for heavier equipment and materials that will be transported to the site.
- Access points will be designed with proper height and width to accommodate large trucks and will adhere to commercial stopping sight distances.

The following is the proposed route from the Logistec Terminal in Halifax to the South Canoe Wind Project site:

1. Drive straight out of Logistec entrance.
2. 0.8 km turn left onto Lower Water Street.
3. When merging onto Barrington Street, stay in the left lane.
4. First set of lights on Barrington hit wire 15.6 will skip.
5. Merge from Barrington to Bedford Highway (up until this point, this is the common route out of the port).
    a. Blades will continue on Bedford Highway and exit on Highway 102. Based on the turning radius review, the blades will enter Highway 102 at Exit 1G or from Hammonds Plains Road. In the event that neither one of these two exits have adequate turning radii, blades will continue on Hammonds Plains Road to Route 213 and merge back onto Highway 103 at Tantallon.
    b. Nacelles would be preferred to exit on Highway 102 at 1G from the Bedford Highway; however, some structures may not be suitable. In this case, permission will be sought from the Province to exit at Kearny Lake from Bedford Highway, turn left onto Dunbrack , right onto the Lacewood exit to Highway 102, then exit to Highway 103 *OR* Bedford Highway, Kearny Lake, left to Dunbrack, continue to North Arm, St. Margaret's Bay Rd, exit onto Highway 103.
    c. Hubs will be transported via the Bedford Highway to Highway 102 at exit 1G.
    d. All remaining components will be transported via the Bedford Highway to Kearny Lake, to Highway 102 exit, to Highway 103.

6. From Highway 103, depending on the location of site entrances, trucks will take Exit 8 onto Route 14 or Exit 9 onto Route 12 and cut across Windsor Road to connect to Route 14. Of note, at each of these exits, it is likely that signage and guardrails will need to be removed.

The following is the proposed route from the Trenton Works Facility to the South Canoe Wind Project site:

1. Turn left out of Trenton Works onto Trenton Connector.
2. Go 0.6 km then turn left following Trenton Connector.
3. At km 2.7, there is a steel grating causeway which may pose a potential structural issue for weight; however, this route has been used in the past to transport heavier wind components and should not be a problem.
4. At km 9, turn left from Trenton Connector to Highway 106.
5. Merge from Highway 106 onto Highway 104 using sloping ramp.
6. Continue on Highway 104 to Exit 15 and enter onto Highway 102.
7. Base only will deviate from 102 at Elmsdale Exit, to Highway 214, then will turn left into Highway 2, getting back onto Highway 102 at the Enfield Exit.
8. Take Exit 4C off of Highway 102 to avoid low structure. Turn right into Glendale

Road, then left onto Cobequid, then at the end of Cobequid turn left onto Highway 101.

9. Highway 101 exit back into Highway 102.
10. Continue on Highway 102 to Highway 103.
11. From the Highway 103, depending on the location of site entrances, trucks will take Exit 8 onto Route 14 or Exit 9 onto Route 12 and cut across Windsor Road to connect to Route 14. Of note, at each of these exits, it is likely that signage and guardrails will need to be removed.

5.6.2 Transportation Effects and Mitigation

The survey of routes from Trenton and Halifax to the Project Area revealed few slight road modifications, mostly involving the removal of signage and guardrails on Route 14 and 12. To mitigate any negative effects on motorists along Route 14 and 12 during the transportation of turbine components, a notice 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 our proposed transportation routes and component transportation activities.

To the extent possible transportation through the City of Halifax 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.* 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

Davis MacIntyre & Associates Limited was contracted by Strum Environmental Ltd. to conduct an archeological resource impact assessment of the proposed South Canoe Wind Project near the Hants/Lunenburg/Halifax County boundaries. The purpose of the assessment was to determine the potential for historic and pre-contact period archeological resources within the Property Boundaries through background research. The data collected during the study assessed in the development of the Optimized Layout.

The assessment of the area within the Property Boundaries suggests historical Mi'kmaq presence in the area, notably a moderate to high potential for First Nations resources around Avon River and Big Otter and Little Otter Lakes (Davis MacIntyre & Associates Ltd., 2012). Utilizing this information, along with other constraint information, the Project Team determined that certain areas would be protected if avoided. All high potential areas are now avoided with the layout proposed within the EA registration document.

Furthermore, Card Lake, Long Bay, Dam Bay, and South Canoe Lake are of low to moderate potential for such resources as these water bodies have been significantly impacted by 20th century flooding. The optimized layout also avoids close proximity to all low-moderate potential areas, with the closest turbine being close to South Canoe Lake (approximately 200m).

Following Aboriginal presence, European settlement occurred in the eighteenth century where 50,000 acres of land in the Falmouth area was granted for farming; however, very few took up farming plots (Davis MacIntyre & Associates Ltd., 2012). Settlement likely did not occur until the mid to late nineteenth century but with little occupation in the area (Davis MacIntyre & Associates Ltd., 2012). The study further reveals that in 1931 a saw mill was located on the north end of South Canoe Lake indicating the presence of logging activities in the area (Davis MacIntyre & Associates Ltd., 2012).

5.7.2 Cultural and Heritage Resources Effects and Mitigation

Areas identified by Davis MacIntyre & Associates Limited as having a moderate to high potential for First Nations resources are located a minimum of 400 m from the proposed impact areas. Therefore, although field testing is not expected to be required throughout the 'Project Area' boundaries, it is recommended that an archaeological reconnaissance of the proposed impact areas (i.e. turbine sites, access roads, substations, other related infrastructure) be conducted prior to ground disturbance to mitigate harmful effects on cultural and heritage resources not identified in 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 and the project will adhere to provincially mandated buffers between watercourses and wind turbines, which should in turn protect the resources.

See Appendix J for a full report of the cultural and heritage resources of our proposed Project Area.

5.8 Mi'kmaq Ecological Knowledge Study

A Mi'kmaq Ecological Knowledge Study (MEKS) is required for the South Canoe Wind Project due its proximity to the Gold River Reserve (Acadia Band) and the New Ross and Pennal Reserves (Shubenacadie Band). A proposal has been received from Membertou Geomatics and a full study will be commissioned upon execution of the power purchase agreement. Please see Appendix K for a copy of the MEKS proposal.

6. OTHER CONSIDERATIONS

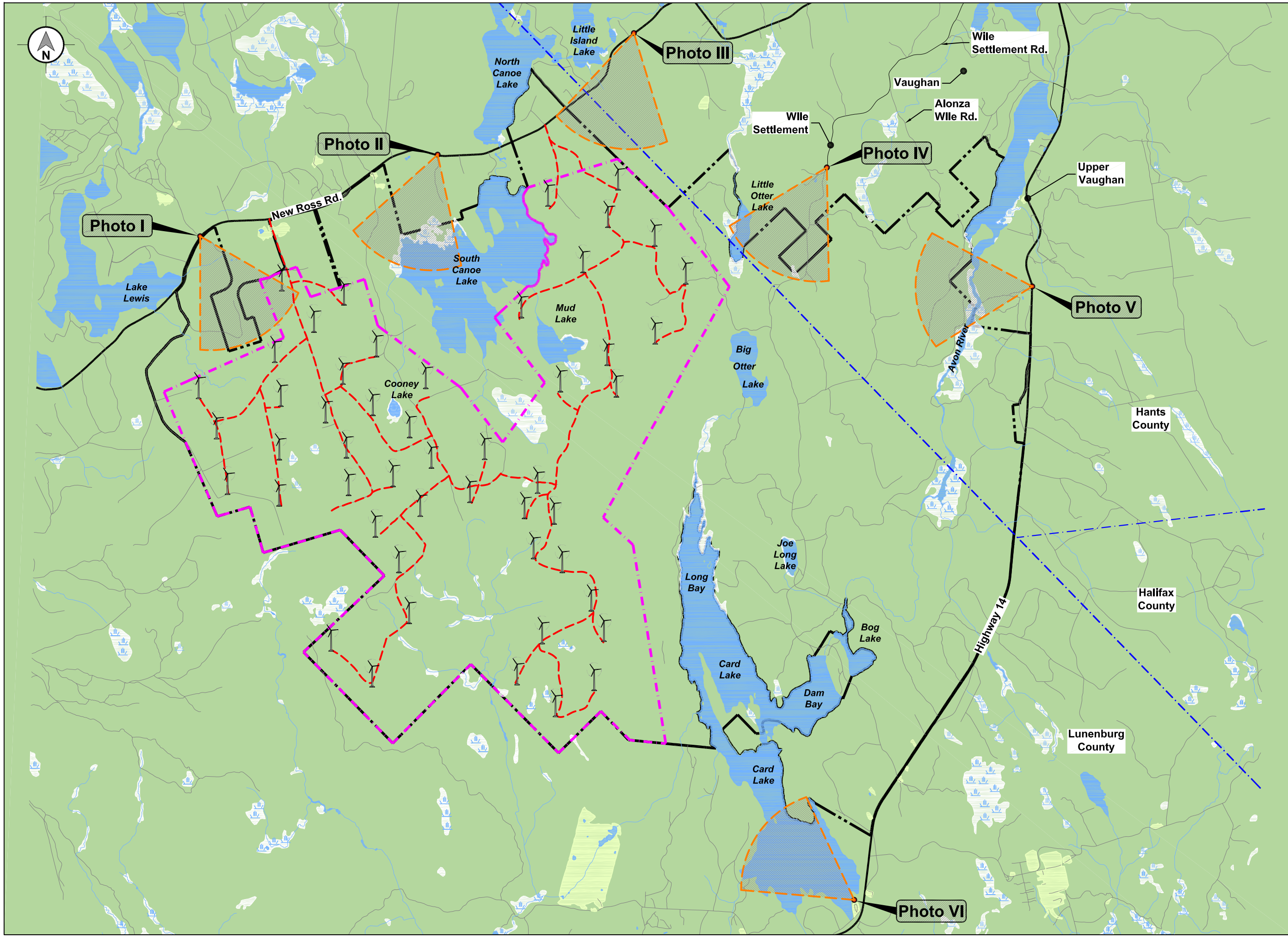
6.1 Visual Impacts

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 optimized layout of all 50 turbine locations.

Photographs were collected around the Project Area in winter and spring 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 six locations around the perimeter of the Property Boundaries as shown in Drawing 6.1. Simulated results are provided in Figures 6.1-6.6.



Notes:

1. Reference: Site Plan supplied by client. Digital topographic Mapping by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.

Legend:

- Proposed Turbine Location
- Viewpoint Location
- Direction of View
- Project Area
- Property Boundary
- County Boundary
- Proposed Road
- Existing Paved Road
- Existing Trail / Access Road
- Mapped Stream
- Mapped Indefinite Stream
- Mapped Water Bodies
- Mapped Wet Area
- Cleared Area

Visual Assessment Locations

OXFORD

MINAS BASIN

Nova Scotia POWER An Emera Company

Strum ENVIRONMENTAL

DATE:	PROJECT #:
May 2012	12-4361
SCALE:	DRAWING #:
1:45,000	***6.1***
DRAWN BY: H. Serhan	
CHECKED BY: A. Walter	

Predicted View:

Actual View:

Figure 6.1: View looking southeast into the Project Area.
Photo location: Intersection of Red Shirt Road and New Ross Road

Predicted View:

Actual View:

Figure 6.2: View looking south/southwest into the Project Area.
Photo location: New Ross Road, southwest of North Canoe Lake

Predicted View:

Actual View:

Figure 6.3: View looking south/southwest into the Project Area.
Photo location: New Ross Road, east of Little Island Lake

Predicted View:

Actual View:

Figure 6.4: View looking south/southwest into the Project Area.
Photo location: Northern portions of the Wile Settlement Road.

Predicted View:

Actual View:

Figure 6.5: View looking west into the Project Area.
Photo location: Highway 14, east of the Project Area

Predicted View:

Actual View:

Figure 6.6: View looking northwest into Project Area from Card Lake Provincial Park.

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 mitigative measures will be implemented:

- Turbines will all consist of the same make, model, and colour.
- Turbines will be located a minimum of 1,200 m from existing residences.
- 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 Project Area 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 50 potential turbine locations to represent a worst case scenario from a sound perspective. 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 Project Area, 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 Appendix L.

The preliminary results of the assessment identified one receptor where predicted sound levels of 41.0 dBA exceed the guideline of 40 dBA. This property owner (PID 60129517) has acknowledged the predicted sound levels at his property as detailed in the letter provided in Appendix M. Therefore, this property is not identified as a considered receptor in the acoustic assessment (Appendix M).

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 on the part of 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 mitigative measures will be implemented to minimize or eliminate impacts to the acoustic environment:

- Placement of wind turbines a minimum of 1,200 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.
- 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 South Canoe Communications Coordinator

A Communications Coordinator position has been established for the Project to coordinate meetings, address community concerns, and act as a liaison between the community and the Project team. Mrs. Beth Caldwell, the Project Communications Coordinator, is a citizen of Hantsport, Nova Scotia, and was previously employed as Public Relations Manager and Executive Assistant to the President at MBPP.

7.2 Consultation Overview

The Project team will continue to consult with the public regarding Project development. To date, the Project team has delivered presentations to Municipal District Councils in Chester and West Hants, local MLAs and MPs, residents, special interest groups and Mi'kmaw communities and organizations. For a summary of the presentations, meetings, and events held thus far, refer to Table 7.1 below.

Table 7.1: Public Consultation Meetings and Events

Date	Format	Location	Public Participant(s)
Jan 26/2012	Presentation	Chester	Chester Municipal Council
Jan 27/2012	Presentation	Wolfville	Scott Brison, MP Kings-Hants
Jan 30/2012	Presentation	Windsor	Chuck Porter, MLA Hants West
Feb 6/2012	Presentation	Hubbards	Denise Peterson-Rafuse, MLA Chester-St.Margaret's
Feb 7/2012	Presentation	Windsor	West Hants Municipal Council
Feb 11/2012, 2-5pm	Open House	Vaughan Fire Hall	Residents
Feb 13/2012, 7-9pm	Open House	Chester Legion	Residents
Feb 17/2012	Meeting	Kaizer Meadow	Card Lake Conservation Society
Feb 20/2012	Presentation	Bridgewater	Gerald Keddy, MP South Shore-St.Margaret's
Feb 22/2012	Presentation	Windsor	Hants RDA
Feb 27/2012, 6-8pm	Meeting	Vaughan	Community Liaison Committee
Mar 24/2012	Meeting	Parkland Rd.	Maritime Parklands Homeowners Association
Mar 26/2012	Meeting	New Ross	Community Liaison Committee
Apr 5/2012	Presentation	Glooscap First Nation Band Office	Glooscap First Nation Band Council
May 6/2012	Wind Farm Tour	Digby Wind Farm	Community Liaison Committee
May 7/2012	Presentation	KMK Office, Truro	KMK Staff: Eric Christmas
May 11/2012	Meeting	Halifax	KMK Staff: Eric Christmas

Meetings with Local MPS, MLAs and Municipal District Councils

Local MLAs and MPs have been engaged early in public consultation to familiarize the Project team with the community and to gauge their interests and concerns. MLAs and MPs asked questions about the Project, provided information on local skills and resources, gave advice on how best to engage the community, and were generally supportive of the Project.

Presentations were also delivered at council meetings for the Municipal Districts of Chester and West Hants (see Appendix N for copies of presentations). As a result of the presentations, letters of support for the Project have been provided by Warden Richard Dauphinee of West Hants and Warden Allen Webber of Chester (see Appendix O). The Project team remains in communication with the Municipal District Councils, and if successful, the Project team will enter into a Development Agreement with the respective municipalities.

Meetings with Special Interest Groups and Concerned Citizens

Representatives from the Project team have met one-on-one with special interest groups and concerned citizens. Notably, the Project team has met with members of the Card Lake Conservation Society at the Kaizer Meadow Environmental Management Centre on February 17, 2012. The Card Lake Conservation Society is a group of volunteers who care for and maintain Card Lake Provincial Park. Society members

communicated that in general they are comfortable with the proposed Project but have concerns about view plane and potential impacts on birds and plants in the park. To specifically address the groups' wildlife and clear-cutting concerns, a bird specialist and environmental consultants were brought in by the Project team to attend the meeting. After the meeting, the group took a tour of Card Lake Provincial Park, led by the co-chair of the Society.

A meeting was held with the Maritime Parklands Homeowners Association in New Ross on March 24, 2012 to address the groups' concerns. Maritime Parklands represents landowners on Lewis Lake by maintaining access to the Maritime Parklands Development and seeks to protect the natural beauty of the Development's land. The group voiced concerns on turbine layout, visual and sound impacts, and property values. The Project team addressed concerns and shared information on RFP and EA process and Project timeline. The group has asked to be kept informed of Project details moving forward as well as any future public meetings.

In addition to meetings with the groups mentioned above, one-on-one meetings have been held with concerned individuals to address specific questions and concerns.

Open House Event

Two community open house events were held to inform the public on the Project and to hear local comments and concerns, one held in Vaughan on February 11 from 2-5pm5 pm and the other in Chester on February 13 from 7-9 pm. To inform local citizens of the open house, approximately 800 newsletters were printed and delivered to various locations such as Lakeside Variety in Vaughan as well as local businesses in New Ross and Chester on January 30th. All residents living within a 3 km radius of Property Boundary were called and given information on Project, informed of the open house and asked if they were interested in attending. Newspaper ads notifying of the event were also run in the Hants Journal and the Progress Bulletin. For a copy of the newsletter and ads in local newspapers, see Appendix P.

Information gathered at the open house registration desk indicated that at least 89 people attended the open house in Vaughan and 46 attended the open house in Chester.

Figure 7.1: Vaughan Open House

Figure 7.2: Vaughan Open House

Figure 7.3: Chester Open House

The open house featured posters sharing information on the Project team, benefits to the area, the EA process, and an overview of Project sound and visuals (see Appendix Q for posters). Attendees could review Project information and voice comments and concerns in several ways:

- Read Project posters and the newsletter, as well as wind energy information from CanWea;
- Speak one-on-one with Project team members;
- Fill out a form on skills, resources and equipment to provide an inventory of resources available for Project construction and operation; and
- Fill out a questionnaire asking about the quality of information received, quality of the open house, and any comments or concerns about the Project.

Of the residents attending the Vaughan open house who provided written comments, 27 provided comments on the open house and 32 provided comments on the Project itself. With regard to comments on the open house, many commented that they would have liked to have seen an open forum, question and answer style meeting. Of those who commented on the Project itself, most were in support while some voiced concerns on issues such as turbine location, sound and health, property values, and animal disturbances. Other respondents generally wanted to stay informed and wanted to see local people employed by the Project.

Of the residents attending the Chester open house who provided written comments, 12 provided comments on the open house and 13 provided comments on the Project itself. Respondents were generally impressed by the open house format, while some wanted to have a presentation with question and answer period; others wanted more chairs at the event. In terms of the Project itself, respondents were generally supportive with only

three commenting on wildlife impacts. For a list of comments made at the Vaughan and Chester open houses, see Appendix R.

Overall, the open houses were deemed successful events where people were given information on the Project and openly shared their concerns with the Project team. The Communications Coordinator will continue to help address any concerns raised by local citizens over the duration of the Project's development.

7.2.1 Website

A website for the Project has been developed and can be accessed at: http://www.southcanoewind.com/Home.aspx. The website provides an overview of the Project, shares information on upcoming meetings, meeting minutes, and Project news, as well as allows interested public to pose questions to the Project team. Common questions from open house sessions and one-on-one meetings have been posted on the website to share information with a wider public audience.

7.2.2 Community Liaison Committee

A Community Liaison Committee (CLC) has been formed to facilitate sharing of information with the community and bring community concerns to the Project Team. Approximately ten residents have agreed to be part of the committee and meetings have been held on February 27, 2012 from 6-8 pm in Vaughan and March 26, 2012 from 6-8 pm in New Ross. A fieldtrip to the Digby Wind Farm took place on May 6, 2012 to allow CLC members to experience a wind farm first-hand.

Figure 7.4: Digby Wind Farm Site Visit

Figure 7.5: Digby Wind Farm Site Visit

CLC members had the opportunity to tour the wind farm site, visit the substation, go inside a non-operating turbine and learn about the turbine SCADA system, and stand next to an operating turbine (Figures 7.4 and 7.5). CLC Guidelines and Approved Meeting Minutes can be found on the South Canoe Wind website.

7.2.3 First Nations Consultation

Due to the Project's proximity to local Mi'kmaq First Nations communities, the Communications Coordinator has been in contact with the following groups:

Twila Gaudet
Kwilmu'kw Maw-klusuaqn Negotiation Office
851 Willow Street
Truro, NS
B2N 6N8

Chief Shirley Clarke (until April 1, 2012), Chief Sydney Peters (as of April 1, 2012)
Glooscap First Nation
P.O. Box 449
159 Smith Road
Hantsport, NS
B0P 1P0

Chief Deborah Robinson
Acadia First Nation
Box 5914 C10526 Highway #3
Yarmouth, NS
B5A 4A8

Chief Janette Peterson
Annapolis Valley First Nation
P.O. Box 8964Goowlane
Cambridge, NS
B0P 1G0

The following is a summary of the Project Team's correspondence, meetings, and engagement with Mi'kmaq communities and organizations.

On February 3rd, an initial call (left voicemail) followed by an email, was made to Twila Gaudet, Consultation Liaison with the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO), sharing information on the Project, asking if a presentation could be made, and notifying of the upcoming open houses. A follow up email was sent on February 7th and follow up phone calls were made on February 13th and 29th. On March 13th, a formal letter was sent to Janice Maloney, Executive Director of the KMKNO, giving details about the South Canoe Wind Project and EA process. On April 5th, 2012, Chris Peters received an email from Eric Christmas (Energy Advisor, KMKNO) suggesting that a meeting be arranged to discuss the South Canoe Wind Project. On April 30th, a meeting date was set for May 7, 2012 between the KMK and Project Team.

During the May 7th, 2012 meeting, the project team met with Eric Christmas and gave an overview of the South Canoe Wind Project including:

- Project team;
- Project size and site;
- Project benefits;
- EA process,
- MEKS;
- First Nations and community engagement;
- The province's renewable electricity targets; and
- RFP process.

A discussion of the Project and required consultation with the Mi'kmaq ensued. Of particular interest to the KMK was South Canoe's EA, MEKS, consultation with particular First Nations communities and the Office of Aboriginal Affairs. Overall, Eric felt that the South Canoe Wind Project was doing a good job of consulting with the Mi'kmaq thus far. A follow up meeting was held with Eric Christmas on May 11th, 2012 to discuss South Canoe's EA, in particular the methodology and the results of the turbine and road layout optimization.

On February 3rd, the Communications Coordinator called and left a voicemail for Chief Shirley Clarke of the Glooscap First Nation. Follow up calls were made on February 7th and 13th and an email was sent sharing information on the Project, asking if a presentation could be made to the Band Council, and notifying the Council of the upcoming open houses. Further calls were placed on February 29th, March 6th, 8th, 20th,

and 22nd to Larry Peters to schedule a date for a presentation to Band Council. On March 26th, Larry Peters confirmed a meeting date for April 5th, 2012 at 10 am between the newly elected Glooscap Band Council (Sydney Peters, Chief; Larry Peters, Councilor; Jean Labrador, Councillor; Kristen Halliday, Councillor) and the South Canoe Project Team.

During the April 5th, 2012 meeting with the Glooscap Band Council, the project team provided an overview of the South Canoe Wind Project including:

- Project team;
- Project size and site;
- Project benefits (e.g. jobs – Glooscap was invited to add to local business inventory);
- Environmental Assessment;
- MEKS;
- Community engagement;
- The province's renewable electricity targets; and
- RFP process.

The Glooscap Band Council posed questions about direct benefits to their community (monetary, employment, training) and spoke about the MEKS process. In summary, the meeting served as initial consultation on the South Canoe Wind Project and the newly elected Glooscap Band Council was encouraged to contact the Project team with any further questions or comments.

On February 3rd, the Communications Coordinator called and left a voicemail for Chief Deborah Robinson of the Acadia First Nation. A follow up call and email was sent on February 7th sharing information on the Project, asking if a presentation could be made to the Band Council, and notifying the Council of the upcoming open houses. On February 13th, a conversation was held with a Band employee discussing the possibility of presenting to Council at the end of March. Follow up calls were made on February 29th and March 12th where Marsha Boudreau suggested a meeting for mid to late April. She asked that a follow up call be made at the beginning of April. Calls were made to Acadia First Nation on April 5th and April 9th, 2012 with no answer and an email was sent to Marsha Boudreau on April 9th, 2012 inquiring about a meeting date and time for mid to late April. A follow up phone call was made on April 17th and a message was left for Marsha Boudreau. The Project Team will continue to work with Acadia First Nation to set up a meeting to share information on the Project.

Annapolis Valley First Nation was contacted on February 3rd and 7th and the Band has notified the Communications Coordinator that they are not interested in receiving a presentation on the Project.

On March 20, 2012, the provincial Office of Aboriginal Affairs (OAA) was contacted and provided a letter outlining details of the South Canoe Wind Project. To date, no reply has been received from the OAA.

Communications with Mi'kmaq communities will be ongoing over 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 Recreation	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	Effect restricted to area within 1 km of the Project Site
	Regional	Effect extends up to several km from the Project Site
	Provincial	Effect extends throughout Nova Scotia
Duration	Short-term	Efffects last for less than 1 year
	Medium-term	Effects are significant for 1 to 10 years
	Long-term	Effects are significant for greater than 10 years
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	Effect causes <1% change in the population or resource (where possible the population or resource base is defined in quantitative terms)
	Moderate	Effect causes 1 to 10% change in the population or resource
	High	Effect causes >10% change in population in resource

The potential level of impact (i.e. adverse environmental effect) after mitigation measures (i.e.g. residual effects) was identified based on the criteria and definitions provided in the NRCAN document, “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 effect could threaten sustainability of the resource and should be considered a management concern. Research, monitoring, and/or recovery initiatives should be considered.
Medium	Potential effect 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 effect 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 effect 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 Effect	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 around wetlands. • Development and implementation of an 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.	• Avoidance of habitat known to contain rare species. • Limit clearing to footprint of development. • Development and implementation of an 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**
Mammal SAR	• Removal or disruption of habitat. • Mortality??.	• Avoid identified important habitat areas. • Minimize Project footprint. • Development and implementation of an EPP. • Restore habitat to the extent possible following construction.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible-Low	No residual effect anticipated	**N/A**

Avifauna	• Removal or disruption of habitat. • Sensory disturbance. • Mortality. • Increased chance of collision from 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 an EPP. • Limit site activities to designated workspaces. • Reduce or avoid construction lighting.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Low	No residual effect anticipated	**N/A**
Sound	• Increased noise due to construction activities.	• Operate site during normal working hours. • Keep community informed regarding periods of significant noise. • Development of noise complaint response protocol.	Scope: Local Duration: Short-term Frequency: Intermittent Magnitude: Negligible	No residual effect anticipated	**N/A**
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	No residual effect anticipated	**N/A**

Socio Economic Component	Potential Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Local Economy	• Creation of 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 the 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 large 1.2km 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 transportation. • Traffic flow on public roads. • Increase loads and oversized loads impacting public roads. • Increased traffic and sound associated with larger vehicles.	• Notices will be placed in public areas to inform local residents the extent possible regarding traffic flow • Temporary signage regarding road infrastructure alterations will be places to ensure public safety. • Use of roads during daytime hours only and not during peak traffic times. • Staff will be located roadside to help directhigh traffic during times when road signs are removed. • Contact Department of Transportation and Infrastructural Renewal for permits and best practices.	Scope: Local/Regional Duration: Short-Term Frequency: Intermittent Magnitude: Low	No residual effects on routes and transportation. Potential traffic wait times on public roads for safe flow of vehicles.	**Low/None**

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 (i.e. Chester, Lunenburg, Mahone Bay), thus few impacts are expected and little mitigation is required.	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 of dust control measures to maintain 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 due to construction activities.	• Conduct an archaeological reconnaissance of high potential for resources areas before construction. • A buffer will be placed around watercourses to protect potential cultural and heritage resources. • 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 Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Wetlands	• Invasive flora colonizing in wetlands. • Alteration to wetland function.	• Development and implementation of an 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	No residual effect anticipated	**N/A**
Flora SAR	• Ongoing vegetation management.	• Development and implementation of an EPP. • Minimize the need for routine vegetation clearing.	Scope: Local Duration: Short-term Frequency: Intermittent Magnitude: Negligible	No residual effect anticipated	**N/A**
Mammal SAR	• Increased activity on site. • Mortality	• Development and implementation of an 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	No residual effect anticipated	**N/A**

Avifauna	• Mortality. • Sensory disturbance. • Lighting (turbines and associated infrastructure).	• Development and implementation of an EPP. • To the extent possible, plan operation and maintenance activities to avoid sensitive habitats and minimize time on site. • Avoid routine vegetation 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.	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 Project Area), which will reduce the number of bird collisions. Bird fatalities due to turbine collisions are not expected to be significant.	**Medium**
Sound	• Turbine blade sweeping noise. • Generator noise.	• Development and implementation of an 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 1200 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	Some 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 an 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	No residual effect anticipated	**N/A**

Socio-Economic Component	Potential Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Local Economy	• Long term employment of a few local people during operation and maintenance. • 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	Increased employment, income, and tax revenue in the area.	**High**
Property Values	• Decreased property values near operational wind farm.	• Maintain open dialogue between Proponents and community to address property value issues as they arise. • Use a large 1.2 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 surrounding area.	N/A	Scope: Regional Duration: Long-Term Frequency: Continuous Magnitude: Low	Increased tourism and economic spinoffs.	**Low**

Human Health	• Increased health problems of local residents.	• Maintain open dialogue between Proponents and community to address health issues as they arise. • Use a large 1.2 km 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 will be made with outstanding stakeholders to determine extent of effect.	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 Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Wetlands	• Disturbance of hydrologic regime • Sedimentation.	• Development and implementation of an EPP. • Avoidance of wetland habitat, to the extent possible.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Low	No residual effect anticipated	**N/A**
Mammal SAR	• Increased activity on site.	• Avoidance of known critical habitat, where possible. • Limit access to existing roads only. • Limit time on site.	Scope: Local Duration: Short-term Frequency: Intermittent Magnitude: Negligible	No residual effect anticipated	**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	No residual effect anticipated	**N/A**
Sound	• Increased noise.	• 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	No residual effect anticipated	**N/A**

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	No residual effect anticipated	**N/A**
Socio-Economic Component	Potential Effect	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 (i.e. Chester, Lunenburg, Mahone Bay), thus few impacts are expected and little mitigation is required.	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 to maintain 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 known 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 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 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 design equipped to shutdown
Lightning strike	Potential fire during operation Damage to electrical systems	• Turbine 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 5.4.4.

The primary mitigative 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 the environment 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 often 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 Project Area (i.e. forestry, general store, gas station and a golf course). The nearest towns include Chester (31 km) and Windsor (24 km). The nearest industrial type facility is a single wind turbine development planned for the regional environmental management centre at Kaizer Meadow (5.2 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
Forestry/tree harvesting	Historical and ongoing	Various locations within the Project Area.	Yes	• Loss or alteration of wildlife habitat • Wildlife mortality • Sound • Visual

Activity	Status of Activity	Location of Activity	Potential Cumulative Effect Expected	Cumulative Effect Interaction
Agricultural practices	Historical and ongoing	Land bordering the Project Area and within the local community.	No	N/A
Christmas tree farming	Historical and ongoing	Local area/community	No	N/A
Kaizer Meadow Wind Turbine (KMWT)	Future/Imminent	Kaizer Meadow Road (4.5 km from nearest Project Area turbine)	Yes	• Loss or alteration of wildlife habitat • Wildlife mortality • Sound • Visual
Small businesses and local economy	Historical and ongoing	Various locations in the local area and towns of New Ross, Chester, Lunenburg and Windsor.	Yes	• Increase in jobs and economic opportunities
Quarrying (small scale)	Historical and ongoing	Beyond the northwestern Project Area boundary (adjacent to the New Ross Road).	No	N/A

10.2 Significance of Cumulative Effects

10.2.1 Birds, Other Wildlife, and Habitat

Past and ongoing forestry and tree harvesting activities within the Project Area have resulted in a loss of contiguous mature forest habitat. Continued tree harvesting in combination with the wind farm development could reduce high quality mature forest habitat within the Project Area. However, as discussed throughout Section 4, the footprint of wind turbines and access roads shall be designed to avoid high quality habitat. Instead, existing access roads and previously disturbed land (i.e. clear cut areas) will be utilized, to the extent possible.

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.

The KMWT is a potential 2.3 MW turbine, recently approved under the Nova Scotia Community Feed-In Tariff (COMFIT) program. This one turbine development will generate power at the Kaizer Meadow Environmental Management Centre and will be located approximately 4.5 km southeast of the Project Area. Since the turbine is planned to be sited in a previously disturbed area of land (cleared), the two Projects are not expected to create cumulative effects on wildlife or wildlife habitat in the region.

Based on the discussion above, cumulative effects to birds, wildlife and wildlife habitat from current and planned activities in the area, is considered not significant.

10.2.2 Visual Impacts

Due to the distance between the Project Area and the KMWT, it is unlikely that turbines from both Projects will be visible in the same viewscape.

Tree harvesting practices will continue to alter the visual landscape within the Project Area due to a reduction in mature tree stands and creation of clear cut areas. It is unlikely that the incremental contribution of the small scale reduction in forest habitat at the Project Area, as a result of the Project, will cause adverse cumulative effects.

Therefore, the cumulative effect of this Project with other visual obstructions within the local view plane is considered not significant.

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 forestry activities will continue to create noise, the Project is only expected to contribute an incremental increase in sound overall. In addition, given the small scale of the KMWT (one turbine) and distance from the Project Area (approximately 4.5 km), sound levels for receptors are expected to remain within acceptable levels. Therefore, the cumulative effect of the Project with other activities on sound is considered not significant.

10.2.3 Small Businesses and Local Economy

It is expected that approximately 100 people may take an active role in the Project during the construction phase and it is expected that 4-5 operations jobs will be created. In addition, local business can expect to see spinoffs and local municipalities 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	Summer/Fall 2012	Entire Project Area + 5km buffer area
Archaeological Screening and Reconnaissance	Summer/Fall 2012	Areas of disturbance (turbines and roads)
Field confirmation for wetlands, watercourses and rare plants	Summer/Fall 2012	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.

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
On-site Sewage Disposal System Approval	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 EPP will be developed, approved by NSE, and communicated to all employees working on the Project.

Although turbine locations have not yet been finalized, the current optimized layout being evaluated for 2 – 3 MW machines. With a total nameplate capacity of approximately 100 MW, there could be between 33-50 turbines located within the Project Area. To the extent possible, the layout will accommodate buffers applied to VEC's.

Existing roads will be used where possible for road development. There is the potential to re-use up to 11.8 km of the 37.5 km of road networks requiring

development, thus reducing the entire footprint of the Project and minimizing impacts to the VEC's.

All studies recommended by NSE's Guide for Wind Proponents have been completed, with the exception of MEKS, micrositing flora/wetland, watercourses and wetlands, and archaeology field assessments. The 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. With a buffer of 1.2 km (the largest proposed distance of any wind farm EA currently registered in Nova Scotia), it was found that the majority of issues were mitigated (i.e. sound, visual, land value, etc.).

The land which is being proposed for the Project currently does not have significant economic value from a forestry standpoint. The Project will bring economic benefits to the land and the surrounding communities. The Municipality of the District of Chester will benefit from increased tax revenues.

Nova Scotia is championing renewable energy both in Canada and in the World with a target of 25% of net sales in the province being generated by low impact renewables by 2015 and 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 South Canoe Wind Project will contribute to Nova Scotia meeting its renewable energy target, enhance energy security, reduce provincial GHG emissions, and is a project which Nova Scotians can be proud of.

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