

5.0 ASSESSMENT OF ENVIRONMENTAL IMPACTS

5.1 Assessment Methodology

A cross impact matrix method was used to examine the interaction of the project activities with the Valued Ecological Components (VECs) identified in Section 4 and summarized in Table 4.6.1. This process was conducted in two stages. The first stage of the impact assessment considered the project activity impacts without consideration to procedures used to mitigate potential impacts. The second phase of the impact assessment considers the mitigative measures and operating procedures which are required by Codes of Practice, or identified in the Environmental Protection Plan and Environmental Management Plan. Residual impacts are identified in the second stage of the assessment where potential impacts remain following the implementation of mitigation and management.

Table 5.1 shows the VECs on the horizontal axis and the project activities on the vertical axis. The evaluation of impacts considers each project activity in relation to each VEC and uses a scale to qualitatively identify the potential change that the activity might have on the VEC. This assessment used the following scale:

- ++ : positive impact
- + : positive impact possible
- blank: no net effect
- - : negative impact possible
- = : negative impact
- ? : Impact unknown

The assessment also considers the temporal and spacial boundaries over which the impacts may occur. Temporal bounds consider the timing and duration over which the project activities occur. The Glen Dhu Project will have a construction program which will take place in two stages from the fall of 2008 to the fall of 2010. At the end of 2010, the operations phase begins and will proceed for the foreseeable future. Therefore, the assessment of impacts for construction activities spans approximately 2 years. The operations phase is considered to be a thirty year time frame (given the economic life cycle of the WTGs).

The spacial bounds of the project have greater variability. The spacial bounds for potential impacts on vegetation, birds and aquatic VECs can be reasonably considered as the habitat area within the boundaries of the Project. The bounds for Species of Concern need to be considered within the context of their occurrence in the area, province and country or even on a world scale for some potentially endangered species. Mainland Moose are an example of a VEC which must be considered within the context of the provincial and national boundaries.

Table 5.1: IMPACT ASSESSMENT MATRIX

Table 5.1: IMPACT ASSESSMENT MATRIX: Potential Impacts Before Mitigation	Geophysical Environment	Physiography & Topography	Surface Soils & Bedrock	Biophysical Environment	Aquatic Fauna	Aquatic Vegetation	Surface Hydrology	Surface Water Quality	Vegetation	Wetlands	Wildlife	Birds	Bats	Mainland Moose	Fishers	James Rive watershed & Eigg Mountain Wilderness Area	Atmospheric Environment	Climate	Air Quality	Socio-Economic Environment	Labour Force	Local Economy	Land Use	Archaeological Resources	First Nations Heritage	Sound Levels	Visual Landscape	Radio Communications	Aviation	Public Safety
	PROJECT ACTIVITIES																													
1.0 Preconstruction Phase																														
1.1 Land Surveys																					+	+								
1.2 Geotechnical Investigations									-		-	-									+	+				-				
2.0 Construction Phase																														
2.1 Site Preparation																														
- Clearing and Grubbing							=	=	=	-	-	-	-	-	-	-					+	+								
2.2 Access Road Construction																														
- Road Work, Excavation, Infilling, Grading		=	=				=	-	=	-	-	-	-	=	=						++	++	++			-				
- Drilling and Blasting			-		-		-	-		-	-	-	-	=	=						+	+				-				
- Culvert Installation					+	-	+														+	+				-			+	
- Stream Course Alteration		=	=		-	=	=																							
- Disposal of Excess Material		=	=				-	-	-		-										+	+	?			-				
- Borrow Pits		=	=				-	-	-		?	+/-									+	+	?			-				
2.3 Wind Turbine Construction																														
- Preparation of Laydown Areas		-	-				-	-	-	-	-	-	-	-	-	-					+	+				-				
- Transporation of Components to Site					-	-	-	-	-	-	-	-	-	-	-	-					+	+				-				
- Transportation of Crane to Site					-	-	-	-	-	-	-	-	-	-	-	-					+	+				-				
- Erection of Turbine Components																					+	+				-	?			
2.4 Powerline Construction																														
- Corridor Preparation			-		-	-	-	-	-	-	-	-	-	-	-	-					+	+	+			-	-			
- Installion of Poles/Towers			-		-	-	-	-	-	-	-	-	-	-	-	-					+	+				-	-			
- Installion of Conductors																					+	+				-	-			
2.5 Accidental Events																														
- Collisions											-																			
- Spills			-		-	-	-	-	-	-	-	-	-	-	-	-					+	+	-	-	-					
- Fire			-				=	-	=	=	=	=	=	=	=	=					+	-	=	=	=	=				
- Turbine Assembly Failure																														
3.0 Operation Phase																														
3.1 Generation Life Cycle																														
- Power Generation												-	-	?	?						++	++	+						?	
3.2 Maintenance Activities																														
- System Component Change-out																														
- Access Road Use																														
- Snow Clearing (note 2)																						+	+				-			+
3.3 Accidental Events																														
- WTG Failure								-	-	-												+	+							
- Oil & Lubricant Release			-		-	-	=	-	-	-	-	-	-	-	-	-														
4.0 Decommissioning Phase																														
- Equipment Disassembly and Removal									-			+	+	-	-							+	=	=		+	?			
- Foundation Removal		+							+		-			-	-							+				-				
- Site Restoration									+		+											+				-	+			

Note 1: Scoring System: (=) - Negative Impact; (-) - Negative Impact Possible; () - No Effect; (+) - Positive Impact Possible; (++) - Positive Impact; (?) - Unknown Effect; +/- may have positive impacts on some species and negative impacts on others

Note 2: Snow Clearing will be as required for maintenance assess. Snow clearing following each significant snow fall will be avoided. Salt will not be used.

Socio-economic VECs for this project are considered within the boundary of the local region and province of Nova Scotia. Most socio-economic impacts and benefits derived from the project occur in these areas although the issues of renewable energy sources and global warming may be considered within a national and global context. Table 5.2 shows the temporal and special bounds for the impacts assigned to individual VECs.

Table 5.2: Temporal and Spacial Bounds Applied to VECs

Criteria	Selected as a VEC	Temporal Bounds	Spacial Bounds
Geophysical Environment			
Physiography and Topography	Yes	permanent	WTG Sites and Access Roads
Surficial Soils and Bedrock	Yes	permanent	WTG Sites and Access Roads
Seismicity	No	Na	Na
Biophysical Environment (Aquatic)			
Aquatic Fauna	Yes	3 years ²	WTG Sites and Access Roads
Aquatic Vegetation	Yes	3 years ²	WTG Sites and Access Roads
Surface Hydrology	Yes	3 years ²	Local Watershed
Surface Water Quality	Yes	3 years ²	Local Watershed
Biophysical Environment (Terrestrial)			
Vegetation	Yes	+ 30 years ¹	WTG Sites and Access Roads
Wetlands	Yes	+ 30 years ¹	WTG Sites and Access Roads
Wildlife (Common)	Yes	3 years ²	WTG Sites and Access Roads
Species of Concern	Yes	+ 30 years ¹ , 3 years ²	Province, Nation
Parks and Significant Natural Areas	Yes	+ 30 years ¹	Region
Atmospheric Environment			
Climate	Yes	+ 30 years ¹	Province (and Global Issue)
Air Quality	Yes	+ 30 years ¹	Province
Socio-Economic Environment			
Population/Demographics/Labour Force and Economic Profile	Yes	+ 30 years ¹	Region
Land use	Yes	+ 30 years ¹	WTG Sites and Access Roads
Cultural Resources, Aboriginal Heritage and Archaeological Sites	Yes	3 years ²	WTG Sites and Access Roads
Existing Sound Levels	Yes	+ 30 years ¹	Region
Recreation Areas	No	Na	Na
Safety Issues	Yes	+ 30 years ¹ , 3 years ²	WTG Sites and Access Roads, Provincial Highways
Visual Landscape	Yes	+ 30 years ¹	Region
Radio Communication, Aviation	Yes	+ 30 years ¹	Region

Notes: 1- Represents project life cycle; 2- Represents period of construction activities

5.2 Assessment of Potential Impacts

Table 5.1 shows the evaluation of impacts of the project activities on the VECs without mitigative measures to reduce and control such impacts. An Environmental Protection Plan (EPP) will provide mitigative measures to be included the engineering designs of roads, water crossings and laydown areas. An Environmental Management Plan (EMP) will be provided to contractors to address any construction practices which will be used and followed during the site work to reduce potential negative impacts and to meet Codes of Practice and environmental guidelines and regulations. Section 6 describes the EMP and EPP.

The following section describes the potential impacts for each stage or project activity and identifies mitigation measures. Where impacts apply to a single VEC, mitigative measures are identified for that VEC. Where mitigative measures apply to a group of VECs, the impacts for each VEC is described and mitigation measures are described for the group of VECs. Residual impacts are those impacts which remain after mitigation is applied.

5.2.1 Pre-construction Phase Activities

Pre-construction activities include land surveys and geotechnical investigations. These activities will commence as soon as possible in the project cycle in order to accommodate road construction and foundation construction done in the dry season in June, July, August and early September. Potential impacts on VECs are assessed and mitigation measures have been identified in the following section as follows:

5.2.1.1 Surveying Operations

Impacts on Birds

During the bird breeding season, surveyors may encounter a hawk nest that exists in a mature hardwood stand east of Vamey's Brook and the beaver meadow. The nest is some distance from the existing road.

Mitigation: If vocalizations are heard, surveyors should refrain from getting closer to the sound. It may be a goshawk nest, and they can be very fierce. It could also be a red-tailed hawk nest in this habitat, as one adult was seen nearby. If possible, surveying and construction work on this site should be done in late summer or winter, away from the breeding season.

Impacts on Mainland Moose

If a moose is using an area where surveyors are operating, the moose will probably move away temporarily as a result of the human intrusion.

Impacts on Fishers

If a fisher is traveling in an area where surveyors are active, the fisher will probably move away temporarily to avoid the human disturbance.

Mitigation: There is already a network of roads providing easy access in the area, and an abundance of private land owners who use their properties. Surveying activity will be added to the current human activities, which include forestry operations. This activity is temporary and there is a protected wilderness area off to the north and east to act as a sanctuary until construction is over.

Impacts on Socio-economic VECs

Surveying will provide local labour and expenditures in the region to support the field personnel and equipment consumables (i.e. fuel, maintenance, etc).

5.2.1.2 Geotechnical Investigations

Impacts on Vegetation

Geotechnical investigations occur on the tower sites and will result in the removal of vegetation in the proposed areas of the access road, turbine and laydown areas. It is anticipated that most of the geotechnical sites will be located within the footprint of the laydown area and therefore will be cleared as part of the permanent development.

Mitigation: The site location and access roads will be subject vegetation surveys prior to commencement of the work. The locations will be moved to avoid interference with species of concern. Vegetation in many of the geotechnical testing areas will fall within the turbine lay-down areas. The cleared areas around the turbines will be allowed to re-vegetate naturally except for a driveway like entrance from the access road to the steps of the tower.

Impacts on Wildlife

Geotechnical investigations will take about a month and create loud noise. The small drilling sites will displace and possibly kill some soil organisms, and other sedentary or slow-moving insects. Other small animals like salamanders may be trampled and killed by the machinery as it moves onto the terrain.

Mitigation: Contractors will be required to use existing roads as much as possible and travel when frozen or dry. Where there are no roads, travel routes and test sites will be selected to avoid species of concern as identified in the site specific vegetation survey. Tree clearing will be minimized as much as possible.

Impacts on Birds

Ground nesting and shrub-nesting birds may have their nests run over as the machinery travels over the terrain, and be seriously disturbed if the activity occurs near a nest site.

Mitigation: Contractors will be required to use existing roads as much as possible; and if possible avoid the breeding period from May to August.

Impacts on Mainland Moose

If a moose is using an area where geotechnical investigations are operating, the moose will probably move away temporarily as a result of the human intrusion.

Impacts on Fisher

If a fisher is traveling in an area where geotechnical investigations are operating, the fisher will probably move away temporarily as well.

Mitigation: There is already a network of roads providing easy access in the area, and an abundance of private land owners. This activity will be added to the current human activities, which include forestry operations. This activity is temporary and there is a protected wilderness area off to the north and east to act as a sanctuary until construction is over.

Impacts on Socio-economic VECs

Geotechnical investigations will provide local labour and expenditures in the region to support the field personnel and equipment consumables (i.e. fuel, maintenance, etc). Emissions and noise from vehicles, drilling equipment and excavators will have a minor and temporary negative impact on air quality and sound levels in the immediate area of the work.

Mitigation: Geotechnical investigation activity is temporary and therefore the noise disturbance and emissions are considered temporary. This equipment would be powered by engines similar to those used in timber harvesting equipment and therefore negative impacts on noise and air quality would be similar as well.

5.2.2 Construction Phase Impacts

5.2.2.1 Land Clearing and Grubbing

Impacts on Vegetation

The clearing of turbine sites, access roads and laydown areas will result in the removal of vegetation in the proposed areas. Each turbine location will require the clearing of an area of 90m by 90m and roads with powerline corridors will be cleared to a width of approximately 15m.

Table 5.3 presents an assessment of the existing forest cover in the proposed project area and the estimated areas to be cleared for access roads and turbine sites. The turbines do not require guy wires as they are secured to an engineer stamped steel reinforced concrete foundation. This analysis provides estimates of the areas by forest types and age class. The percentage by age class is calculated for forest cover which is to be cleared for access roads and turbine sites. The area data also shows the composition of the project area by forest type and percentage by age class of total project area to be cleared.

Table 5.3: Forest Cover to be Cleared for Roads and Turbine Sites¹

Forest Cover Age Class	Forest Type				Sub-Total	Percentage of Existing Forest on Turbine Sites and Access Roads to be Cleared (by age)	Percentage of Existing Forest on Project Area to be Cleared (by age)
	Softwood	Mixed	Hardwood	Other (2)			
(years)	(ha)	(ha)	(ha)	(ha)	(ha)	(%)	(%)
5	11.5	0.9	0.2	-	12.5	28.3	1.00
15	0.6	1.3	-	-	1.9	4.3	0.15
25	0.9	3.2	2.2	-	6.3	14.3	0.50
35	3.7	0.9	6.7	-	11.2	25.3	0.89
45	0.3	1.1	2.6	-	4.0	9.1	0.32
55	-	-	1.0	-	1.0	2.3	0.08
65	-	-	3.4	-	3.4	7.7	0.27
75	-	-	0.1	-	0.1	0.2	0.01
Uneven Aged	-	-	3.3	-	3.3	7.4	0.26
Cleared Area by Forest Type (ha)	17.0	7.4	19.4	0.5	44.3	(³)-	3.52
Forest Type in Project Area (ha)	299.6	246.8	436.6	269.6	1252.6	-	-
Percentage of Project Area to be Cleared (by Forest Type) (%)	5.7	7.3	4.4	0.2	3.5	-	3.5

Notes: 1. Clearance for roads with power line corridors will be 15m wide; Clearance areas for Turbine Sites will 90m by 90m. 2. Cut Over (Non-regenerated) 3. Due to rounding the total is less than 100%

Access roads will consist of new roads and the upgrading of existing roads. The present road layout has been carefully selected to minimize water crossings and disturbance of wetland areas. This layout calls for a total of 21.2 km of road for the development made up of 13.5km of new access roads and the upgrading of 7.7km of existing roads.

The Project will remove approximately 44 hectares of various forest types which is approximately 3.5% of the total area within the project boundary. The data indicate that approximately 81% of the area to be cleared is composed forest of 45 years of age or less. Mature softwood forest and mixed forest (age class +60 years) was not present in the project area. On a conservative basis, assuming that mature tolerant hardwood forest includes identified hardwoods and uneven aged stands, mature hardwood (age class +75) are present on approximately 3.3

hectares or 0.26% of the area within the project boundary. Because of the long history of forestry in the area, there is little mature tolerant forest habitat present in the Project area. A small portion of this habitat type will be cleared for the Project. It is noted that presently there is a strong demand for hardwood for home heating and that woodlot owners in the region are harvesting hardwoods for firewood.

The substation will be placed on a concrete foundation which requires the dimensions of approximately 25 m by 25 m area for placement. The area around the substation will be cleared to permit the erection of a security fence. The power line route to the intertie site will be cleared as well.

Mitigation: Land clearing, because of its impact on the environment, will be done minimally throughout the construction phase of the Glen Dhu Project. Site locations and access roads have been subject to vegetation surveys prior to commencement of the work. Following construction, the cleared areas around the turbines will be allowed to re-vegetate naturally except for a driveway-like entrance from the access road to the steps of the tower.

Harvestable timber will be sold. Contractors will be required to chip the non-harvestable material and distribute the chips over suitable dry areas.

The impact of removing mature forest for the project areas should be reviewed in the context of present harvesting practices and woodlot management and environmental impacts.

The layout of access roads for the project has been designed to minimize the length of the roads required to access the turbine sites. To the extent possible, existing roads will be used; however, many of these roads are in areas where vegetation and wetlands would be impacted by the upgrades. Routes were selected for new roads to minimize impacts on wetlands and vegetation, avoid water crossings to the extent possible and follow direct routes to minimize length.

Impacts on Wildlife

The clearing and grubbing phase kills many plants and soil organisms, and displaces small wildlife species like voles, mice, and shrews. The result is habitat alteration from forest to open sites.

Mitigation: The road design will specify the minimum widening of existing roads that are necessary to bring in the machinery and to the extent possible, damp ground will be avoided to protect frogs and salamanders. This work will be conducted in the most appropriate time

when small animals that are displaced will have time to relocate before winter.

Impacts on Birds

This activity will displace some forest birds, although it will create foraging opportunities for generalists already in the area, such as robins. If it takes place during the late spring, breeding failures and mortalities of eggs or young could happen.

Mitigation: In the first stage of the project, clearing and grubbing are scheduled to begin in mid July (the end the breeding cycle) and take place over the summer and early fall. For the second stage of the project the period for clearing and grubbing would most likely be winter when the ground is frozen.

Impacts on Mainland Moose

If any moose are in the area, they will move away from the activity. This displacement will continue through the construction phase. Proposed sites were scouted in March and April, 2008 and no moose sign was found. Pellet surveys were conducted in May. There was no evidence of any moose activity within the Project boundaries.

Impacts on Fisher

Any fisher in the area will be temporarily displaced, like the moose, by this activity, if there are any in the area.

Mitigation: Although no moose have been located in the project area and the entire road network assessed, if any wintering areas for moose are found, re-routing will be made around them. As much as possible, existing roads are used and upgraded rather than new ones built. This activity is temporary and there is a protected wilderness area off to the north and east to act as a sanctuary until the work is over.

Impacts on Socio-economic VECs

Clearing and grubbing will provide local labour and expenditures in the region to support the field personnel and equipment consumables (i.e. fuel, equipment maintenance, etc). Emissions and noise from vehicles, chainsaws, and other cutting and chipping machines will have a minor and temporary negative impact on air quality and sound levels in the immediate area of the work.

Mitigation: Clearing and grubbing are temporary activities and therefore the noise disturbance and emissions are considered temporary. The equipment used is similar that used in timber harvesting and therefore negative impacts on noise and air quality would be similar as well. No significant impact is identified on the residents of the area who are well acquainted with this type of activity in the project area.

5.2.2.2 Road Construction: Mass Excavation and Infilling, Grading and Finishing

Impacts on Physiography and Topography

Construction of improved roads will permanently alter the local physiography of the access roads. Minor changes in the topography of the access roads will occur where slopes are re-aligned to meet the requirements for transportation of components.

Mitigation: To the extent possible, access roads will follow existing woods roads to minimize potential environmental impacts and changes to existing habitat. New roads will be designed to meet the design load requirements and be constructed in accordance with provincial regulations. Widening of existing roads will be necessary to accommodate component loads. The alterations to the physiography and topography of the project area are considered minor and fall within the context of historical anthropogenic activities in the project area.

Impacts on Surface Soils and Bedrock

Localized disturbance to surface soil will occur in the access road alignment. Bedrock may be disturbed where outcrops occur or bedrock is present at shallow depths at turbine foundation sites where road realignment or grading is required.

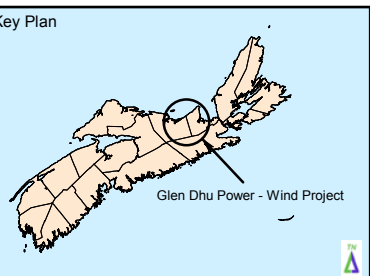
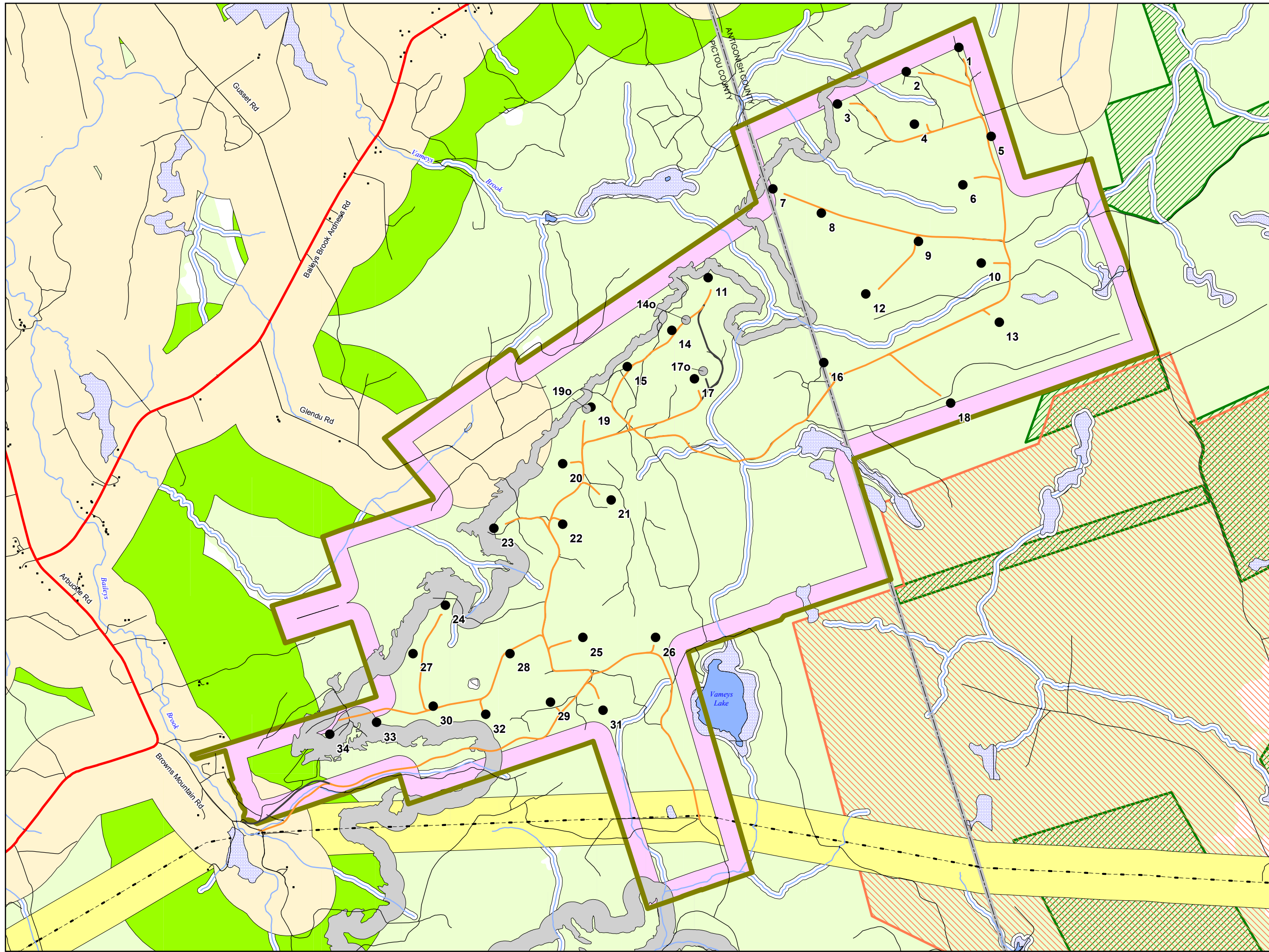
Mitigation: Surface soils which are removed will be preserved for re-use or site restoration. Contractors will be required to follow NSE's *Erosion and Sediment Control Handbook for Construction Sites* to ensure that surface soils are managed to prevent erosion. The alterations to the surface soils are considered minor and fall within the context of historical anthropogenic activities in the project area. Exposed surface soils will be addressed in the site restoration plan.

No significant quantities of bedrock are expected to be removed during the project. Those areas where bedrock is removed will be covered with the road surface.

Impacts on Surface Hydrology

Alteration to surface hydrology may occur due to construction of access roads and the location of turbine laydown areas.

Mitigation: Impacts on surface hydrology will be minimized by the installation of culverts and ditching. Culverts will be installed to maintain natural drainage to the extent possible. An exclusion zone of 30 m has been established around streams and tributaries as shown on Figure 5.1.



- Legend:**
- Existing Features**
- Paved Roads
 - Local Roads
 - - - Transmission Line
 - Streams
 - Forested
 - Non Forested
 - Water
 - General Wetlands
 - ▨ Eigg Mountain Wilderness Area
 - ▨ James River Watershed Area
- Exclusion Zones**
- Stream & Wetlands 20 m
 - Transmission Line 160 m
 - Public Road 300 m
 - Property Line 120 m
 - Homes 600 m
 - Slope 50 & 100 m
- Project Features**
- Project Site
 - Proposed Roads
 - Optional Proposed Roads
 - Proposed WTG's
 - Optional WTG Sites
 - WTG ID



**Glen Dhu Power -
Wind Project
Registration Document**

Figure 5.1
Exclusion Zone Map

DWG No: 5.1_08_07_08
 REVISION: 3.0
 SCALE: 1: 30,000
 DATE: August 07, 2008
 PRODUCED BY: NORTEK/STANTEC

Impacts on Vegetation

Impacts on vegetation will occur mostly in the clearing and grubbing stages of the site work. During construction, it can be anticipated that vegetation in the work areas will sustain damage from heavy equipment.

Mitigation: Impacts on vegetation will be minimized by confining heavy equipment activities to the designated work areas. Areas for parking equipment will also be designated to minimize the environmental footprint from heavy equipment.

Impacts on Wetlands

There is a potential for damage to wetlands due to infilling on the existing roads that require upgrading.

Mitigation: Where existing road systems will be upgraded, wetlands are to the greatest extent only on one side of the existing road. Widening, in these cases, will be done on the other side opposite the wetland. New road construction has been laid out to avoid wetland areas. One site was noted where the existing road straddles a wetland. Culverts in the road at this site are damaged and prevent adequate drainage. The presence of the wetland along the road at this site may be attributed to the poor drainages created by the damaged culverts. These culverts will be replaced during road improvement. Widening will encompass some wetland on up-gradient side of the road.

If any destruction is necessary, a permit will be applied for. The most likely scenario for SWI will be to compensate a 3:1 ratio of created wetland area.

Impacts on Wildlife

Some forest and edge habitat will be covered by widening existing roads and building new ones. Forest soil animals, salamanders, mice, and voles will be displaced or die.

Mitigation: Road construction will be conducted when it is dry or frozen to minimize damage.

Impacts on Birds

Foraging areas and nesting territories will be converted to roadbed.

Mitigation: Existing roads will be followed as much as possible. The right-of-way clearing will be kept as narrow as possible, and any new roads will be as narrow as possible to allow passage of the equipment. Cutting of forest habitat will be minimized to that which is necessary. To the extent possible construction will be limited during the breeding season from May to July.

Impacts on Mainland Moose

The noise and activity of the construction phase will cause any moose in the area to leave.

Mitigation: This activity is temporary and there is a protected wilderness area off to the north and east to act as a sanctuary until construction is over. There is already considerable human activity in the area and there may be no moose to displace. No sign of moose activity or presence was encountered during field surveys from November 2006 to July 2008. If moose are displaced, they should return after the construction phase.

Impacts on Fisher

These wide roaming animals will avoid the construction phase as well.

Mitigation: If fisher have been using the area before the construction phase, they will likely return when the phase is over. This activity is temporary and there is a protected wilderness area off to the north and east to act as a sanctuary until construction is over.

Impacts on Socio-economic VECs

Road work which entails excavation, infilling, grading, compacting and possible paving provides business opportunities to local construction contractors. In addition, these project activities will provide local labour and expenditures in the region to support the field personnel and equipment consumables (i.e. fuel, maintenance, etc). Land use will be positively impacted by the enhanced economic value to the land owners for rights-of-ways for access roads and power line corridors. Emissions and noise from vehicles, dozers and excavators will have a temporary negative impact on air quality and sound levels in the immediate area of the work.

Mitigation: Construction activity will take place over a three year period. Road construction and site preparation are scheduled to be completed in early 2010. Road construction is temporary and therefore the noise disturbance and emissions are considered temporary. This equipment would be powered by engines similar to those used in timber harvesting equipment and therefore negative impacts on noise and air quality would be similar as well. Exclusion zones have been established such that the locations of turbine sites and access roads comply with present or anticipated by-laws and regulations, and public concerns.

5.2.2.3 Road Construction: Drilling and Blasting

Impacts on Surface Soils and Bedrock

Drilling and blasting will permanently alter the local bedrock morphology at the access roads and turbine locations

Impacts on Wildlife

This will be loud and cause some small animals to vacate the immediate vicinity.

Impacts on Birds

The noise and activity will cause some displacement and avoidance particularly in the period May to July, when nesting takes place.

Impacts on Bats

Very sensitive to sound, this activity could cause hearing damage if bats are nearby.

Impacts on Mainland Moose

This activity will cause any moose to leave the area.

Impacts on Fisher

This activity will spark avoidance if fisher are in the area.

Impacts on Socio-economic VECs

Drilling and blasting will provide local labour and expenditures in the region to support the field personnel and equipment consumables (i.e. fuel, equipment maintenance, etc). Blasting operations may pose a safety risk to public who inadvertently trespass during the work. Noise from drilling machines and blasting will have a minor and temporary negative impact on sound levels in the area.

Mitigation: To the extent possible drilling and blasting will be avoided. The preferred method of removing bedrock will be a large excavator equipped with a hydraulic breaker. This method reduces noise levels and provides a safer method of bedrock removal. Should drilling and blasting be necessary, the Contractor will obtain the required permits and conduct the work in a safe and responsible manner and make the duration in each locality as short as possible. Drilling and blasting will be scheduled to occur in the period November to April to minimize impacts on wildlife.

5.2.2.4 Road Construction: Culvert Installation

Impacts on Aquatic Fauna

A portion of the brook where a culvert is installed on a new road or extended on an old culvert site will be covered and the aquatic habitat removed.

Mitigation: Culverts installed on new roads will be sized to standards that permit natural drainage and can handle peak (100 year return) flows. This should facilitate normal fish passage. Fish and amphibians may use the culvert as cover from avian predators. Where improperly installed or collapsed older culverts exist, properly sized and installed new ones could improve fish passage. Beaver sign was found in the area and they may

take advantage of new culverts as places to build new dams. There are ways to control beaver dam water levels at such sites, while maintaining flows through the culvert and adding the biotic potential that a beaver pond brings to the aquatic and terrestrial fauna of the area.

Impacts on Aquatic Vegetation

Sunlight will no longer produce photosynthesis-based plant life in any stream segment covered by culverts.

Mitigation: The tradeoff here is proper transfer of water under the road to sustain the downstream balance of the aquatic ecosystem.

Impacts on Surface Hydrology

The replacement of collapsed and improperly installed culverts will help to restore natural surface hydrology. Localized alterations to surface hydrology may occur due to construction of new access roads.

Mitigation: Impacts on surface hydrology will be minimized by the installation of new culverts and ditching. Culverts will be installed to maintain natural drainage to the extent possible and restore drainage where existing culverts are damaged or ineffective. Surface water hydrology of the project area will have a net improvement over the present condition.

Impacts on Wildlife

Culverts will have to be upgraded in many cases due to the widening of existing roads. This could mean temporary displacement of animals that may live in the old culverts, like a northern water shrew.

Mitigation: The new culverts should offer the same habitat opportunities for these creatures and should be better for aquatic life in general after they are properly installed.

Impacts on Birds

Species like the northern water thrush will have stream bottom foraging areas removed where culverts are installed.

Mitigation: The project will impact only a very small portion of the available forage habitat for these species. The road construction will require the installation of approximately 14 new and upgraded culverts.

Impacts on Mainland Moose

The noise of culvert installation will be part of the general activity that will push any moose in the area off to the north and east.

Impacts on Fisher

The noise of culvert installation will be part of the general activity that will push any fisher in the area off to the north and east.

Mitigation: This activity is temporary and there is a protected wilderness area off to the north and east to act as a sanctuary until construction is over.

Impacts on Socio-economic VECs

Culvert installation will provide local labour and expenditures in the region to support the field personnel and equipment consumables (i.e. fuel, equipment maintenance, etc). Noise from construction equipment will have a minor and temporary negative impact on sound levels in the area. The replacement of damaged culverts will improve the condition of woods roads and provide safer roads for the public who use the area for recreational and commercial purposes.

Mitigation: The installation of culverts is a temporary activity and therefore the noise disturbance and emissions are considered temporary. The equipment used is similar that used in road construction and therefore negative impacts on noise and air quality would be similar as well. No significant impact is identified on the residents of the area who are well acquainted with this type of activity in the project area.

5.2.2.5 Road Construction: Disposal of Excess Material

Impacts on Physiography and Topography

Disposal of excess material will permanently alter the local physiography in the disposal area. Changes to the topography will occur and the site will probably retain features of the disposed material for some time as native soils and bedrock will be covered.

Impacts on Surface Soils and Bedrock

Localized disturbance and removal of surface soil and shallow bedrock will occur at borrow pit sites. Bedrock may be disturbed where outcrops occur or bedrock is present at shallow depths.

Mitigation: To the extent possible, existing borrow pits will be used for the disposal of excess material with the owners' approval. Disposal sites outside of borrow pits will be selected to avoid vegetation species of concern, wetland areas and watercourses. A minimum setback from these features of 30m will be maintained.

Impacts on Wildlife

There will be a temporary loss of open ground cover plants that serve as foraging areas for hare, and small mammals like mice and voles where excess material is placed.

Impacts on Birds

There will be a temporary loss of open ground cover plants that serve as foraging areas for small birds and northern harriers where excess material is placed.

Mitigation: As natural vegetation colonizes the new material, there should be a recovery of lost ground cover habitat.

Impacts on Mainland Moose

The noise of machinery moving this material will be part of the general activity that will force any moose in the area to move off to the wilderness area to the north and east.

Impacts on Fisher

The noise of machinery moving this material will be part of the general activity that will force any fisher in the area to move off, probably to the wilderness area to the north and east.

Impacts on Socio-economic VECs

Disposal of excess materials will provide local labour and expenditures in the region to support the field personnel and equipment consumables (i.e. fuel, equipment maintenance, etc). Noise from construction equipment during these operations will have a minor and temporary negative impact on sound levels in the area. These excess materials will be available to land owners for use in further development of their properties.

Mitigation: As much as possible all of these road building activities should be scheduled for as short a time period as possible - to get the noise over as soon as possible.

5.2.2.6 Road Construction: Borrow Pits

Impacts on Physiography and Topography

Removal of materials for borrow pits will permanently alter the local physiography of the borrow area. Changes to the topography will occur and the pit will probably retain steep side slopes and exposed native soils and bedrock.

Impacts on Surface Soils and Bedrock

Localized disturbance and removal of surface soil and shallow bedrock will occur at borrow pit sites. Bedrock may be disturbed where outcrops occur or bedrock is present at shallow depths.

Mitigation: To the extent possible, existing borrow pits will be used. A number of borrow pits have been identified near the project area. Where new borrow pits are established an agreement covering restoration will be made with the owner.

Impacts on Wildlife

There will be a possible loss of forest and definite loss of ground cover foraging and shelter areas for wildlife species.

Impacts on Birds

The pit itself may well create a vernal pool for amphibians in its bottom if the water table is encountered, and the steep sides of the pit may present an opportunity for species like bank swallows that excavate holes in soft aggregates for nesting. If the borrow pit is near Vamey’s Lake a kingfisher might excavate a nest hole in the side of the pit once it is abandoned.

Mainland Moose

The noise and machinery associated with extracting and moving material will cause aversion for any moose in the area.

Fisher

The noise and machinery associated with extracting and moving material will cause and fisher in the area to move away.

Mitigation: Construction time periods will be as short as possible to reduce the disturbance.

Impacts on Socio-economic VECs

The removal and transport of materials from borrow pits will provide local labour and expenditures in the region to support the field personnel and equipment consumables (i.e. fuel, equipment maintenance, etc). Noise from excavators and trucks will have a minor and temporary negative impact on sound levels in the area. Removal of material from borrow pits will provide a source of income for the landowner as SWI has written into an agreement to pay a certain amount of money per cubic meter of removed aggregate.

Mitigation: The excavation and transport of materials from borrow pits are temporary activities and therefore the noise disturbance and emissions are considered temporary. The equipment used is similar that used in normal road construction and therefore negative impacts on noise and air quality would be similar as well. No significant impact is identified on the residents of the area who are well acquainted with this type of activity.

5.2.2.7 Wind Turbine Construction: Preparation of Lay-down Areas

Impacts on Physiography and Topography

Construction and preparation of turbine locations will permanently alter the local physiography of turbine locations. Minor changes to the topography of the turbine locations will occur with the grade changes and leveling of the lay-down area at each site.

Mitigation: The alterations to the physiography and topography of the turbine locations are considered minor and fall within the context of historical anthropogenic activities in the project area.

Impacts on Surface Soils and Bedrock

Localized disturbance and removal of surface soil and shallow bedrock will occur at turbine locations. Bedrock may be disturbed where outcrops occur or bedrock is present at shallow depths.

Mitigation: To the extent possible, surface soils and organic material which may be removed or graded will be re-used as fill. Exposed surfaces will be restored following the terms of the site rehabilitation plan.

Impacts on Wildlife

Construction and preparation of turbine locations will move the organic soil layer where forest once existed. Habitat for mice, voles and soil animals will be adversely altered.

Impacts on Birds

This activity will remove the organic soil layer where forest once existed. Habitat for forest birds will be adversely altered.

Mitigation: Minimize the size of the lay-down areas. If possible mix the organics with the graded top layer to hasten the return of productive soils and ground cover. Seed the areas with a natural mix to stabilize the ground after grading.

Impacts on Mainland Moose

The noise will repel any moose away from the area.

Mitigation: Construction time periods will be as short as possible to reduce the disturbance. Once the construction and noises associated with that activity have ended, the speculated population would return to the area.

Impacts on Fisher

The noise will cause any fisher to avoid the area.

Mitigation: Once the entire operation is over in the area, fisher would return. Some large trees that may be felled onto the adjacent forest floor will be left in place. In time they may serve as denning logs.

5.2.2.8 Wind Turbine Construction: Transportation of Components and Crane to Site

Impacts on Aquatic Fauna

Dust from the road travel may land and be absorbed by the water, acting like fine silt in the stream and have a negative impact on stream habitat.

Impacts on Aquatic Plants

Dust from the road travel may land and be absorbed by the water, acting like fine silt and covering plants in the stream.

Impacts on Wetlands

Dust could be deposited on a wetland, having a deleterious affect.

Impacts on Wildlife

Dust could coat the surrounding vegetation, making it less palatable to small mammals like mice and hares.

Impacts on Birds

Dust could coat the surrounding vegetation, making it less palatable to birds foraging for seeds or insects.

Mitigation: If dust becomes a problem in this way, dust suppression with water will be used to keep the dust down. If necessary, speed limits may be imposed to curtail dust generation.

Impacts on Mainland Moose

Noise from this activity will cause aversion.

Impacts on Fisher

The travel noise will cause temporary avoidance.

Mitigation: There is a wilderness area to the north and east where any fisher and moose can move to until this travel is complete.

Impacts on Socio-economic VECs

The transport of turbine components from landing ports to the site will require local labour for offloading and traffic management during transit on public roads. The components are moved on specialized trailers which will be brought to the worksite for this purpose. During this phase, local services will be required to support the field personnel and equipment consumables (i.e. fuel, equipment

maintenance, etc). Noise from trucks will have a minor and temporary negative impact on sound levels in the area. Vehicle emissions will have a minor negative impact on air quality. The transportation of components on public roads poses potential public risks.

Mitigation: Transport vehicles are similar to those used commonly in commercial trucking. Therefore the noise disturbance, safety issues and emissions are considered similar to trucking activity presently conducted in the area. The activities are temporary. No significant impact is identified on the residents of the area who are well acquainted with trucking activities and logging in the project area.

5.2.2.9 Wind Turbine Construction: Erection of Turbine Components

Impacts on Wildlife

There will be some displacement of wildlife activity from the graded laydown sites while these components are erected.

Impacts on Birds

This will amount to disturbance and cause some displacement of bird activity from the immediate area of the sites.

Mitigation: Impacts will be temporary. Components will be erected in a timely and safe manner.

Impacts on Mainland Moose

Any moose will avoid this area during this activity.

Impacts on Fisher

The noise of this activity will cause temporary avoidance.

Mitigation: Impacts will be temporary. There is a wilderness area to the north and east where fisher and moose can retreat until the erection of components is complete.

Impacts on Socio-economic VECs

The assembly and erection of the turbines will require labour and services for equipment and personnel. Noise and emissions from cranes during erection activities will have a minor and temporary negative impact on sound levels and air quality in the work area. The visual landscape will be altered as the turbines are erected and the public will be able to view the turbines from the surrounding area for the first time. .

Mitigation: The noise disturbance and emissions that are present during turbine erection will be confined to the immediate project area and no

significant impact is identified on the residents of the area. Due to their size, the WTGs will alter the landscape. Area residents will likely take divergent views on this impact. As found in other areas where wind farms have been developed, some citizens will find this alteration to the landscape a negative impact while others will take a positive view of the development.

5.2.2.10 Power Line Construction: Corridor Preparation

Impacts on Aquatic Fauna

Wet areas could be traversed by machinery, causing mortalities of amphibians and displacement of fish.

Impacts on Aquatic Vegetation

Wet areas could be trampled by machinery, killing water plants.

Impacts on Wetlands

These areas are sensitive to disturbance. Travel on them can kill plants and alter water flow regimes.

Mitigation: To the extent possible wet areas will be avoided. Heavy machinery will not be operated on soil that is water saturated; rather when it is dry or frozen. Temporary bridging or culverts will be constructed over stream crossings.

Impacts on Vegetation

Localized disturbance and removal of vegetation will occur along the power line corridor.

Mitigation: The power line corridor will follow the access roads and will be cleared and prepared as part of the preparation of the roads. Exposed surfaces will be restored following the terms of the site rehabilitation plan. Cleared brush will be chipped and distributed over suitable dry areas. Merchantable timber will be removed for sale. Some felled trees will be left on site to develop as habitat for birds and small animals.

Impacts on Wildlife

Forest soil animals, salamanders, mice, and voles will be displaced or die.

Mitigation: This clearing activity is a linear one, offering some approach time which provides a warning time for animals to be displaced rather than killed. Ground cover, including shrubs, will be left intact as much as possible when removing trees. To the extent possible this activity will be conducted in dry or frozen conditions to minimize rutting. If low enough, standing dead trees will be left intact for cavity users like flying squirrels.

Impacts on Birds

Breeding bird success could be compromised by the disturbance and foraging of shelter areas altered.

Impacts on Bats

Some forest habitat will be removed.

Mitigation: Activities during the bird breeding season from May to July will be avoided and landowners will be encouraged to comply. Standing dead trees will be left for cavity users like barred owls or chickadees and bats if they are low enough.

Impacts on Mainland Moose

While the corridors are being cut, any moose in the area will be displaced by the activity.

Impacts on Fisher

The activity will cause any fisher in the area to avoid it.

Mitigation: Impacts will be temporary. There is a wilderness area to the north and east where fisher and moose can move into until the corridor is completed.

Impacts on Socio-economic VECs

The preparation of the power line corridor will require labour and services for equipment and personnel. This work will be conducted concurrently with the development of the access roads. Land use will be positively impacted by the enhanced economic value to the land owners for rights-of-ways for power line corridors. Noise and emissions from these activities will have a minor incremental effect associated with construction of the roads. No significant impact is identified on the residents of the area.

Mitigation: The noise disturbance and emissions are during turbine erection will be confined to the immediate project area.

5.2.2.11 Power Line Construction: Installation of Poles/ Towers

Impacts on Aquatic Fauna

Machinery carrying poles or tower components could drive over and kill amphibians and other aquatic life.

Mitigation: Wet areas will be avoided and installation equipment will follow access roads between pole locations. Installation equipment will not enter streams. Where possible, poles will be spaced to span wet areas.

Impacts on Aquatic Vegetation

Machinery carrying poles or tower components could drive over and kill aquatic plants.

Mitigation: Wet areas will be avoided and installation equipment will follow access roads between pole locations. Installation equipment will not enter streams. Where possible, poles will be spaced to span wet areas.

Impacts on Vegetation

Localized disturbance and removal of vegetation will occur at power pole locations.

Mitigation: The power line corridor will follow the access roads and will be cleared and prepared as part of the preparation of the roads. The installation of individual poles will be confined to small areas 2-3 m in diameter. To the extent possible, surface soils and organic material which may be removed will be re-used as fill. Exposed surfaces will be restored following the terms of the site rehabilitation plan.

Impacts on Wildlife

There may be some small animal mortality associated with digging and installing poles and towers.

Mitigation: To minimize mortalities, installation will be done when conditions are dry or frozen.

Impacts on Birds

Ground users and nesters may be displaced where poles or towers are installed.

Mitigation: To minimize displacement or mortalities, installations will be conducted when conditions are dry or frozen, and outside of the period between May and June.

Impacts on Mainland Moose

While the poles/towers are being installed, any moose in the area will be displaced by the activity.

Impacts on Fisher

The activity will cause any fisher in the area to avoid it.

Mitigation: Impacts will be temporary. There is a wilderness area to the north and east where fisher and moose can move into until the poles and towers are completed.

Impacts on Socio-economic VECs

The installation of the power poles or towers will require labour and services for equipment and personnel. Because of their close proximity to the access roadbed, this work will be conducted after the turbine components have been moved to their respective sites. Noise and emissions from pole installation activities will have a minor and temporary incremental negative impact associated with all construction activities.

Mitigation: The noise disturbance and emissions that are present during power pole installation will be confined to the immediate project area and no significant impact is identified on the residents of the area.

5.2.2.12 Power Line Construction: Installation of Conductors

Impacts on Aquatic Vegetation

Machinery carrying conductors could drive over and kill aquatic plants.

Impacts on Wildlife: There may be minor small animal mortality associated with traveling to install conductors.

Impacts on Birds

Ground users and nesters may be displaced when conductors are installed.

Mitigation: To the extent possible, wet areas will be avoided during the installation of power line conductors. Conductor installation will be scheduled when ground conditions are dry or frozen and outside of the bird breeding period between May and June.

Impacts on Mainland Moose

While the conductors are being installed, any moose in the area will be displaced by the activity.

Impacts on Fisher

The activity will cause any fisher in the area to avoid it.

Mitigation: Impacts will be temporary. There is a wilderness area to the north and east where moose and fisher can move into until the installation is completed.

Impacts on Socio-economic VECs

The installation of the conductors onto power poles will require labour and services for equipment and personnel. Because of their close proximity to the access roadbed, this work will be conducted after the turbine components have been moved to their respective sites. Noise and emissions from pole installation

activities will have a minor and temporary incremental negative impact associated with all construction activities.

Mitigation: The noise disturbance and emissions that are present during power pole installation and not during installation of the conductors will be confined to the immediate project area and no significant impact is identified on the residents of the area.

5.2.2.13 Accidental Events: Collisions

Impacts on Wildlife

There is a possibility of road killed wildlife. Deer, porcupines and other small, slow moving or startled animals could be hit by vehicles.

Impacts on Socio-economic VECs

Collisions are considered negative economic impact resulting from lost time and revenue. Though considered a small risk, vehicle collisions are a negative impact of safety of personnel and the public.

Mitigation: Mitigation will include an accident prevention program. Contractors will be required to have a proper safety program in place during the conduct of the work. Speed limits will be imposed for general safety reasons. Water will be used to keep dust to a minimum and visibility good. Vehicles will be properly maintained to ensure safe operation. Operators will be experienced and trained on the specific equipment on which they work. Where site conditions warrant and public roads are involved, appropriate warning devices and/ or flagging controls will be employed.

5.2.2.14 Accidental Events: Spills

Impacts on Surface Soils and Bedrock

Spills involving petroleum hydrocarbons will have an adverse impact on surface soils which will render them unsuitable for use and/ or require their removal.

Impacts on Aquatic Fauna

Lubricants, fuels and other petroleum-based and synthetic fluids could have a deleterious effect if they are released into a waterway.

Impacts on Aquatic Vegetation

Lubricants, fuels and other petroleum-based and synthetic fluids could have a deleterious effect if they are released into a waterway.

Impacts on Wetlands

Lubricants, fuels and other petroleum-based and synthetic fluids could have a deleterious effect if they are released into a wetland.

Impacts on Wildlife

Lubricants, fuels and other petroleum-based and synthetic fluids could have a deleterious effect on animals if they come in contact with these substances. Often wildlife reacts by ingesting the substance while trying to clean it off, which can prove fatal. A petroleum product spill would require additional labour for the cleanup and restoration.

Impacts on Socio-economic VECs

Such a spill would have potential negative impact on land use from the effects of the spill. First Nations heritage sites and archaeological resources, if present, could be negatively impacted from contact with petroleum products. Petroleum spills are considered a potential negative impact on public safety due to possible contact with tainted vegetation and soils.

Mitigation: Mitigation will include a spill prevention program. Hazardous materials will be identified as required by law. An emergency response plan and necessary containment equipment will be maintained on site to ensure containment on land if an accident occurs. To minimize risk to aquatic systems, fueling activities will be conducted only on specified locations which are located away from aquatic habitat. Fuel trucks will have a supply of absorbent and containment materials during all equipment filling operations.

5.2.2.15 Accidental Events: Fire

Impacts on Surface Water Quality

Forest fire would adversely impact surface water because of sedimentation in runoff and deleterious materials such as ash.

Impacts on Vegetation

Surface vegetation including species of concern would be destroyed over the burned area.

Impacts on Wetlands

Wetland species including species of concern would be destroyed over the burned area. Water quality in the wetland would be altered.

Impacts on Wildlife

Wildfire is often fatal to many animal species, particularly those that move slowly or cannot fly. Even fast-moving animals may become trapped, panicked or overcome by smoke. Some take shelter in cavity trees that subsequently burn.

Impacts on Birds

Forest fires occur in the breeding season period in May prior to leaf-out, and in dry summers before the young of some species learn to fly.

Impacts on Bats

Spring or summer fires can kill colonies of forest bats, particularly when they roost in dead, hollow trees. In summer young may be unable to fly.

Impacts on Mainland Moose

There are few water bodies for moose to retreat to in case of fire. If any moose were in the area they would attempt to leave, but might get caught by a major fire.

Impacts on Fisher

Denning logs would have no protection from fire, and young as well as adults might perish.

Impacts on the James River Watershed and Eigg Mountain Wilderness Area

Under unfavourable conditions in which a fire became uncontrolled, fire could spread to areas outside the project area including the areas of the James River Watershed and Eigg Mountain.

Impacts on Climate and Air Quality

A significant forest fire in the project area would have a negative impact on climate due to the combustion emissions and particulate. Impacts from these emissions would mostly occur in the local airshed in the form of smoke. The releases will add to the global quantity of Greenhouse Gas emissions which are related to climate change.

Impacts on Socio-economic VECs

The destruction within the burn area of the forest fire would negatively impact income and land use from the potential timber resources lost in the fire. Archaeological and First Nations heritage resources would be lost. During the period of natural vegetation, the viewscape of the burned area would be negatively impacted. Such fires pose a safety risk to those responsible for fighting the fire and to the public who may be in the area during the fire.

Mitigation: Fire suppression equipment will be maintained on site and emergency response capabilities are available from the surrounding communities. Special precautions and limitations to project activities may be imposed when the fire hazard is moderate or high. Woods travel might have to be monitored or limited, because of the general public access already in the area. NSDNR might have to enact a public travel ban. Emergency response capabilities are available from the surrounding communities.

5.2.2.16 Accidental Events: Construction Accidents During Turbine Assembly

Impacts on Socio-economic VECs

An accident during the erection of turbines could have significant financial consequences to Enercon and SWI because of the cost of components. Worker safety is a major issue at all times and particularly while lifting large, heavy loads.

Mitigation: Enercon personnel will conduct this stage of the work. They will provide experienced personnel who are well versed in the assembly procedures. Enercon is a world leading supplier and constructor of large wind turbines and will exercise great care to prevent any such accidents.

5.2.3 Operation Phase

5.2.3.1 Operation Phase: Power Generation

Impacts on Birds

Bird fatalities may result from birds inadvertently striking turbine blades. Soaring birds that use the updrafts along the scarp face may be at risk.

Impacts on Bats

Bat fatalities may result from bats inadvertently striking turbine blades. Bats navigate acoustically and are not subject to attraction to lights. They may; however, feed on flying insects which may be attracted to continuous light. The use of flashing lights will serve to reduce the attraction for insects and therefore bats, particularly at the elevations (+80m AGL) of the top the nacelles where the lights are located.

Mitigation: The prediction of bird and bat fatalities poses a significant difficulty for the assessment of potential impacts. CWS provides guidance on conducting monitoring through the use of carcass surveys once the operation of the wind facility begins. SWI will follow this guidance and conduct these surveys as part of their Environmental Monitoring Program. A setback of 100 meters has been established in the area of the scarp face where soaring birds were most frequent. The setback for the remaining area of the scarp face is 50 m. Figure 5.1 shows the exclusion areas established to address this and other environmental issues.

Lighting for turbines is required for aeronautical safety. The selection of a lighting system must consider the risk of attracting birds and bats and the potential for the disturbance of the aesthetic of nearby residences. To mitigate the potential attraction of lights on turbines the following lighting specifications are proposed:

- Lighting will be confined to the perimeter turbines and selected turbines within this perimeter to meet the requirements of aviation safety. As the turbine structure may be considered a “cluster” under the regulation, lighting is proposed for optimum 14 locations within the 30 turbine cluster (see Figure 2.11).
- The proposed lighting will be medium intensity, white, flashing, omni-directional obstruction lights as specified in Chapter 6 and Table 6-1 of the Standard as shown in Table 2.3. These specifications have been selected based on evidence that these characteristics reduce the potential attraction to avian species.
- There will be no base-level lighting. This will minimize the attraction of the sites to insects and the potential attraction for feeding bats.

Turbine locations have been selected in elevated areas away from wetlands and streams (see Figure 2.3). There are no significant wetlands in close proximity to the turbines and the closest streams are more than 100m from the nearest turbine site.

Impacts on Mainland Moose

Although the impacts of the operation of the Glen Dhu Project on mainland moose are difficult to predict, it is reasonable to assume that mainland moose will return to the project site to the extent they used it prior to the development. This assumption is based on the behavior which moose exhibit at other locations where wind turbines are present in moose habitat.

Mitigation: The restoration of the mainland moose population is dependant on a number of factors over which project activities will have no influence. SWI will implement a moose survey for a number of years during the operation of the wind farm in cooperation with NSDNR to evaluate the population distribution in the project area.

Impacts on Fisher

It is reasonable to assume that fishers will return to the project site during the operation phase to the extent they used it prior to the site activities.

Impacts on Climate and Air Quality

The province of Nova Scotia has initiated a requirement for energy from renewable sources to reduce reliance on the combustion of fossil fuels. Climate change and impaired air quality are attributed to the use of fossil fuels. The energy created over the life cycle of the Glen Dhu Project will provide a positive contribution to climate change and air quality by lessening the reliance on fossil fuel combustion.

Impacts on Socio-economic VECs

Ongoing maintenance programs will employ local personnel in various capacities and contribute to long-term employment opportunities in the region. The Project will have a positive impact on the local economy through enhanced taxation on land values and revenues derived from land rental. Improved land use and revenue will be received by land owners for leases of turbine sites and access roads.

Visual Landscape

The alteration of the visual landscape which large WTGs create will be an issue of public debate for some time. This debate occurs in many areas where wind farms are developed because of the subjective nature of this perception. Photomontages illustrated in Figures 5.2a through d demonstrate the view of the wind farm from various locations in the area surrounding the Project site.

Some citizens will find this alteration to the landscape a negative impact on the existing landscape while others will consider the WTGs of technical interest and a positive development for the community.

Figure 5.3 is a computer generated Turbine Visibility Analysis which illustrates the areas from which the site can be seen and the number of turbines visible at each area. The visibility of turbines depends on topography, distance between the viewer and the turbine, and atmospheric conditions at the time.

Shadow flicker occurs under sunny conditions when the rotating blade of the turbine passes through the path between the sun and a receptor. Figure 5.4 shows the potential impact of shadow flicker around the Glen Dhu site. The analysis shows the potential areas affected and the number of hours per year under which this condition could occur.

Glen Dhu Power – Wind Project

Volume I: Environmental Assessment and Registration Document



Figure 5.2a: Photomontage from Big Island Beach showing the Glen Dhu Wind Turbine array

Glen Dhu Power – Wind Project

Volume I: Environmental Assessment and Registration Document

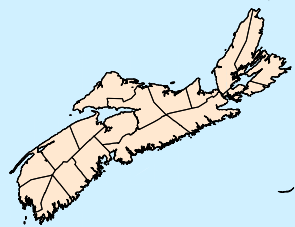
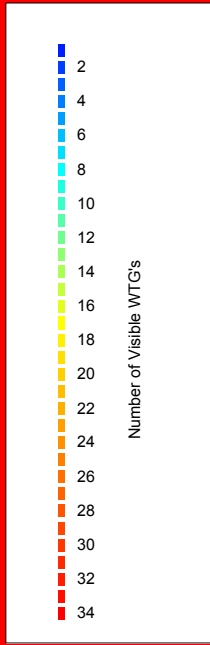
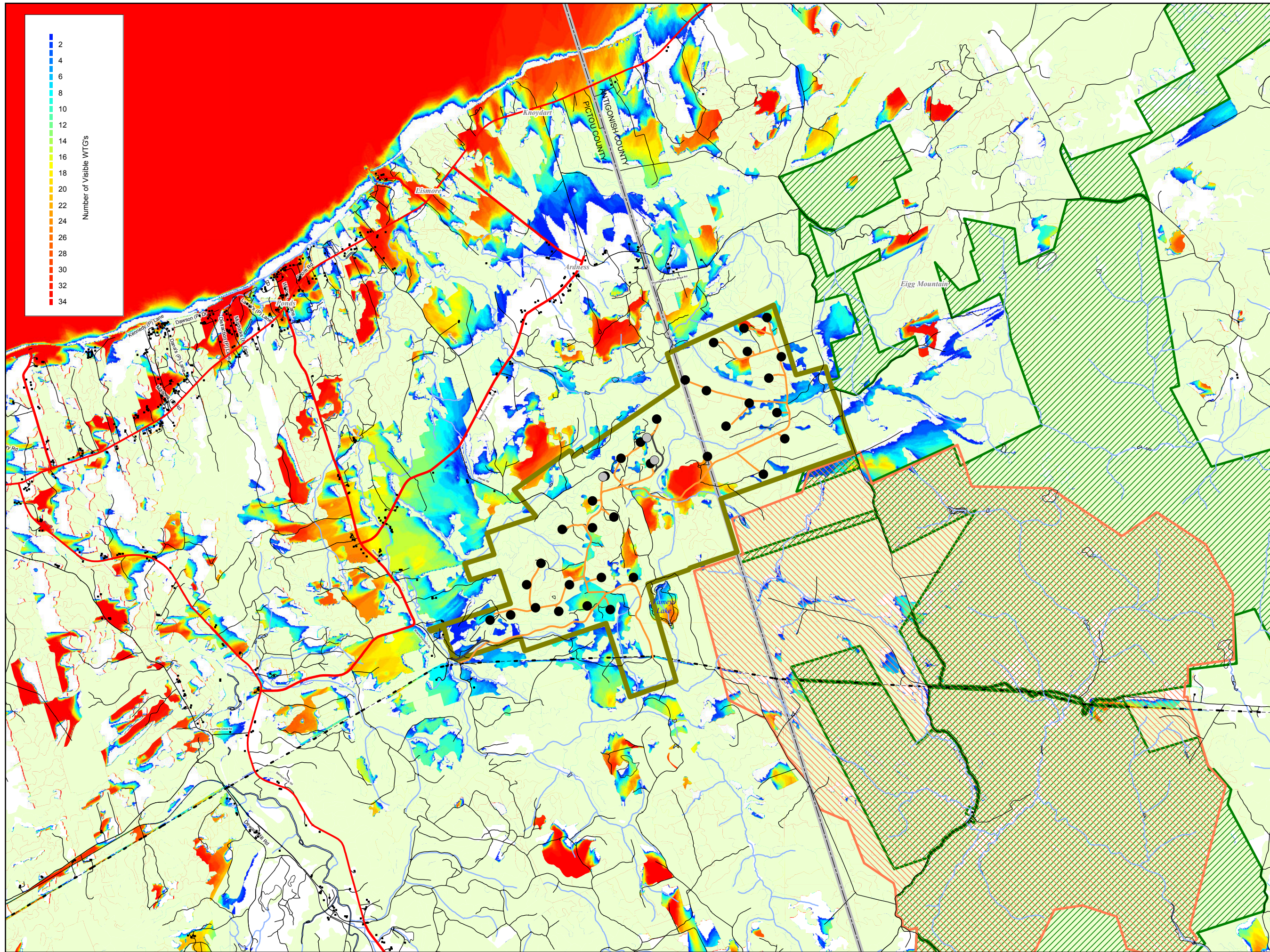


Figure 5.2b: Photomontage from Verhagen's field on the New Road, Lismore, showing the Glen Dhu Wind Turbine array.



10/07/2008

Figure 5.2c: Photomontage from Eigg Mountain showing the Glen Dhu Wind Turbine array



Legend:

Existing Features

- Paved Roads
- Local Roads
- Transmission Line
- Streams
- Forested
- Water
- Wetlands
- Eigg Mountain Wilderness Area
- James River Watershed Area

Project Features

- Project Site
- Proposed Roads
- Optional Proposed Roads
- Proposed WTG's
- Optional WTG Sites



**Glen Dhu Power-Wind Project
Registration Document**

**Figure 5.3
Turbine Visibility Analysis**

DWG No: 5.3_08_07_08
 REVISION: 3.0
 SCALE: 1: 50,000
 DATE: August 07, 2008
 PRODUCED BY: NORTEK/STANTEC

Sound Levels

Sound levels generated by the operation of the WTGs may have a negative impact on residents close to the site. Figure 5.5 is a predicted analysis of sound levels generated by Enercon E-82 Turbines. This analysis indicates that sound levels exceeding 50dBa are confined to the project area. Sound levels greater than 40dBa do not occur at the nearest residence. Sound level data which were collected from monitoring stations at selected locations near the project site boundary in October 2007 indicate that natural background sound levels at night can exceed Provincial sound level guidelines for night time noise of 55dBa. (See Sections 4.5.1 and Appendix E)

Mitigation: Municipal regulations require that turbines are located at least 600 m from residences. Turbine sites in the Glen Dhu Project area are at greater distances from residences than required by the regulations. These distances will negate or limit the potential negative impacts on nearby residents from the WTGs under most conditions.

The technology employed in the Enercon E-82 has been designed to mitigate the generation of noise. The Enercon E-82 turbine technology does not require a transmission, which was often the source of noise in the previous generations of wind turbines.

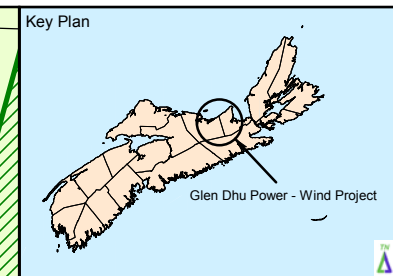
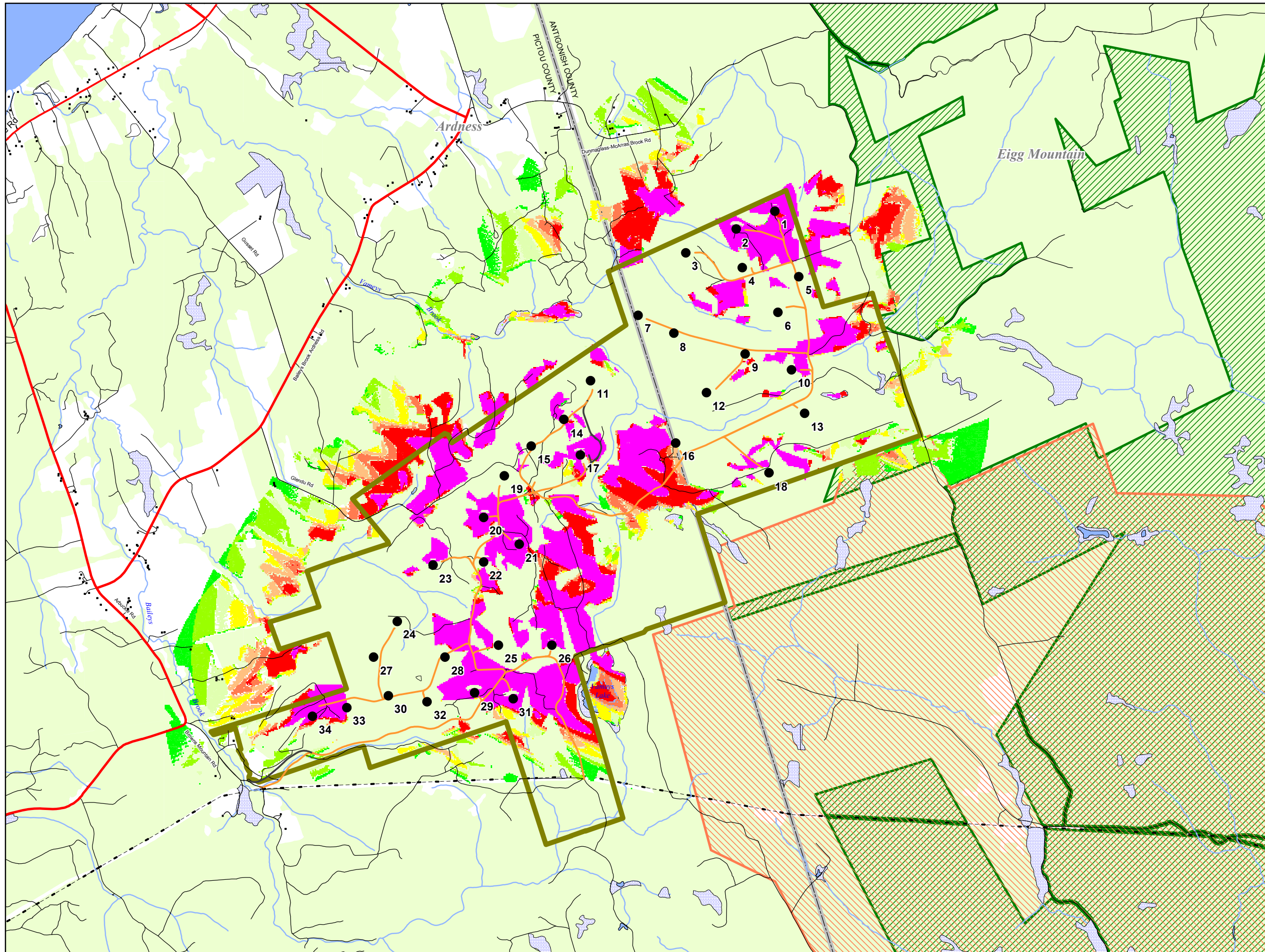
5.2.3.2 Maintenance Activities: System Component Change-out

Impacts on Wildlife

There will be some displacement of wildlife activity from the graded lay-down sites while old components are dismantled and new components assembled and added.

Impacts on Birds

The change-out of components will amount to some disturbance and cause some displacement of bird activity from the immediate area of the sites.



Legend:

Existing Features

- Paved Roads
- Local Roads
- - - Transmission Line
- Streams
- Forested
- Non Forested
- Water
- Wetlands
- Eigg Mountain Wilderness Area
- James River Watershed Area

Project Features

- Project Site
- Proposed Roads
- Proposed WTG's
- 33** WTG ID

Shadow (Hrs/ Year)

- 0 - 4
- 5 - 9
- 10 - 14
- 15 - 19
- 20 - 24
- 25 - 29
- 30 - 49
- 50 - 100



**Glen Dhu Power-Wind Project
Registration Document**

Figure 5.4
Shadow Flicker Analysis

DWG No: 5.4_08_07_08
 REVISION: 3.0
 SCALE: 1: 30,000
 DATE: August 7, 2008
 PRODUCED BY: NORTEK/STANTEC

Mitigation: Impacts will be temporary. Old components will be removed and new components erected in a timely and safe manner.

Impacts on Mainland moose

Any moose will avoid this area during this activity.

Impacts on Fisher

The noise of this activity will cause temporary avoidance.

Mitigation: Impacts will be temporary. Moose and fisher may retreat to the wilderness area to the north and east until the installation of new components is complete.

Impacts on Socio-economic VECs

Where large components are changed out, the transport landing ports to the site will require local labour for offloading and traffic management during transit on public roads. The dismantling and reconstruction of turbines will require labour and services for equipment and personnel. Noise and emissions from the crane during these activities will have a minor and temporary negative impact on sound levels and air quality in the work area.

Mitigation: The noise disturbance and emissions are during turbine component changes will be confined to the immediate project area and no significant impact is identified on the residents of the area.

5.2.3.3 Maintenance Activities: Access Road Use

Impacts on Wildlife

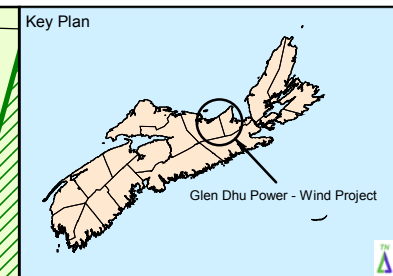
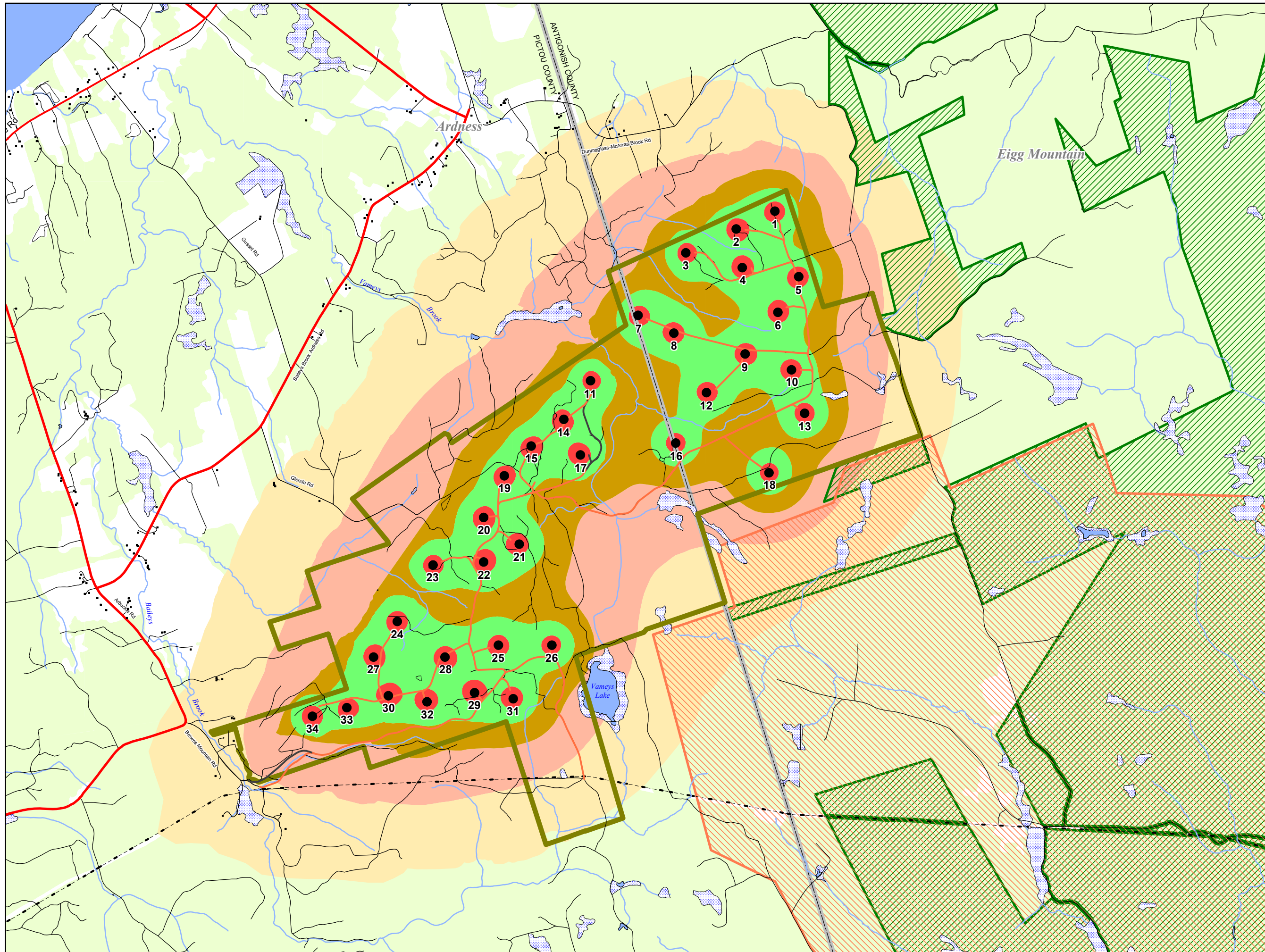
Vehicles and human activity may disturb wildlife in the vicinity of the roads and turbine locations.

Impacts on Mainland Moose

Vehicles and human activity may disturb moose in the vicinity of the roads and turbine locations.

Impacts on Fisher: Vehicles and human activity may disturb fisher in the vicinity of the roads and turbine locations.

Mitigation: Impacts will be temporary. Wildlife, including moose and fisher, may retreat from the immediate area of disturbance and move to the wilderness area to the north and east if the disturbance is of sufficient duration.



Legend:

Existing Features

- Paved Roads
- Local Roads
- Transmission Line
- Streams
- Forested
- Non Forested
- Water
- Wetlands
- Eigg Mountain Wilderness Area
- James River Watershed Area

Project Features

- Project Site
- Proposed Roads
- Optional Proposed Roads
- Proposed WTG's
- WTG ID

Noise (dBa)

- 35 - 39
- 40 - 44
- 45 - 49
- 50 - 54
- 55 - 100



Glen Dhu Power - Wind Project Registration Document

Figure 5.5
Estimated Turbine Sound Levels

DWG No: 5.5_08_07_08
 REVISION: 3.2
 SCALE: 1: 30,000
 DATE: August 07, 2008
 PRODUCED BY: NORTEK/STANTEC

5.2.3.4 Maintenance Activities: Snow Clearing

Impacts on Wildlife

Impacts from snow clearing activities can benefit some species such as deer and coyotes by allowing them an access corridor that deep snow does not provide. Access for coyotes may provide an increased range for foraging; however, this could have a negative impact on prey species. In deep snow conditions, plowed roads would provide deer with a greater range for winter browse.

Impacts on Mainland Moose

Human activity may disturb moose in the winter when survival conditions are most difficult for the species. Cleared access roads would open areas to predation from coyotes. Increasing the range of white tailed deer into moose territory can increase exposure of moose to the deer parasite *P. Tenuis*.

Impacts on Fisher: Cleared access roads would open areas to predation of fisher from coyotes.

Mitigation: Snow clearing will be conducted on an “as needed” basis rather than after each snowfall. This will reduce the access period while allowing service of the WTGs.

Impacts on Socio-economic VECs

Snow clearing operations will require labour and services for equipment and personnel. Some noise disturbance will occur during the clearing operations. Cleared roads will provide enhanced safety for the public using the area for recreation.

Mitigation: The noise disturbance and emissions are similar to that of the grader used on the snowmobile trails scattered throughout the Project area and will amount to a minimal increase from the norm. Furthermore, the disturbance from noise will only occur during actual plowing and be confined to the immediate project area.

5.2.3.5 Operation Phase: WTG Failure

Impacts on Surface Water Quality

In the unlikely event of a catastrophic failure of a WTG, surface water quality could be negatively impacted by turbine materials and lubricants.

Impacts on Vegetation

In the unlikely event of a catastrophic failure of a WTG, surface vegetation, including species of concern, could be destroyed by falling components.

Impacts on Wetlands

In the unlikely event of a catastrophic failure of a WTG, wetland species, including species of concern, would be destroyed by falling components. Water quality in the wetland could be impacted by residual lubricants.

Mitigation: No such failures have occurred with Enercon E-82 machines. Should such a failure occur, the debris area would be cleaned up and the site restored.

5.2.3.6 Operation Phase: Oil and Lubricant Release

Impacts on Surface Soils

A release of oils and lubricants during turbine operations could impair soil quality.

Impacts on Aquatic Fauna

A release of oils and lubricants entering surface water could have a negative impact on aquatic animals.

Impacts on Aquatic Vegetation

A release of oils and lubricants entering surface water could have a negative impact on aquatic plants.

Impacts on Surface Water Quality

A release of oils and lubricants during turbine operations could impair water quality.

Impacts on Wetlands

A release of oils and lubricants during turbine operations would have a negative impact on wetland ecology.

Impacts on Wildlife

A release of oils and lubricants could coat the surrounding vegetation, making it less palatable or perhaps toxic to small mammals like mice and hares.

Impacts on Birds

A release of oils and lubricants could coat the surrounding vegetation, making it less palatable or perhaps toxic to birds foraging for seeds or insects. In sufficient quantities, birds which come in contact with oil and lubricants are subject to toxic effects from ingestion of these substances from grooming.

Impacts on Mainland Moose

A release of oils and lubricants could coat the surrounding vegetation, making it less palatable or perhaps toxic to moose.

Impacts on Fisher

Fisher may come into physical contact with oils and lubricants on vegetation and soil and ingest these substances during grooming.

Impacts on Socio-economic VECs

Humans could come into contact with oils and lubricants around a turbine if a release were to occur. Inadvertent exposure could be considered a safety risk but it is unlikely that it would pose a significant health risk.

Mitigation: No such failures have occurred with Enercon E-82 machines. No significant quantities of oils and lubricants are present in E-82 turbines. If the unlikely event of a spill were to occur, the area effected would be cleaned up immediately following NSE standards, and following the codes in the EMP and EPP.

5.2.4 Decommissioning Phase

5.2.4.1 Decommissioning Phase: Equipment Disassembly and Removal

Impacts on Vegetation

Activities associated with the removal of turbines would require removal of vegetation which has become re-established on site lay-down areas.

Mitigation: A site restoration plan would be implemented to re-vegetate exposed soils and allow natural succession over cleared areas.

Impacts on Bats

Removal of the turbines would remove the potential risk to bats of striking turbine blades.

Impacts on Birds

Removal of the turbines would remove the potential risk to birds of striking turbine blades.

Impacts on Mainland Moose

Vehicles and human activity during the removal process may disturb moose in the vicinity of the roads and turbine locations.

Impacts on Fisher: Vehicles and human activity during the removal process may disturb fisher in the vicinity of the roads and turbine locations.

Mitigation: Impacts will be temporary. Wildlife, including moose and fisher, may retreat from the immediate area of disturbance and move to the

wilderness area to the north and east if the disturbance is of sufficient duration.

Impacts on Socio-economic VECs

Removal of the turbines will have a negative impact on employment, services, and revenues for landowners and municipalities. Sound levels will return to pre-project levels. The restoration of the visual landscape will remain an issue of public debate for some time.

Mitigation: Provincial regulations require that turbines are located at least 600 m from residences. The turbine sites in the Glen Dhu Project area are at greater distances from residences than required by the regulations. Using this setback condition will negate potential negative impacts on nearby residents from the WTGs.

5.2.4.2 De-commissioning Phase: Foundation Removal

Impacts on Physiography and Topography

Removal of foundations will restore the natural topography of the site and permit natural re-vegetation of the foundation area.

Impacts on Wildlife

There will be some displacement of wildlife because of the work activity, noise and human presence.

Impacts on Mainland Moose

Any moose will avoid this area during this activity.

Impacts on Fisher

The noise of this activity will cause fisher to temporarily avoid the area.

Mitigation: Impacts will be temporary. Moose and fisher may retreat to the wilderness area to the north and east until the removal of the foundation is complete.

Impacts on Socio-economic VECs

Removal of the foundations will employ local labour and services. Noise generated during the activity will be a temporary, local impact.

Mitigation: The turbine sites in the Glen Dhu Project area are located further away from dwellings than required by regulations and therefore the noise associated with this activity is unlikely to affect adjacent residents.

5.2.4.3 De-commissioning Phase: Site Restoration

Impacts on Vegetation

Site restoration will be conducted as part of the de-commissioning of turbine sites. This will promote re-vegetation of the areas either through natural succession or through seeding using common local vegetation species.

Impacts on Wildlife

Site restoration will promote re-vegetation which will benefit species that forage on new growth.

Impacts on Socio-economic VECs

Site restoration work will benefit the local economy through the use of local labour and services. Noise from this work will have a minor and temporary negative impact on sound levels in the work area. The landscape of the sites will be restored which will be considered a positive impact by those who value natural conditions.

Mitigation: The turbine sites in the Glen Dhu Project are further away from houses than the distance set by regulators for measurement from dwelling to turbines and, therefore, the noise associated with this activity is unlikely to affect adjacent residents.

6.0 MITIGATION MEASURES, ENVIRONMENTAL MONITORING AND PUBLIC CONSULTATION PROGRAMS

The Proponent is committed to environmental protection in the construction and operation of the Glen Dhu Power project and to mitigating potential impacts related to its Project. The Project size is thirty turbines, making it a medium size under the Nova Scotia assessment criteria. It must be noted, that to the greatest extent, turbine sites and access roads will be leased from individual land owners and the Crown, if approved. A small portion of the land will be owned by SWI. Land use activities, outside of those areas leased or owned by SWI, is at the discretion of the land owners.

SWI supports provisions for managing site access; however, land owners determine whether public access is allowed on their lands. In the past, access to this area has provided recreational activities for the public. Public access has been raised as a potential source of environmental impacts for number of reasons; however, the assignment of mitigating impacts resulting from public access and behavior for the overall area, for legal and contractual reasons, cannot be assumed by the Proponent.

6.1 Environmental Protection Plan (EPP)

An Environmental Protection Plan (EPP) has been prepared which will guide the design and installation of the physical components of the project. The EPP includes the selection of physical locations and access roads and identifies construction methods which minimize potential impacts on the environment. The EPP applies provincial and federal guidelines for construction activities and procedures which will be followed during the construction of the project.

The EPP incorporates approved design methods for erosion and sediment control, set backs from streams and areas of environmental or heritage significance and appropriate engineering designs for surface water management and stream crossings. The EPP also designates the time frames for seasonally sensitive activities. The schedules for the pre-construction and construction activities will consider the information provided in the Environment Impact Study (EIS) to determine the optimum periods for conducting activities such as:

- stream crossings during late summer low flow periods (between June 1 and September 30 as required by NSE)
- clearing and grubbing when the ground is frozen
- spring weight restrictions on rural roads and highways
- woods closures due to risk of fire
- other seasonal sensitivities as identified in the EIS

The EPP designates the areas of environmental responsibility for the proponent and contractor(s). Typically, the responsibilities for environment protection in the Project

design and monitoring of the site activities will be those of the Proponent and the responsibilities for implementation, construction activities and reporting will be those of the Contractor.

The EPP will be included in tender documents to guide contractors in costing, scheduling, planning and conducting construction activities. Other documents to be included under the EPP will be the Environmental Management Plan (EMP), Emergency Response Plan (ERP) and the Site Restoration Plan (SRP).

6.2 Environmental Management Plan (EMP)

The Environmental Management Plan (EMP) has been developed to guide site specific activities and procedures to be followed during the pre-construction and construction phase of the project. The purpose of the procedures designated in the EMP is to manage and minimize risks and potential environmental impacts from equipment and construction activities.

The EMP designates procedures and locations for equipment storage, servicing and fueling, designates lay-down areas for materials and supplies, sets requirements for sanitation and on-site waste management and provides procedures for equipment operations to limit potential impacts on sensitive habitat.

The EMP will include a Site Restoration Plan (SRP) and an Emergency Response Plan (ERP) to methods to restore the site and to address environmental emergencies respectively. The ERP is a field document which describes the procedures, responsibilities, contacts and reporting requirements to be followed in case of an environmental emergency. The ERP will be available to all site personnel.

This Environmental Management Plan (EMP) was developed by Shear Wind to describe the protection measures required for activities associated with development of the Glen Dhu Wind Power Project and the monitoring protocols necessary to ensure that mitigation measures are effective and adequate. The text will include following along with a site specific emergency response and site safety plan.

*The purpose of the **Environmental Management Plan** is:*

- 1. To ensure that Shear Wind's commitments to minimizing environmental effects are met.*
- 2. To ensure development activities meet all provincial, federal and municipal requirements.*
- 3. To provide mitigation of the potential environmental impacts due to construction activities.*
- 4. To provide a reference document for planning and/ or conducting construction activities that may have an impact on the environment.*

Construction Phase Environmental Mitigation Measures

A: Site clearing, road and tower foundation construction.

- A.1 *Access road and tower foundation construction will be conducted in accordance with Enercon's Technical Specifications for:*
- 1) Access Roads and Crane Platforms (See Appendix B, Section 2)*
 - 2) Civil works, Crane and Road Requirements (See Appendix B, Section 3)*
- A.2 *All construction activities will be restricted as much as practically possible to approved work spaces, designated access roads and turbine sites.*
- A.3 *When possible, the contractor will avoid grading immediately before or after heavy rain events, which would further loosen the road surface and promote runoff of graded material.*
- A.4 *Where possible, a buffer area of 30 m will be established around rare plants in which vegetation will not be disturbed.*
- A.5 *All construction equipment brought to the site will be cleaned prior to arriving at the site, and shipments of imported materials must have fumigation certificates before arriving in Nova Scotia to ensure that harmful species are not transferred to the region.*
- A.6 *Watercourses will be spanned by culverts that do not alter the existing flow regime of any watercourse and all water crossings will take place at designated crossing sites.*
- A.7 *To the extent possible, access roads and towers will not be sited in wetlands and culverts will be installed to minimize disturbance to the existing flow regime of any watercourses.*
- A.8 *Wherever possible, rock excavation will be performed by ripping rather than blasting. No excavation or placement of rock will be required in any watercourse.*
- A.9 *The slope of any excavation pit will be minimized so that the pit does not present a safety hazard to site workers or the public (offsite pit). The area will be marked with signs and/ or fencing, depending on its location. If the pit was used only for development of this wind park, it must be backfilled with native material and seeded with non-invasive, native, herbaceous plant species.*
- A.10 *During tower foundation construction, the crane platform will also serve as a storage area for material (e.g. reinforced steel) and machinery.*
- A.11 *Any excess earth excavated during the construction phase will be stored on the lay-down area adjacent to the foundation.*
- A.12 *Excavated soils unsuitable for use as fill or dressing slopes will be disposed at a site approved by the project engineer.*
- A.13 *All aggregate sources will be approved by project engineer and based on considerations such as the Pit and Quarry Guidelines (NSDOE 1988a).*
- A.14 *All disturbed sites will be re-vegetated or stabilized and allowed to re-grow naturally with non-invasive, native, herbaceous plant species upon completion of construction activities.*

B: Vehicle Operation:

- B.1 The construction site will have restricted access to prevent trespassing or inadvertent entrance by public vehicles. “Restricted Access” signs will be posted at the entrance of each access road.*
- B.2 Transport of materials, especially on semi trailers (e.g. turbine blades) to and from the site will be done in accordance with local and provincial traffic regulations. The project engineer will coordinate with RCMP to ensure safe transport of these materials with minimal disturbance to the public.*
- B.3 Contractors will abide by local traffic laws, speed limits, and will use safe, defensive driving practices.*
- B.4 Construction will be completed in a timely manner as to minimize the amount of time the construction equipment is on site*
- B.5 Appropriate dust suppression measures will be used to ensure there are no health risks to site workers and nearby communities.*
- B.6 The contractor will maintain onsite an emergency spill containment kit to adequately control any loss of fuel or lubricant by equipment working near the river.*
- B.7 Most of the vehicles will operate on diesel fuel and will be maintained to reduce noise and exhaust emissions such that they pose no health risk to workers at the site.*
- B.8 Vehicles will be parked and fueled at a designated site away from wetlands and watercourses.*
- B.9 The transportation of petroleum, oils and lubricants will be conducted in compliance with the Transportation of Dangerous Goods Act.*
- B.10 If adequate borrow and/ or disposal sites are not available within the right-of-way, some truck traffic will occur off site, but this should be kept to a minimum.*
- B.11 A noise complaint reporting and response system will be established.*

C: Construction Waste:

- C.1 Construction Waste will be removed from the project area and disposed of in a manner which prevents release or impacts to watercourses and wetlands. These wastes may include minor amounts of scrap metal, timber, soils and non combustible material.*
- C.2 Disposal of waste materials from construction activity will be in accordance with NSDTC’s Standard Specifications (1980 and revisions) for Access Road Construction. Waste quantities are expected to be minimal and no hazardous waste will be generated.*
- C.3 Disposal sites are to be located by the contractor and will be approved by project engineer.*
- C.4 Limbs and timber will be chipped at the site, in accordance with the Nova Scotia Forest Fire Protection Act. Non-combustible material, overburden and rock will be disposed of where their use as fill material is impractical.*
- C.5 Waste disposal areas will be located where they do not negatively impact rivers, wetlands or any watercourse.*

C.6 *Portable toilets will be used at the construction site so that no untreated sewage is disposed in the watercourses or on site.*

D: Water Quality:

D.1 *The disposal of any agent, either directly or indirectly, will not be permitted into any watercourse or wetland during construction.*

D.2 *The contractor will endeavor to make sure there is no alteration in the water quality of the watercourses and wetlands at the site.*

D.3 *For construction activities near watercourses, appropriate erosion and sediment control measures (outlined in the Nova Scotia Erosion and Sediment Control Manual, 1988) will be used to minimize erosion and ensure silt containment. These measures include the use of silt fences/ hay bales. The contractor will be responsible for maintaining these erosion and sedimentation control systems to ensure their effectiveness.*

D.4 *Any water which intrudes into excavations that may be removed by pumping will not be discharged directly into any wetland or watercourse. Discharge water from pumping operations may contain Total Suspended Solids (TSS) which exceed the Federal and Provincial Guidelines for TSS, which is defined as a concentration exceeding 25 mg/l above the background condition of watercourse at the site. For this reason, discharge water from excavation must be pumped to a designated area up-gradient and downstream of the excavation. The discharge may be allowed to spill onto the ground and return to the watercourse following the natural topography providing that the discharge does not erode or entrain soil particles in its flow.*

D.5 *Following completion of construction, erosion and sediment barriers will be removed from those areas which may be flooded by watercourses under high flow seasonal conditions to prevent these materials from being entrained in the watercourses.*

D.6 *Should the excavations required to install the footings intrude into a watercourse for any reason, the contractor will be responsible to obtain the required environmental permitting for the water course alterations, diversions or temporary barriers as necessary to complete the installation of the footings.*

D.7 *Any material placed in or adjacent to the watercourses for the temporary diversion of the river will be removed as soon as possible by the contractor after the construction of work is completed.*

D.8 *The contractor will be responsible for sampling and monitoring of TSS as conditions warrant. Where required, water samples will be collected from the watercourses at locations upstream, adjacent to, and downstream of the site and analyzed for TSS. The average value of these three samples will be used to establish the background TSS value.*

D.9 *Erosion control measures will be monitored to ensure their effectiveness.*

E: Storage of Petroleum Oils and Lubricants

E.1 For the minor quantities of petroleum, oil and lubricants stored on site during the construction phase, this storage will be in a designated lay-down area and will be done in compliance with applicable Provincial and Federal regulations, codes and guidelines.

F: Wildlife Encounters

F.1 Personnel will be advised on appropriate procedures to use in the event of a wildlife encounter.

F.2 Personnel will be instructed in the proper methods of garbage disposal at designated disposal locations.

F.3 Personnel will keep the work area clean of food scraps.

F.4 No attempt to harass wildlife will be made by any person at the work site.

F.5 Equipment and vehicles will yield the right-of-way to wildlife.

F.6 Any dead animals will be reported, as soon as possible, to the local Provincial Wildlife Officer.

F.7 Personnel will report the presence of wildlife to management.

F.8 When wildlife sightings are reported to management, the manager will initiate any reasonable action to reduce the chance of disruption or injury. Should disruption or injury to the wildlife occur, management will contact the local Provincial Wildlife Officer.

F.9 In the event of encounters with injured or diseased wildlife at the work site, the site supervisor will contact the local Provincial Wildlife Officer. No attempt will be made to harass the animal, and no person at the work site will come into direct contact with the animal.

F.10 If an injured or dead bird or bat is encountered, the location will be marked and reported to the Site Manager. The Site Manager or Environmental Specialist will record: date and time it was found; state of decomposition; injury sustained (if identifiable); and species. This information will be kept on file with Shear Wind for incorporation into the post-construction bird monitoring program.

G: Fires:

G.1 All site personnel will be responsible for fire prevention and will conduct their work in a safe manner to prevent fires.

G.2 Flammable waste will not be stored on site, it will be disposed of in an appropriate manner.

G.3 Smoking will be prohibited within 50 m of flammable products.

G.4 On-site fire fighting equipment will be maintained in good working order. Operation and maintenance personnel will be trained in the proper use and maintenance of fire-fighting equipment.

G.5 In the event of a fire on or near the turbine site, onsite personnel will attempt to put out the fire if it is safe to do so, using the on-site fire-fighting equipment. The fire will be reported immediately to the Site Manager. If the

fire cannot be contained, the nearest fire departments (Barney's River Volunteer Fire Department) will be contacted at 9-1-1.

G.6 In case of medical emergencies, medical assistance will be requested from 9-1-1.

G.7 Members of the nearest fire departments and medical rescue personnel will be trained to handle fire and medical emergencies within a wind farm setting. All fires, even those put out by on-site personnel, will be reported to the nearest fire departments.

Fire Departments within reasonable vicinity of the wind farm:

- *Alma Volunteer Fire Department*
- *New Glasgow Volunteer Fire Department*
- *Stellarton Volunteer Fire Department*
- *Trenton Volunteer Fire Department*
- *Antigonish Volunteer Fire Department*
- *Merigomish Volunteer Fire Department*
- *Barney's River Volunteer Fire Department*

6.2.1 Site Restoration Plan (SRP)

The Site Restoration Plan (SRP) establishes the scope of activities to restore the site following completion of construction. The SRP will guide the restoration of construction sites, lay-down areas and field operations. The restoration activities may include:

- grading of work areas and borrow pits,
- leveling or removal of stock piles,
- re-planting using native vegetation,
- restoration of stream banks and ditches by planting or hydro-seeding using native vegetation species.

The SRP is conducted following construction and is intended to provide stable environmental conditions at the site during its operation. Site conditions will also be restored by natural succession as the native vegetation around the sites becomes re-established.

6.3 Environmental Monitoring Programs

Mammals

A monitoring program for Mainland Moose will be reviewed with the Wildlife Division of DNR. A meeting is scheduled for August 15, 2008 at which DNR and SWI will plan a course of action for monitoring moose in the subject and adjacent areas. SWI will contribute to or conduct population surveys depending on the preferred approach. The data will be returned to DNR.

Birds

The site has been considered a Category 4 site as defined by the Canadian Wildlife Service in reference the species of birds present in the area. Monitoring programs following the Category 4 requirements for birds and bats will be initiated during the operation phase of the Glen Dhu Project. The monitoring programs will be established within the project area. Those areas which were investigated by Kearney & Associates located south of the project area are outside the present project boundary and therefore are not considered for monitoring in this phase of the development.

A proposed Monitoring Program will be conducted during the construction phase and for the first two years of operation. The findings of the surveys will be reviewed annually and depending on the findings of the Post-construction survey, either terminated or extended upon agreement of DNR and CWS.

Construction Phase

- Acoustic Monitoring Study, fall 2008, predawn surveys at four selected turbine sites.
- Watch Counts at four selected turbine locations on the northern area of the project site during the construction period to assess issues related to soaring birds.

Post-construction Phase

- Migratory Bird Surveys, Spring and Fall for 2 years
- Breeding Bird Surveys, 2 years
- Carcass Surveys, 2 years

These surveys will be conducted following the *CWS Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds*, April 2007. To the extent possible, the surveys will be based on the locations previously used by Kearney & Associates that fall within the project boundary. Further discussions will be held with CWS and DNR to develop the Terms of Reference for these programs.

Surface Water

Surface water monitoring will be conducted before, during and following construction. An environmental consultant will be contracted to conduct sampling and report on the results of the monitoring program. Water samples will be collected up stream and down stream at the four largest water crossing sites. In addition, during road construction where culverts are being installed, water samples will be collected to monitor potential sediment entrainment.

Surface water will be analyzed in a laboratory for total suspended solids (TSS). Field measurements of pH, water temperature, dissolved oxygen (DO) and Specific Conductance will be collected during the field sampling program. These data will be compiled into a report to be presented following completion of the final sampling program following construction.

Additional surveys and inspections will be conducted during or following significant storm events to assess potential sedimentation risk and to determine the effectiveness of erosion control measures. The environmental consultant will report any potential sedimentation releases to the Site Manager who will take immediate action to rectify the release.

6.4 Agency, Public and First Nations Consultation

Since the inception of the project, SWI has undertaken a consultation program with various levels of government, land owners, the public and First Nations. This is an ongoing program which will permit an open exchange of information between the proponent and stakeholders to identify issues of concern to be addressed in the project activities and development plans.

6.4.1 Public Notification

Mandatory public notification is required under the Assessment Regulations of the Nova Scotia Environment Act. As the project is designated a Class 1 Undertaking, the Assessment Regulations require that within seven days of submitting the project registration, a public notice is issued in the manner prescribed in the Regulations. Proof of this public notification must be provided to NSE within 14 days of the Registration.

SWI will conduct the public notification within the terms of the regulations to meet the mandatory elements of the Assessment Regulations.

6.4.2 Agency and Stakeholder Consultations

A Community Engagement Plan has been developed to inform the public of the project and to provide details to address questions and possible public concerns.. SWI has initiated contact and discussions with a large number of public authorities, regulators, stakeholders and the public. As identified in Table 1.2 in Section 1 of this document and Section 3 describe the consultation program undertaken by SWI in the development of this Registration Document. During the environmental review process and the development of the detailed project design, additional review and contact with responsible authorities may be required. SWI will initiate such contacts as required to harmonize the project with regulatory guidelines and objectives.

6.4.3 Public Consultation

Following submission of the Registration Document a public consultation program will be initiated. NSE will receive public comments as part of the project review process. SWI will provide open public information sessions to provide public access to the project plans and details and update this information with developments on construction activities.

During the environmental review process and the development of the detailed project design, additional review and contact with responsible authorities may be required. SWI will initiate such contacts as required to harmonize the project with regulatory guidelines and objectives.

6.4.4 First Nations Consultation

Consultation with First Nations was initiated in establishing the Scope of the Assessment (see Section 3). Following this consultation, an MEK study was commissioned to assess interests and historic uses of the project area. SWI will undertake to preserve First Nations artifacts and interests on the project site and will endeavor to maintain open communications with First Nations representatives on all aspects of project activities.

7.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

7.1 Climatic Conditions

The Glen Dhu Project is located in an area of the province of Nova Scotia which will provide sustainable wind resources to the project. Figures 4.4.1 and 4.4.2 in Section 4 show the wind energy estimates for the province and for the Cape George area. It is unlikely that climate change would alter these conditions over the life-cycle of the project or in the foreseeable future.

7.2 Extreme Events

In the past decade, seven post-tropical depressions have made landfall in this region of the province (see Table 4.4.3). These events are likely to provide the highest sustained winds conditions to which the WTGs are exposed. The design criteria for the proposed wind turbines and towers exceed the maximum wind values from these storms and maximum predicted values from the site data. During extreme winds, system controls will shut down the turbine and stop the rotation of the turbine blades.

8.0 EFFECTS OF THE PROJECT ON THE ENVIRONMENT

8.1 Potential Residual Impacts on VECs

Physiography and Topography

As a result of construction, there will be minor residual impacts on the physiography and topography of roads, turbines sites and lay-down areas. These residual impacts are not considered significant.

Surface Soils and Bedrock

There will be minor residual impacts on surface soils and possibly bedrock. Some areas of surface soils will be covered by roads and turbine sites. Outcrops or shallow bedrock in the access roads and turbine sites may be required to be removed. Within the context of historic use of the area, these impacts are not significant.

Aquatic Fauna

No residual impact. Culverts may act to enhance habitat for aquatic fauna.

Aquatic Vegetation

There will be minor residual impacts on aquatic vegetation along access roads. Species of Concern will be avoided, or moved to a suitable area selected for habitat enhancement for the impacted species.

Surface Water Quality

No residual impact. Culverts may act to improve water quality through improved flow and exchange.

Vegetation

There will be minor residual impacts on surface vegetation along access roads. Species of Concern will be avoided or moved. Within the context of historic use of the area, these impacts are not significant.

Wetlands

No residual impact. Culverts may act to enhance flow and provide improved wetland habitat.

Wildlife

Potential impacts to most wildlife will take place during the period of construction. Project activities may have a minor long term negative impact on some species while habitat for other species such as deer may be enhanced.

Birds

Residual impacts may occur to the bird population. A monitoring program will be initiated to assess bird mortalities at the turbines following CWS guidance. Setbacks for the scarp face have been established to mitigate potential collision risks to soaring birds.

Bats

Residual impacts may occur to the bat population. A monitoring program will be initiated to assess bat mortalities at the turbines following CWS guidance.

Mainland Moose

Prediction of long-term residual effects from the project on mainland moose is difficult due to the number of other survival factors imposed on this population. During the period of construction, moose will avoid the area. A Moose Monitoring program will be conducted in conjunction with and consultation from DNR and the Mainland Moose Recovery Team.

Fisher

No residual impact. Fisher will avoid the area during construction activities but will likely re-habituate once the operation phase begins and the area is not subject to as much human activity.

Climate

On a global or national basis, the project is too small to have a residual impact on climate.

Air Quality

On a provincial basis, the project will have a positive residual impact on provincial air quality as energy sources move away from the combustion of fossil fuels.

Labour Force

The project will have a positive residual impact on the labour force, particularly during construction.

Local Economy

Revenues derived during construction activities and from long-term leases and tax revenues will have a positive residual impact on the local economy.

Land Use

The Project is considered to have a positive long term residual impact on land use.

Archaeological Resources

No residual impact.

First Nations Heritage

No residual impact.

Sound Levels

There will be a residual impact on background sound levels near the WTGs. No significant impacts to ambient sound level at nearby residents are anticipated because of the setback distances between WTGs and residents and natural ambient sound levels in the area.

Visual Landscape

There will be a residual impact on the visual landscape in those areas where the WTGs can be seen.

Radio Communication

The assessment of impacts on radio communication has not been completed.

Aviation

No residual impact. Navigation lighting will meet Transport Canada requirements.

Public Safety

No residual impact.

8.2 Significance of Impacts

The construction phase of the project will provide economic benefits to the region through employment and expenditures on local services. These revenues will have a multiplier effect on the regional economy.

Economic benefits will accrue to the region over the project life span (30+ years). The Project represents an economic benefit to Pictou and Antigonish Counties through municipal taxation revenues. Landowners' incomes will benefit from payments on leased lands for turbines and access roads. The province of Nova Scotia will receive benefits from leased parcels on Provincial Crown Lands (if approval is given) where turbines are located.

Alteration of the visual landscape will occur in various areas around the project location. This impact may be considered a significant negative impact on traditional natural views of the land by some members of the community while others will find the machines of interest from a mechanical or economic perspective.

Of the biophysical VECs identified in the scoping phase of this assessment, mainland moose, birds and bats have potential negative impacts that are difficult to determine and therefore require further monitoring to which SWI is committed.

The province of Nova Scotia and Nova Scotia Power have committed to increasing the province's energy supply through renewable energy sources. There are global concerns related to emissions into the atmosphere from the use of fossil fuels which cause climate change. The use of wind power has the advantage of increasing the provincial output of

energy without the use of fossil fuels. Wind energy provides a renewable resource which has low life cycle costs to access and exploit.

9.0 OTHER APPROVALS REQUIRED

Table 9.1 lists the permits and approvals required for project activities and the present status of the various submissions for these permits. The preparation of the respective applications has been initiated and submissions will occur as the respective elements of the design are finalized.

Glen Dhu Power – Wind Project

Volume I: Environmental Assessment and Registration Document

Table 9.1: Other Permits Required

Item	Approvals And Permits	Status	Submission Date	Anticipated Approval Date
1	NSDNR ⁵ : Application for Crown Land	Submitted	Mar. 25, 2008	NA
2	Nova Scotia Environmental Assessment Regulations and Canadian Environmental Assessment Act	Submission of Registration Document/ Environmental Assessment	August 13, 2008	October 1, 2008
3	Fisheries Act, Navigable Water Protection Act, Permits under the Nova Scotia Environment Act	Preliminary service roads and potential water crossings have been identified. Final road and water crossing designs will incorporate stream and wetland protection measures for approvals by NSE ¹ , DFO ² and TC ³ and documented in EIS	July 18, 2008	Approval Pending
4	Transport Canada, Canadian Aviation Regulations, Tower lights and Markings	Under review, pending design completion and environmental review.	July 15, 2008	Aug. 29, 2008
5	NSDTPW ⁴ : Breaking Soil of Highways Permit	To be reviewed pending the final design of service roads.	Aug. 25, 2008	Oct.10, 2008
6	NSDTPW ⁴ : Building Near A Highway and Access to Property Permit	To be reviewed pending finalization of the turbine locations and design of power lines and access roads.	Aug. 25, 2008	Oct.10, 2008
7	NSDTPW ³ : Use of Right - of - Way for Pole Lines Permit	To be reviewed pending finalization of the turbine locations and design of power lines and access roads.	Aug. 25, 2008	Oct.10, 2008
8	NSDTPW ⁴ : Special Move Permit - Over dimension	Application for a permit will follow finalization of the design and work plan schedule.	Jan., 2009	May, 2009
9	NSDTPW ⁴ : Special Move Permit- Over weight	Application for a permit will follow finalization of the design and work plan schedule.	Jan., 2009	May, 2009
10	NSDNR ⁵ : Travel in Woods During Woods Closure Permit	As required during potential closure periods.	As required	?
11	NSDNR ⁵ : Crown Lands Access Road Construction Permit	Pending the final design of service roads with respect to Crown Lands.	As required	?
12	NSDNR ⁵ : Inland Aggregate Removal Permit (Not More Than 5000 Cubic Metres or 7000 Metric Tonnes)	Pending design completion and identification of potential aggregate borrow pits.	Oct, 2008	Nov, 2008
13	NSDNR ⁵ : Survey of Crown Lands Boundary Approval	Pending finalization of the turbine locations, power lines and access roads.	As required	?
14	NSE ¹ : Electrical Wiring Permit	Pending design completion.	?	?
15	Blasting Permit	Only as needed depending on bedrock conditions	As Required	?
16	Building Permits as required by Antigonish and Pictou Counties	Pending design completion.	Aug 25, 2008	Nov, 2008

Notes: 1= Nova Scotia Environment; 2 = Department of Fisheries and Oceans; 3 = Transport Canada (Navigable Waters Protection Act); 4 = Nova Scotia Department of Transportation and Public Works; 5 = Nova Scotia Department of Natural Resources.

10.0 FUNDING

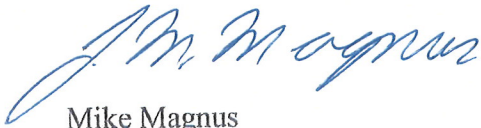
As indicated in Section 1.7, SWI has applied for federal funding under the *ecoENERGY Renewable Initiative*. It will provide the developer with \$0.01/kwh of production for up to ten years as an incentive to develop these projects. SWI submitted an application in August 2007 and this application has been approved.

This acceptance is a trigger for Federal review of this Environmental Assessment and registration under the provisions of the Canadian Environmental Assessment Agency (CEAA). It is understood that the CEAA will work simultaneously with NSDEL in the review of the registration document.

11.0 VERIFICATION

Shear Wind Incorporated confirms its commitment to the undertakings, environmental protection measures and monitoring programs described in this document.

Shear Wind Inc.



Mike Magnus
Chief Executive Officer