4.0 Environmental Setting

4.1 Biophysical

4.1.1 Geophysical

The MBWF site is located on Irish Mountain which has a peak elevation of 215m above sea level (asl). The elevation change across the MBWF site ranges from 60m asl to 215m asl. The soil conditions are described by the NSDNR Ecological Land Classification (ELC) system as being well drained, fine textured soil on hilly terrain (Peter D. Neily, 2003). The 1990 soil survey of Pictou County indicated that Irish Mountain has "Barney" soils, which are characterized as gravelly loam to silt loam over firm strongly acidic, olive to olive gray, gravelly loam glacial till. Under forest, Barney soils have 3-10 cm of extremely acidic, poorly decomposed mor humus (Agriculture Canada, 1990). These soils are known for medium to high potential for erosion (Nova Scotia Department of Natural Resources, 2007).

Figure 4.1 represents the digital version of NSDNR Published Map ME 2000-01, Geological Map of the Province of Nova Scotia, compiled by J.D. Keppie, 2000 (NSDNR, 2012). The digital product was created by the NSDNR, Mineral Resources Branch staff. The original data was compiled and digitized from over 60 maps and sources of information that are noted on the map. The GIS databases were developed from the information contained on this map. The digital product contains layers for geological features such as: bedrock geologic units, faults, geological contacts, isotope ages, other geological features (NSDNR, 2012).

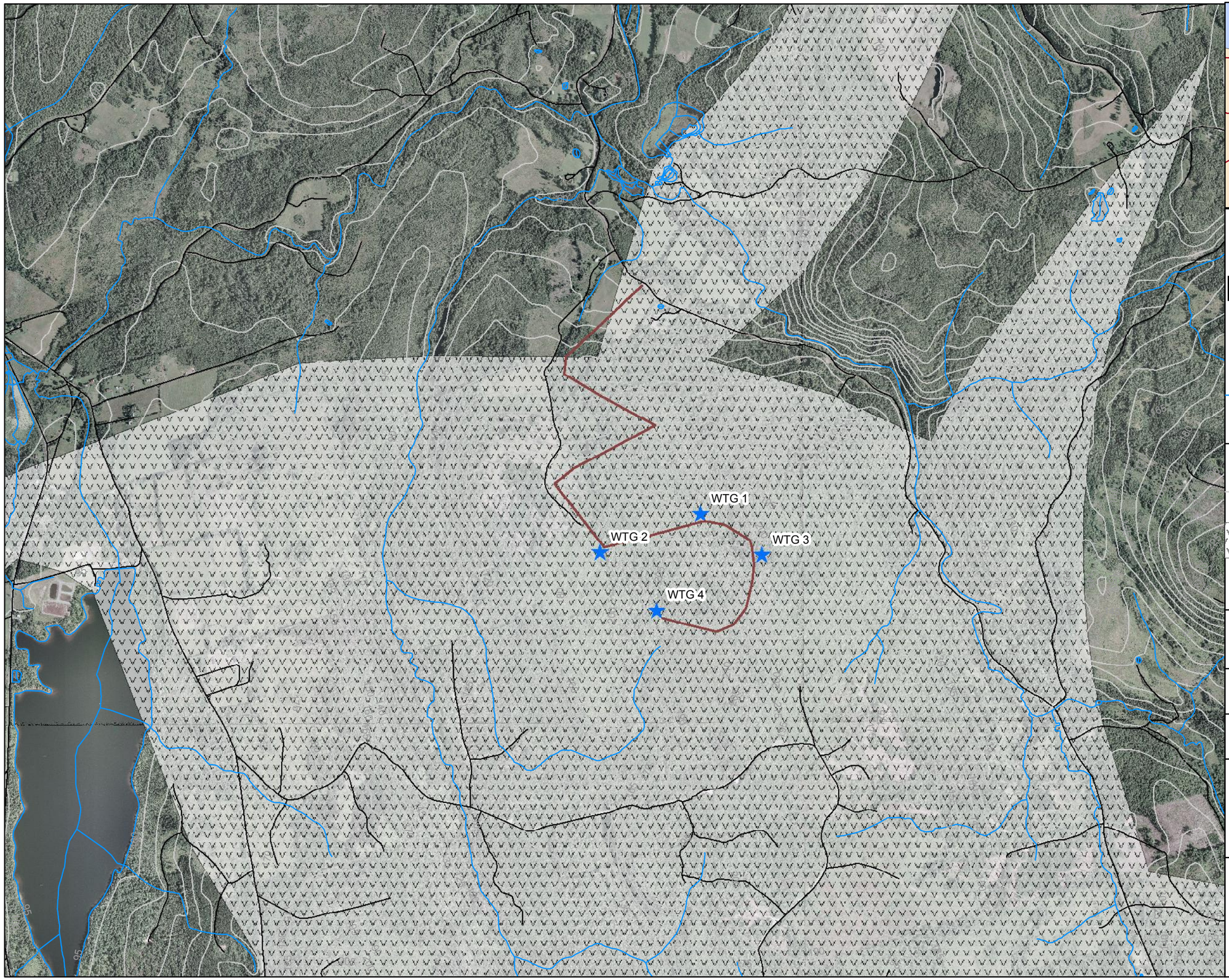
The characteristics of the bedrock formation determined to be present at the MBWF site is outlined in Table 4.1. This formation is broadly known as the Arisaig Group (SA).

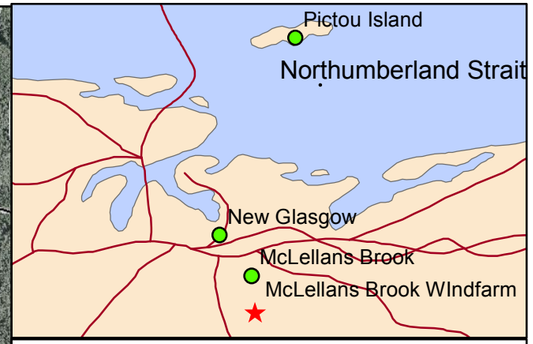
Table 4.1 Site Bedrock Characteristics

Field	Description
Unit Description	subaerial-shallow marine siltstone, mudstone, shale, minor limestone, arkose and rhyolite, 930 m (early Llandovery-early Gedinnian fauna)
Group	Arisaig Group (SA)
Formation	Ross Brook

Installation of the meteorological tower at the site indicated that bedrock exists either at the surface or within 0.25-1.0m from the surface. Section 2.5 details the procedures which will be taken should blasting be required for the construction the foundations.

In summary, the desktop review of geophysical conditions at or near the Project site determined that there is no risk of sulphide-bearing material in the rock but the soils themselves are generally fine to medium grained.





Legend

- WTG
- Watercourse
- Existing Roads
- Contour Lines (5m)
- Arisaig Group

FIGURE 4.1

Geologic Formation

Drawn by: AWA	Date: 2013/01/02
Project #: 2012043	Scale @ 11"x17"

EON WindElectric

0 187.5 375 750

Meters

Coord. System: NAD83 CSRS UTM Z20N
Projection: Trasnverse Mercator
Units: Meters

N

4.1.2 Atmospheric

The MBWF site is located in what is known as the Pictou-Antigonish Highlands. Climate data was taken from an Environment Canada weather station located near Lyons Brook approximately 25 km northwest of the site (Environment Canada, 2012). The climate averages, extremes and months of occurrences can be found in Table 4.2

Table 4.2: Site Atmospheric Conditions

Parameter	Time period	Data Source	Value
Average Daily Temperature (°C)	Yearly average (1971-2000)	Environment Canada	6.5
Extreme Maximum Temperature (°C)	August	Environment Canada	36
Extreme Minimum Temperature (°C)	February	Environment Canada	-32.5
Average Total Rainfall (mm)	Yearly average (1971-2000)	Environment Canada	956.7
Average Snowfall (cm)	Yearly average (1971-2000)	Environment Canada	276.2
Extreme Daily Rainfall (mm)	14th September, 1996	Environment Canada	83
Extreme Daily Snowfall (cm)	22nd October, 1986	Environment Canada	45
Extreme Snow Depth (cm)	26th October, 1986	Environment Canada	95
Predominant Wind direction	Yearly Average	Canadian Wind Atlas (confirmed with Watts MET tower readings)	SW

The setting is considered rural, with no to low presence of artificial lighting coming from streetlights or shops. The main source of noise in the community would come from traffic on the Brookville Road.

The wind direction 'rose' from the collected data at the site can be seen in Figure 4.2. The wind rose is an important metric for the placement of turbines with respect to energy micrositing, shadow flicker and noise modelling.

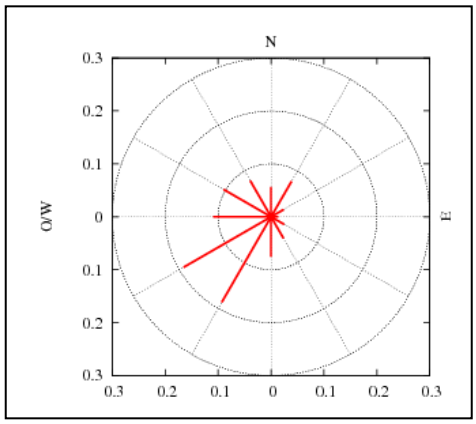


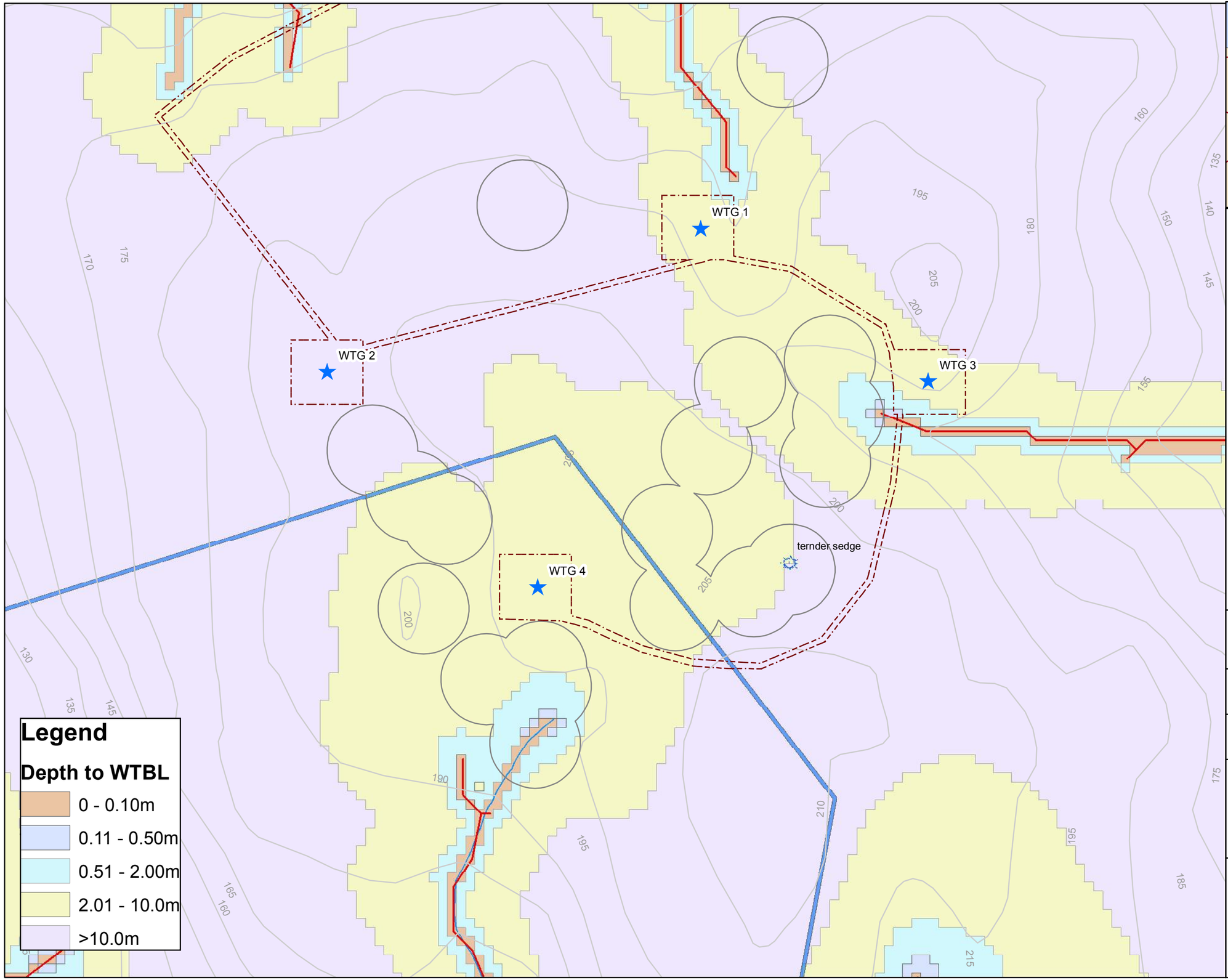
Figure 4.2: Wind Frequency Rose

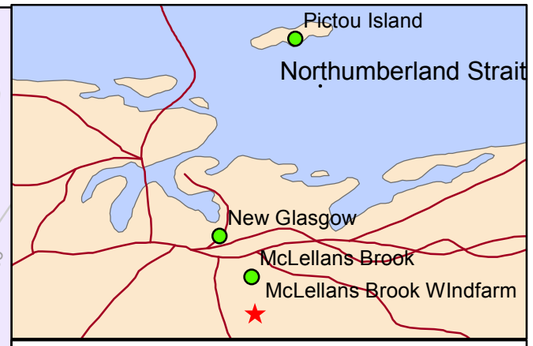
4.1.3 Groundwater, Surface Water and Wetlands

The Project site is within the East, Middle, West River Watershed. Other than the relative proximity to Forbes Lake (i.e., approximately 2km to closest WTG) and McLellans Brook (i.e., approximately 1 km west), the site is not near any other major surface water features. McLellans Brook runs adjacent to the Brookville Road. McLellans Brook eventually connects to East River, which flows into Pictou Harbour 15km north of the Project site.

Figure 4.3 displays several surface water, groundwater and wetland features based on NSDNR Wet Area Mapping (WAM) data (NSDNR, 1998b) and field investigations. The WAM mapping layer includes two features: depth to water table (WTBL) and flow channel layers. The WAM model predicts where water will naturally flow and/or accumulate in the landscape based on digital elevation data and the known location of surface water bodies and wetlands. In essence, WAM is a cartographically derived depth-to-water index.

Depth values listed do not represent predicted depth to a water table or ground water, rather they are a relative wetness index which can be related to the likelihood of there being natural water flows (above or below ground) and accumulation of water as reflected by on-site drainage conditions (well, moderately well, imperfect, poor, very poor). WAM does not take into account soil conditions that may further influence drainage conditions (such as soil texture), nor does it predict flows and accumulations that are the result of human disturbance or infrastructure. The WAM flow channel layer is a line layer that predicts the location of potential unmapped streams or below ground flow channels. For a predicted flow channel to be shown, a minimum of 4 ha of land must contribute flow to that point. All predicted flow channels eventually connect to a mapped water body (NSDNR, 1998b). Soil conditions are described in Section 4.1.1.





Legend

- WTG
- Tender Sedge
- Watercourse
- Flow Channel
- Contour Lines (5m)
- Road/Laydown area
- 50m wetland buffer
- Watershed Zone 2

FIGURE 4.3

Groundwater/Surface Water/Wetlands

Drawn by: AWA	Date: 2013/01/02
Project #: 2012043	Scale @ 11"x17"

EON WindElectric

0 50 100 200
Meters

Coord. System: NAD83 CSRS UTM Z20N
Projection: Trasnverse Mercator
Units: Meters

N

There are minor watercourses and intermittent drainage on the Project site. The location is on top of a ridge and within head water area of two drainage systems; these drain to either Forbes Lake to the west or McLellans Brook to the east. As previously noted, a portion of the Project site is located in Zone 2 of the Forbes Lake Protected Water Area. The surface water drainage on the site is predictable; there is good relief and hills are well drained. The Project as proposed maintains a minimum 50m buffer from the watercourses with the exception of the one culvert upgrade at the utility line watercourse crossing.

Although no wetlands were indicated on site on the NSDNR wetland inventory map, several wetlands were identified within the Project boundaries. The wetlands identified in field surveys generally follow linear drainage pathways or they are discrete pocket wetlands that are generally under 100 square meters (m^2). Based on the proposed WTG and access road locations and the summer 2012 wetland surveys, the Project will be able maintain a 50m minimum buffer to wetland areas. The Proponent will continue to finalize the Project design based upon recommendations as outlined in Appendix 8, including key areas to avoid and completion of additional field work on wetland identification and delineation if necessary. Figure 4.3 depicts this 50m buffer around wetland areas identified to date based on summer 2012 field work. A discussion of species at risk and of concern found in wetland areas, i.e., tender sedge as identified in a vernal pool on the Project site, can be found in Section 4.1.7.

4.1.4 Migratory and Breeding Birds

Data from ACCDC and MBBA were used to design and implement the migratory and breeding bird survey at the site, as well as reliance upon the extensive bird studies completed at uplands east of the Project site (as completed for the EA of Glen Dhu Wind Farm). In addition, these surveys were completed by two experiences birders, Andrew Horn (Halifax) and Ken McKenna (Stellarton), both of whom contributed substantially to the MBBA data for the squares containing the Project site.

Andy Horn prepared draft protocols which were relayed to CWS who provided comments via email (B. Whittam, May 2, 2012). These protocols were implemented by Ken McKenna via spring and fall migration surveys and summer breeding bird surveys. Refer to Appendix 5 for reports compiled by Andy Horn; however, the key findings are presented below:

- During spring transects and point counts, no obvious migrants were encountered; most birds seen were flying well below turbine height, suggesting local movements rather than migration.
- During breeding bird survey, species were typical of the habitats they were found in, although they do include several Partners in Flight Priority Species and species known to have flight displays.
- Additional species seen in the summer within 2 km of the Project site included Osprey, Broad-winged Hawk, Fox Sparrow, Grey Jay, Boreal Chickadee, Nashville Warbler, and Chestnut-sided Warbler; other birds noted are as recorded in the final report.
- During fall transects, mostly summer or permanent resident species were encountered; however, species seen on few days but in high numbers, and thus likely migrants, included Cedar Waxwings, Common Grackles, and Evening Grosbeaks, but were not particularly concentrated at the site.

- On fall passage counts, some of the birds seen were presumably local residents, but some were likely migrants despite no strong directionality in flights through the area overall; largest flocks were 35 Cedar Waxwings, 6 American Goldfinches, 25 gulls (2 flocks), 20-25 finches (2 flocks), and 6 Canada Geese.
- Because Canada Geese had been noted during the surveys, the observer checked for waterfowl in the beaver pond in Churchville on 7 November; 250 Black Ducks, 60 Green-winged Teal, 3 Mallards, 1 recognizable Mallard and Black Duck hybrid, 1 Northern Pintail, and 2 American Wigeon were found, as well as a large flock of Canada Geese in Forbes Lake.
- No listed species were identified though three DNR Yellow Ranked species were identified; a discussion of bird species at risk and of concern can be found in Section 4.1.7.
- Surveys did not reveal any high sensitivity factors for migrating or breeding birds (e.g., colonies, staging area, etc.).

An initial evaluation of the required pre-construction bird surveys (in consultation with (Environment Canada, 2007a) and (Environment Canada, 2007b)) classed site sensitivity as Very High using a precautionary approach; however, the survey results suggest that the site sensitivity is Low. The size category of the Project (< 10 turbines) is Small, so the level of concern is judged to be Category 1 though the pre-construction surveys were designed to treat the site as a Category 4 (Environment Canada, 2007b).

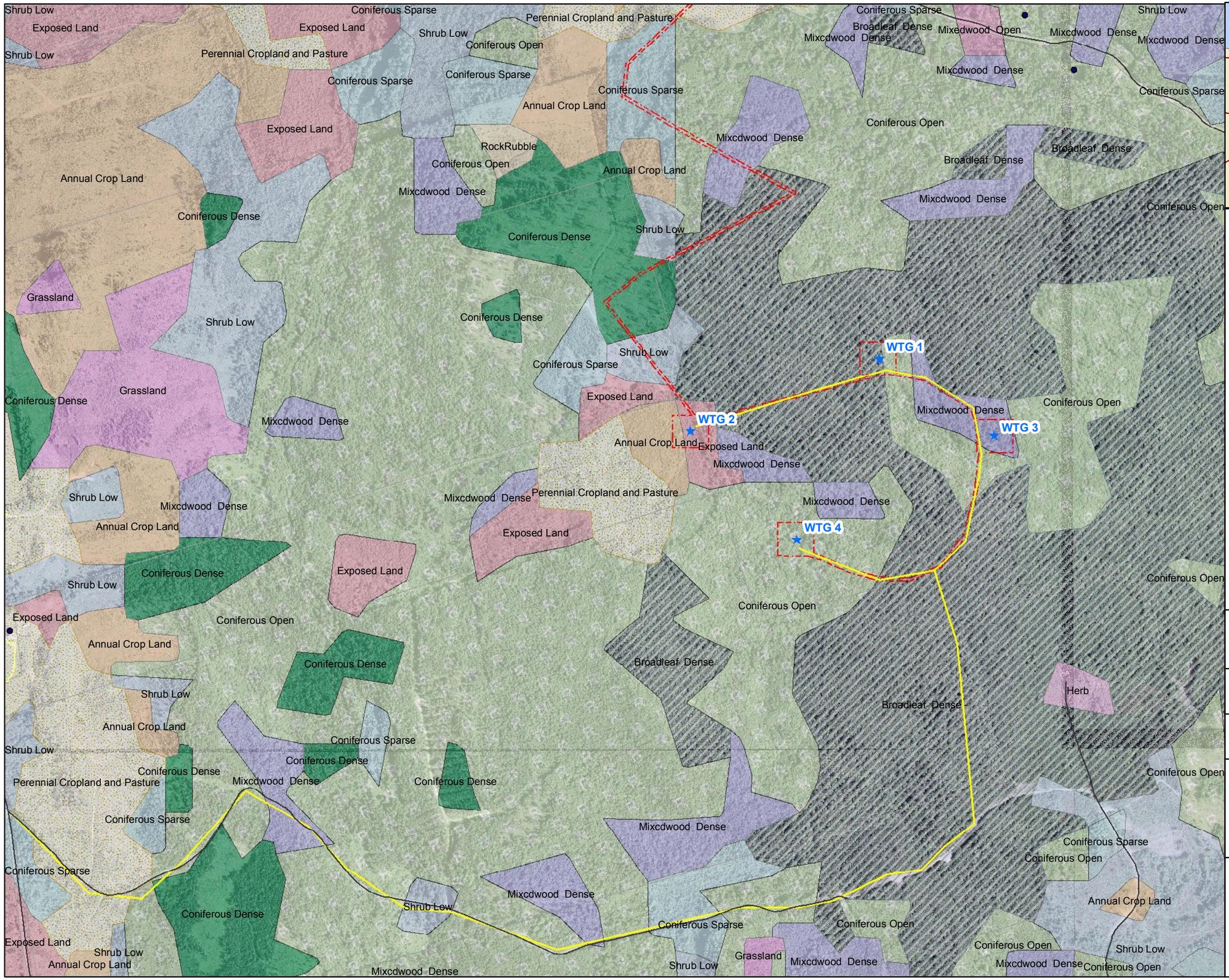
4.1.5 Flora and Fauna

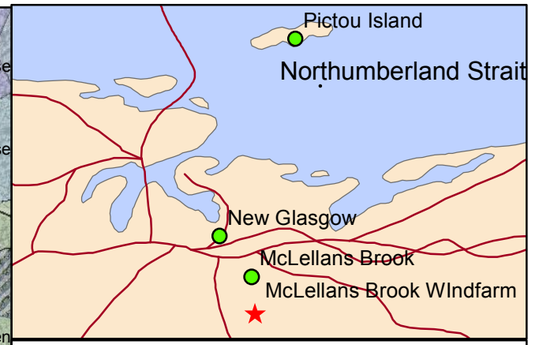
Land cover data for preliminary desktop analysis was taken from online sources (Geobase, 2011) and is displayed in Figure 4.4. Land cover information is the result of vectorization of raster thematic data originating from classified Landsat 5 and Landsat 7 ortho-images, for agricultural and forest areas of Canada, and for Northern Territories (Geobase, 2011).

The survey of plants in the area of the WTGs found an upland deciduous forest. The hardwood forest is Sugar Maple dominated with yellow birch and often an understory of understory of Evergreen Woodfern, as well as hobblebush, hazel, Canada holly, Christmas fern and Solomon's Plume. Some of the area has been cut over; this has led to growth of vigorous growth of raspberry, goldenrods, elder and other light-demanding plants.

The total list of vascular plants combining botanical finds of Jim Jotcham and N. Hill (June 22, 2012) and of N. Hill (Aug. 15, 2012) is provided in Appendix 8. Field surveys within the project bounds discovered 169 native Green-listed plants (NSDNR= Secure), one native Yellow-listed plant (S1/S2, Sensitive, NSDNR ranking) and 13 exotic or introduced species. The high native to non-native ratio reflects the habitat integrity of the area. Upland habitats are either second growth (circa 80 years old) hardwood communities dominated by sugar maple, yellow birch and beech (*Acer saccharum, Betula alleghaniensis,* and *Fagus grandifolia*) or recently clear cut hardwoods. Discussion of plant species at risk and of concern is within Section 4.1.7.

Review of digital ELC data showed that the Project is located in what is known as the Pictou-Antigonish Highlands Ecodistrict (Peter D. Neily, 2003). The total area of the Pictou-Antigonish Highlands ecodistrict





Legend

- Building Points
- WTG
- Paved Roads
- Unpaved
- Driveway
- Proposed Utility Route
- Road/Laydown area

FIGURE 4.4

Land Cover

Drawn by: AWA	Date: 2013/01/02
Project #: 2012043	Scale @ 11"x17"

EON WindElectric

0 125 250 500

Meters

Coord. System: NAD83 CSRS UTM Z20N
Projection: Trasnverse Mercator
Units: Meters

N

is 131,000 ha;typical of the upland ecodistricts, freshwater accounts for only 0.54% or 702 ha (Peter D. Neily, 2003). Table 4.3 outlines climatic conditions common in the ecodistrict, which drives flora growth and diversification.

Table 4.3: Climate Data for Ecodistrict 330

Ecoregion/Ecodistrict	Annual Precipitation (mm)	Growing Degree Days	Growing Season (days)	Mean Annual Temp (^{o}C)	Mean Summer Temp (^{o}C)	Mean Winter Temp (^{o}C)
330 Pict/Ant Highlands	1409	1521	192	5.4	16.6	-5.9

Mainland Moose populations persist in the Tobeatic Region, Chebucto Peninsula, Cobequid Mountains, Pictou-Antigonish highlands, and the interior of the eastern shore area from Tangier Grand through Guysborough (NSDRN, 2009b). A number of reasons are purported for the low number (1000 animals) of mainland moose populations, including disease (i.e. P. tenius (brainworm), illegal kill (i.e. poaching), calf predation by black bears, habitat alteration and increased access, disturbance and possibly climate change and acid rain (NSDRN, 2009b). A Mainland Moose survey was commissioned at the Project site as a result of the ACCDC findings. The moose survey consisted of 8 transects. The survey was conducted in the early May 2012. The transects were set up by Jody Hamper with the use of Google Earth and Department of Natural Resources land classification maps. Each transect was roughly 1km and 1m on each side was observed. All habitat, including cutovers and over mature hardwood and softwood stands, were covered. No evidence of moose was recorded.

According to bat consultant background research, there are three known underground sites within 25 km of the proposed development area that have records of late summer bat activity around their entrances. The sites are McLellan's Brook Cave, a dissolution cave in limestone with a surveyed length of 85 m, and two small, abandoned copper mine adits at New Laing. In 2010, Randdall conducted ultrasonic monitoring at each of these sites and a third abandoned adit located at New Laing (Randall, 2011). No evidence suggested that these sites were significant fall swarming sites for bats, although they could be used as hibernacula by some bats.

Acoustic and harp trap surveys were completed at the Project site resulting in the determination that there is no significant movement of bats through the study area. The average number of recorded sequences per night during the sampling period was 40.8. All of the identified echolocation call sequences recorded during the survey period were attributable to the two species of Myotis bats known to occur in Nova Scotia, the Little Brown Bat and the Northern Long-eared Bat. The harp trap survey resulted in the capture of one bat; a male Northern Long-eared Bat on a forested trail. The presence of a single, male capture does not suggest that the study area is important for reproductively active females, though it does not rule it out. Discussion of yellow ranked bat species is within Section 4.1.7.

4.1.6 Fish and Fish Habitat

In the East, Middle, West River Watershed, typical freshwater fish species may include perch, shiners, Brown Bullhead, Brook Trout, American Eel and Gaspereau. As no direct alteration of watercourses is expected, no direct studies of fish habitat were completed on the site. Yet the site is within headwaters of several watercourses containing fish habitat. Brown Trout are known for their presence in headwater streams in the uplands of the region (Nova Scotia Museum).

4.1.7 Species at Risk or of Concern

Desktop data on species at risk in the vicinity of the MBWF was compiled and reviewed as collected from ACCDC. ACCDC is part of the NatureServe network and maintains data for the Atlantic Canadian Provinces. Data reflects known occurrences for rare and endangered flora or fauna. As per NSDNR requirements, data is presented within 100km radius and ACCDC cannot specify exact location for mapping; however, distances from known location to site are noted by ACCDC. In addition, Environment Canada's species at risk mapping for *Species at Risk Act* (*SARA*) Schedule 1 (Government of Canada, 2012b) species was accessed to support the ACCDC data. The typical habitat for the species was reviewed based on online information from Environment Canada and DNR.

Ten species that are known to occur in the general proximity of the Project are designated under Schedule 1 of *SARA* and/or the *Nova Scotia Endangered Species Act* (Government of Nova Scotia, 2009). These are tabulated below with Federal and Provincial designations listed. From ACCDC data, observations and known distance from site are noted. Based on the specialists' site visits and the desktop review, a comparison was completed of the known habitat for the species at or near the Project works. This can assist in determining the likelihood of the species at risk being present at or near the Project works. The risk will be defined as either insignificant, low, moderate, or high. This is shown in Table 4.4.

Plants

Two botanical surveys were completed (June 22, 2012; August 15, 2012) at the MBWF study area by Maribon Inc. (J. Jotcham and N. Hill). The field studies were completed after the botanists reviewed the ACCDC listing (Appendix 8) for plants to ensure that they were aware of reports in the area to have minimum target species for searches, as well as to verify that timing of field visits were appropriately scheduled to identify the rare flora. The review of the ACCDC listing given the site characteristics is included in the reporting from our botanists (Appendix 8).

Based on two targeted searches by botanists, none of the Federal or Provincial listed flora species were found in the study area; however, one patch of yellow ranked species was discovered. The Tender Sedge (*Carex tenera*) was found in a vernal pool growing in Soft Leaf Sedge (approximately 2m^2 in area; 45.504399N, 62.604104W) as shown on Figure 4.3. This is not within the proposed area of disturbance of the WTG pads or the access roadways. Marbicon recommended this area for avoidance; mitigative measures are discussed in Section 6.2.

Table 4.4 Potential for Species at Risk

Scientific Name	*Common Name*	*Taxonomy Group*	*Federal Status (COSEWIC)*	*Provincial Status*	*Number of Observations ; Distance (km)*	*Typical Species Habitat*	*Potential of Presence at or near Project works*
Erioderma pedicellatum (Atlantic pop.)	Boreal Felt Lichen	Lichen	Endangered (Endangered)	Endangered	48;46 ±10	Northerly exposed forested slopes in mature forest sites which are also rich in moisture-loving species, such as sphagnum mosses and Cinnamon Fern.	Low
Isoetes prototypus	Prototype Quillwort	Plant	Special Concern (Special Concern)	Vulnerable	2; 83 ±0.1	fully submerged aquatic perennial of small, nutrient poor, usually cold, spring-fed lakes	Very Low
Lilaeopsis chinensis	Eastern Lilaeopsis	Plant	Special Concern (Special Concern)	Vulnerable	SC1; 96 ±0	semi-aquatic plant found in the intertidal zone	Very Low
Cypripedium arietinum	Ram's-Head Lady's-Slipper	Plant	Not listed	Endangered	1; 75 ±0.1	found in moderately open forests possessing cool, sub-acid or neutral soils. In Nova Scotia, it is largely associated with gypsum bedrock, and is found in moderately open, mesic woods on outcrops, cliff tops, river banks, moderate to steep slopes and in sinkholes (Mazerolle, 2007)	Low

Thuja occidentalis	Eastern White Cedar	Vascular Plants	Not listed	Vulnerable	8;52 ±.5	Located along western Nova Scotia in riparian areas near streams and wetlands	Very Low
Sterna dougallii	Roseate Tern	Birds	Endangered (Endangered)	Endangered	20;18 ±10	Islands off Atlantic Coast, specifically Brothers Islands, Grassy Island, and the Country Island complex	Very Low
Calidris canutus rufa	Red Knot (rufa ssp)	Birds	Endangered (Endangered)	Endangered	16; 21 ±0.5	Migratory stopovers and wintering grounds are vast coastal zones such as sandflats; nest in Arctic.	Low
Glyptemys insculpta	Wood Turtle	Reptiles	Threatened (Threatened)	Vulnerable	59;6 ±10	Moderately moving rivers with sandy soils and along nearby roadbeds	Moderate
Histrionicus histrionicus (pop. 1)	Harlequin Duck (Eastern pop.)	Birds	Special Concern (Special Concern)	Endangered	6; 73 ±10	Wintering in Nova Scotia on offshore islands, headlands, and rocky coastlines.	Low
Alces alces americana (Mainland Population)	Eastern Moose	Mammal	Not listed	Endangered	16;17 ±10	Mixed wood forests with wetlands; typically in high elevations, e.g., along Cobequid Mountains.	Moderate

Birds

During the pre-construction bird surveys (spring and fall migration and summer breeding), no listed species at risk were seen; however, there were species of concern (each DNR Yellow Ranking) identified:

- one Canada Warbler (*Wilsonia Canadensis*) was detected about 300m south of the site;
- breeding of both Olive-sided Flycatchers (*Contopus borealis*) and Canada Warblers (*Wilsonia Canadensis*) just over 2 km south of the site; and
- one Common Loon (*Gavia immer*) was detected flying over the site, and likely breeds on Forbes Lake.

Impact assessment and mitigation and follow up measures related to birds are discussed in Section 6.2.

Mammals

During field work completed for moose in spring 2012, no evidence of moose was found (pellets or evidence of browsing). Impact assessment and mitigative measures related to moose are discussed in Section 6.2.

Occurrence of Little Brown Bat (*Myotis lucifugus*) and Northern Long-eared Bat (*Myotis septentrionalis*) were recorded as part of the work completed by Dr. Broders; these are both yellow listed in Nova Scotia. Bat activity recorded at the Project site was dominated by Myotis species as is typical of many bat studies completed in Nova Scotia. Impact assessment and follow up measures related to bats are discussed in Section 6.2.

Reptiles

In terms of the wood turtles, they are known in the East, Middle, West River Watershed. While there are no moderately moving watercourses with sandy soils near the WTG sites, there is a watercourse draining the ridge toward Brookville Road. Upon discussion with DNR (M. Pulsifer on April 4, 2012), it was determined that suitable mitigation (e.g., education and timing of work) would be appropriate and a targeted field study was not indicated for wood turtle for this Project. Impact assessment and mitigative measures related to wood turtles are discussed in Section 6.2.

4.2 Socio-economic

4.2.1 Community

The community of McLellans Brook is 10km southeast of Stellarton. It is part of the Municipality of Pictou County, District 11. It was historically a community of loggers, farmers and maple sugar producers. The community remains rural and residences are located along the roadway, e.g., Brookville Road. The community of Churchville is located approximately 3km northwest of the Project site, and is

the closest, most populous community to the MBWF. Community meetings were hosted at the Churchville community hall. The MBWF site is located on what is known as Irish Mountain. Irish Mountain was settled by an Irishman named Patrick Finner who was supposed to have been one of the first settlers. Another early settler was Donald Ross, who was born at Eddrachillis, in Sutherlandshire and came to Nova Scotia in 1816 (Pictou Antigonish Regional Library, 2010).

McLellans Brook is predominantly residential with few businesses and organizations, including: MacGregors Custom Machining Ltd. (machine shop), Canadian Farm Supply (farm equipment retail), Blaine F MacLean Excavation Ltd (excavation/civil contractor), the Forbes Lake Water Treatment Plant, and three community halls (McLellans Brook, Brookville, Churchville).

There are less than 200 dwellings in the communities of Churchville and McLellans Brook, of which approximately five are within 1km of site, ten are within 1.5km of the turbine site, and approximately 30 are within 2km. The WTGs are located more than 600m away from the nearest dwelling which satisfies setback requirements implemented by the Municipality to mitigate socio-economic concerns. Community consultation is discussed in Section 5.1.

4.2.2 Cultural Resources, Heritage Sites and Archaeological Sites

Cultural Resource Management Group (CRM) was retained to perform the Archaeological Screening and Reconnaissance for the MBWF. CRM was issued a Heritage Research Permit A2012NS147 from the Nova Scotia Museum. Field reconnaissance was conducted on the site on the 24th of October 2012. Results of the desktop and field work concluded that there is a low risk for the MBWF project and its Project components to impact archaeological resources. CRM made the recommendation to halt work if archaeological deposits or human remains are found within the MBWF area and made immediate contact with the Coordinator of the Special Places Program, Laura Bennett.

In a letter from Nova Scotia Communities, Culture and Heritage dated December 21, 2012, the staff agree with these recommendations and the study area as defined in the Archaeological Resource Impact Assessment (ARIA) is cleared of any requirement for future archaeological investigation. Refer to Appendix 7 for the CRM report and the letter from the Province.

4.2.3 Aboriginal Uses and Resources

The Project is located 20km south of Pictou Landing First Nation (PLFN), 54km northeast of Millbrook First Nation (MFN) and 70km southwest of Paqtnkek Mi'kmaw Nation (PMN). The Proponent has informed various aboriginal groups of Project specifics, including: Kwilmu'kw Maw-klusuaqn (KMK), Maritime Aboriginal Peoples Council (MAPC), PLFN and PMN. The Proponent has also exchanged information with the Office of Aboriginal Affairs (OAA) on several different occasions. Refer to Section 5.2 for detailed communication references.

CRM performed desktop research and analysis into the potential for Precontact and historic Native, as well as early Euro-Canadian influences and installations, within the boundaries of the MBWF site. Based on the various components of the background study, including environmental setting, Mi'kmaq land use

and property history, the vicinity of the study area is considered to exhibit low potential for encountering Precontact and/or historic archaeological resources.

East River, which is located approximately 5km to the west of the Project site, would have been an important transportation route facilitating travel inland from the Northumberland Strait at Pictou Harbour, and a significant source of salmon and other fish species. Yet, the site is relatively far removed from any significant watercourse and therefore would have been less suitable as a location for Mi'kmaq settlement.

A review of the Maritime Archaeological Resource Inventory (MARI), a provincial archaeological site database maintained by the Nova Scotia Museum, determined that there are no registered Precontact or early historic Native archaeological resources located within the study area. The closest registered Precontact site is located approximately 8km northwest of the Project site. In addition, field work has been completed for moose which are of importance to First Nations.

Along with the results from the ARIA, the Proponent is aware of four separate wind energy projects within a 50km radius of the MBWF site which had each commissioned an Mi'kmaq Ecological Knowledge Study (MEKS). The availability of site specific data from the MEKS are not readily available as per the MEKS protocols. Vast amounts of traditional use information and data has been collected in the areas surrounding the MBWF site providing macro scale information, in combination with the site specific ARIA data collected by CRM.

Refer to Section 5.2 for a description of the correspondence and meetings with various First Nation stakeholders across Nova Scotia. The full report from CRM can be found in Appendix 7, which details the extensive background research and field reconnaissance completed as part of the archaeological investigation.

4.2.4 Noise

A noise model was completed for the MBWF using the wind farm planning and design software, openWind. The openWind noise modelling software is based on ISO standard 9613-2 - *Attenuation of sound during propagation outdoors*. The noise modelling in openWind applies conservative estimates to factors contributing to the attenuation of noise in the environment. Such factors include: ground porosity, atmospheric attenuation, and geometric spreading.

Conservative estimates of these parameters contribute to a cumulative conservative estimate for the noise levels produced from the Project. The model was run using the *Alternative method for A-weighted sound pressure level (ISO 9613-2),* creating isolines for sound pressure emanating from all WTGs. The digital elevation model data was downloaded from Geobase.ca (Geobase, 2011), which is a database of Canadian GIS information. The turbine SPL at 95% of the turbine rated capacity used was 105.5dBA at the nacelle, which is the highest value of the various turbine types the Proponent is considering.

Conservative assumptions include the omission of attenuation of sound vibrations from vegetation; the model was run assuming no vegetation layer to further illustrate the worst case scenario. Further the model was run using the five WTG site layout; this conservatively illustrates the predicted noise effects for the Project as proposed at four WTGs plus the potential expansion of an additional WTG. The model outcome shows that all nearby residential dwellings are predicted to experience an SPL below 40 dBA. This is understood as the most appropriate criteria to ensure sleep is protected. Residence 5, a seasonal camp, is predicted to experience the highest resulting SPL though it remains under 40dBA with conservative assumptions as explained above. Figure 4.5 is a visual representation of the SPL isolines created by the openWind model. Table 4.5 outlines the results of the model.

Table 4.5: Noise Analysis Results

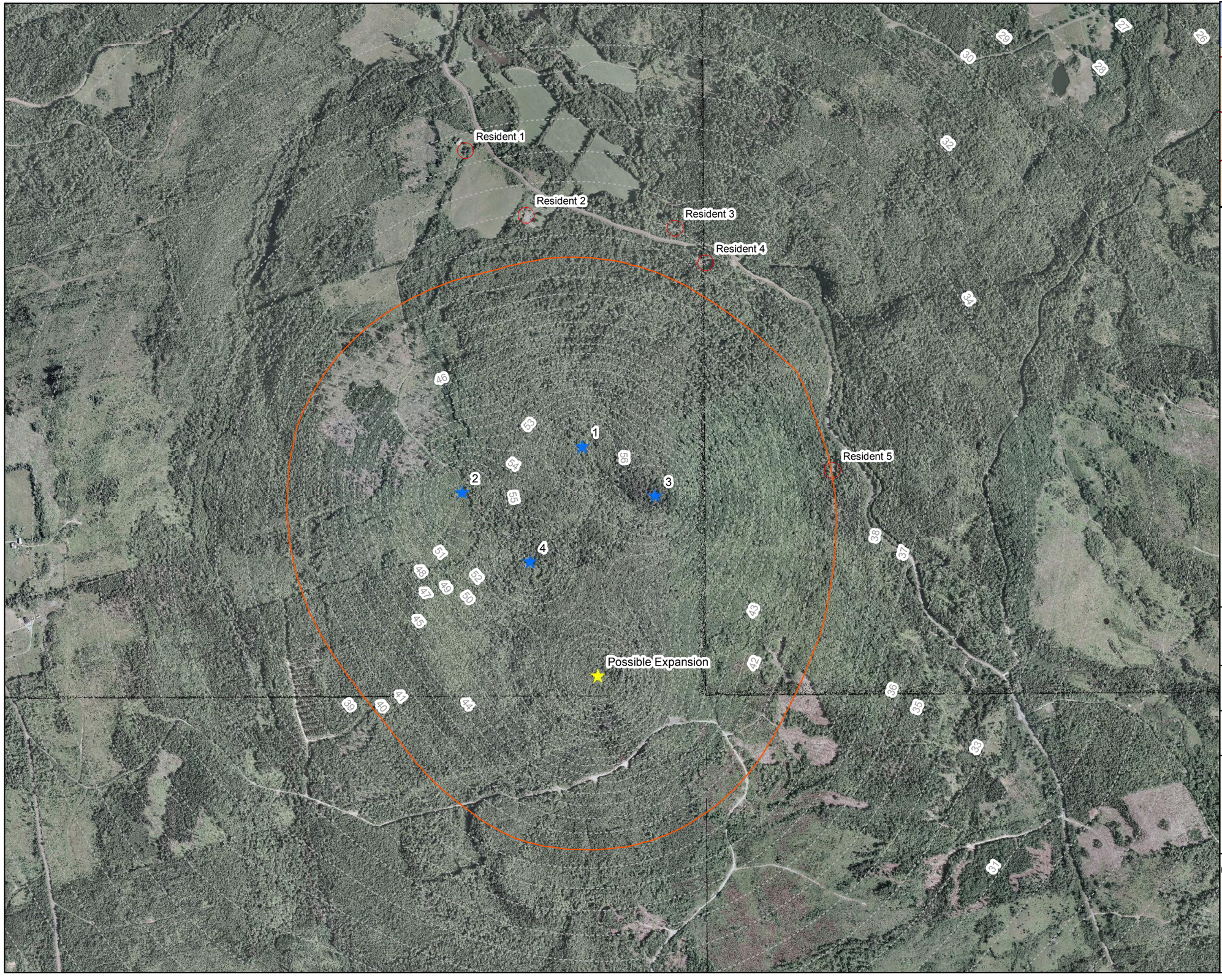
Name	Noise Level (dBA)	UTM Zone20N	
Resident 1	35.5 dBA	530429.603	5040442.283
Resident 2	38 dBA	530637.0368	5040221.091
Resident 3	38 dBA	531146.0961	5040176.641
Resident 4	38.5 dBA	531250.8714	5040058.107
Resident 5 (seasonal resident)	39.8 dBA	531679.4972	5039331.031

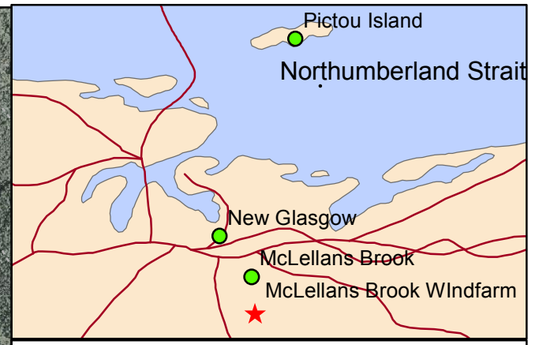
The model was run using the five WTG site layout with no added vegetation layer; using these conservative inputs, the predicted SPL from the Project is 39.8 dBA for the closest residence. The model was rerun with a vegetative layer added; this reduced the resulting SPL at Residence 5 by about one decibel. Similarly, modeling the noise with the four WTG layout proposed resulted in a reduction of an additional one decibel. While the resulting noise can only be predicted based on best assumptions, the work completed provides justification that resulting SPL from the Project will be below 40dBA even in the worst case conditions.

Should the turbine layout change appreciably, the Proponent commits to commissioning another noise analysis which will comply with the SPL of 40dBA at the nearest receptor. In this case, the proposed layout change and the corresponding predicted noise effect will be communicated to NSE and the nearest residents.

4.2.5 Radio and Radar Communication

The Proponent has contacted all mandatory stakeholders listed in the guidance document prepared by the Canadian Wind Energy Association (CanWEA) and the Radio Advisory Board of Canada (RABC) (CanWEA, 2007). Positive responses have been received from all agencies who replied to date; there has not been a response from the Royal Canadian Mounted Police (RCMP). The Proponent will continue to engage with appropriate radio-communication, radar and aviation operators throughout the duration of





Legend

- Nearest Dwellings
- WTG
- Possible Expansion
- Noise Isolines
- 40 dBA Isoline

FIGURE 4.5

Noise Study

Drawn by: AWA	Date: 2013/01/02
Project #: 2012043	Scale @ 11"x17"

EON WindElectric

0 250 500 1,000

Meters

Coord. System: NAD83 CSRS UTM Z20N
Projection: Trasnverse Mercator
Units: Meters

N

the development, construction and operation of the MBWF. Approvals and communication with mandatory agencies can be found in Appendix 2.

4.2.6 Shadow Flicker

The Proponent procured the expertise of Al-Pro Consulting Inc. to perform the shadow flicker assessment for the Project. Wind data from the meteorological tower installed onsite and weather (cloud cover) data from Charlottetown, PEI was used as model input parameters. The data from Prince Edward Island was used by the independent consultant, and was deemed to be the most representative of the MBWF cloud cover data. The influence of flicker is limited to the distance at which it is still considered relevant, which in this case is dictated by the average blade width (3.99m), which equates to approximately 1.5km. Flicker is ignored if the sun is less than 3 degrees above the horizon. Flicker is only calculated if more than 20% of the sun is covered by a blade. Astronomical worse case assessments assume the sun shines every day of the year. Additionally, rotor blades are assumed to be constantly generating shadows as they are considered to be perpendicular to the sun angle. For the actual case scenarios, the assessments are based on real monthly sunshine probabilities and onsite wind data.

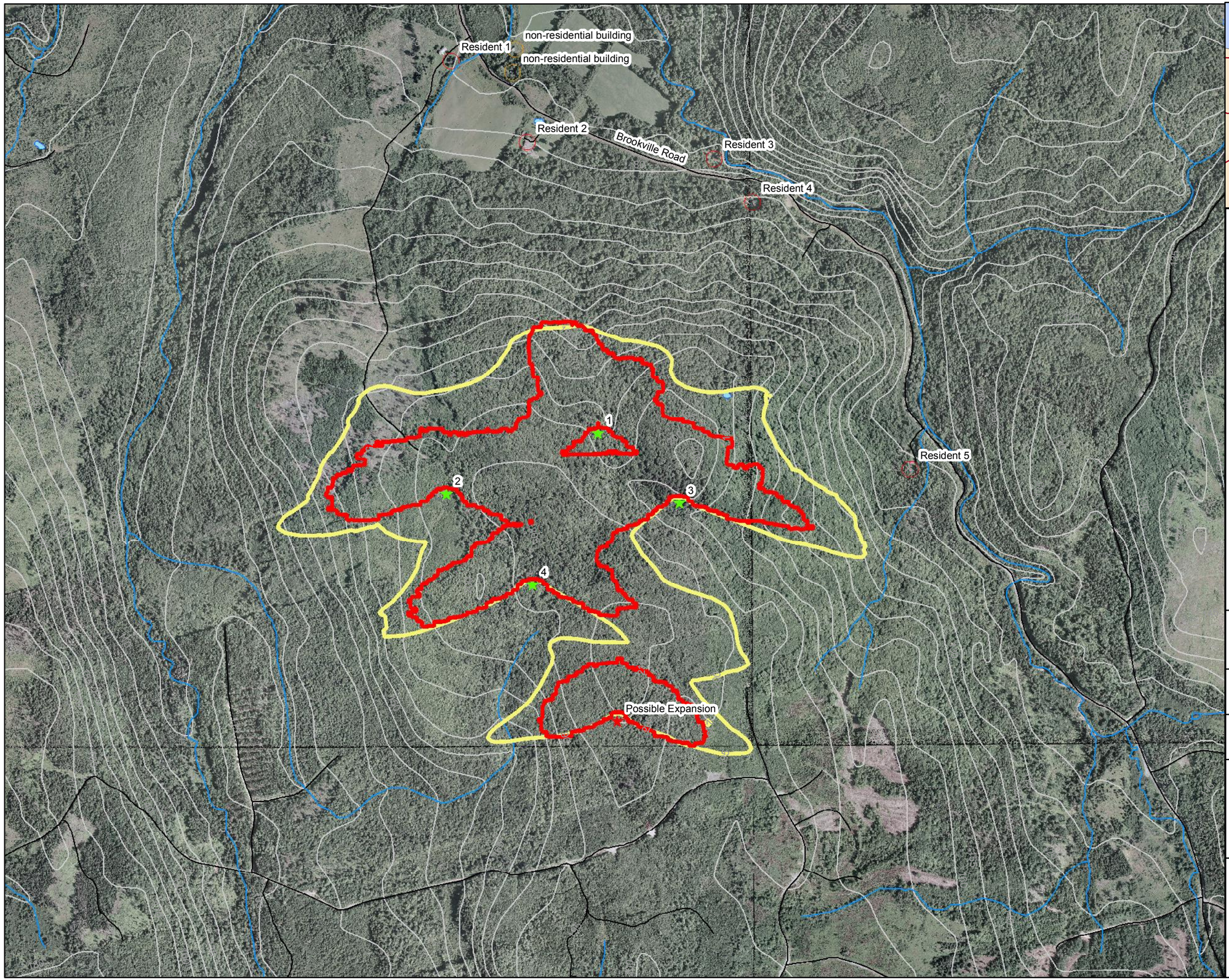
Figure 4.6 outlines the results of the assessment. For this site location, there are no Municipal, Provincial or Canadian flicker emission regulations at the time of submission for this document. A guiding restriction of 30 minutes per day and 30 hours per year based on the above actual case operating conditions was applied to the MBWF. This is a well used guideline for protection of health. All residents are well outside of the areas that exceed the guidance of 30 minutes per day and 30 hours per year.

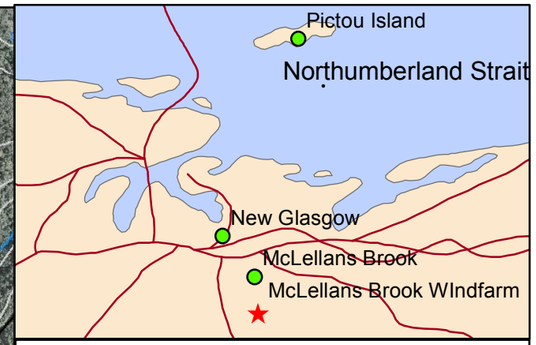
4.2.7 Visual

The openWind planning software was used to create a photomontage of the MBWF. Three locations were chosen to perform the photomontage. Figure 3.1 shows the locations of the vantage points for the visualization study. While the general setting is considered scenic, the only listed scenic viewpoints is located at Blue Mountain, off Nova Scotia Highway 347, approximately 12km east of the site (Museum of Natural History, 2012a). Images for the visualization study were taken in open fields near residents' houses, i.e, locations with greatest potential visual effect as versus wooded areas with no viewing area.

Vantage Pnt 1 was taken from a field located on Brook Road, approximately 1.5km northeast of Churchville. Vantage Pnt 2 and Vantage Pnt 3 are taken near two of the closest residents' houses.

Residences surrounding the MBWF are generally surrounded by mature forests, limiting visual intrusion of turbines. Resident 1 and Resident 2 are expected to have the most view of WTGs because of clearing around houses. Residents 3 to 5 have denser forest cover immediately surrounding their houses, which helps to impede view of the turbines.





Legend

- Nearest Dwellings
- WTG
- Possible expansion
- Contour Lines (10m)
- 30 Minutes/day Shadow Flicker
- 30 Hours/year Shadow Flicker
- Watercourse
- Roads

FIGURE 4.6

Shadow Flicker

Drawn by: AWA	Date: 2013/01/02
Project #: 2012043	Scale @ 11"x17"

EON WindElectric

0 125 250 500
Meters

Coord. System: NAD83 CSRS UTM Z20N
Projection: Trasnverse Mercator
Units: Meters

N

Figure 4.7: Original Image – Vantage point 3

Figure 4.8: Photomontage Image – Vantage point 3

Figure 4.9: Original Image – Vantage point 2

Figure 4.10: Photomontage Image – Vantage point 2

Figure 4.11: Original Image – Vantage point 1

Figure 4.12: Photomontage Image – Vantage point 1

Should the turbine location change, or if Watts Wind is issued an additional capacity for the Project from the NSDOE through the COMFIT program, the Proponent will provide additional visualization studies.

4.2.8 Recreation

Regional recreational activities exist in the area, such as fishing in lower reaches of watershed and hiking, swimming and other outdoor pursuits. The Project site is currently used for the harvesting of firewood for home heating purposes by the landowner. The landowner is also involved in tapping trees near the Project boundaries for maple syrup production. The Proponent has ensured the landowner that tree harvesting and site clearing will not impinge on the maple syrup operations.

The properties under option do not have trails specifically constructed for the use of all-terrain vehicles or snow mobiles. Public walking trails are also nonexistent within or near the Project boundary.

The MBWF will be situated approximately equidistant from the Glen Dhu and Dalhousie Mountain wind farms and is not expected to attract significant tourism attention, given its relative proximity to two of the Province's largest wind installations.

4.2.9 Economic Development

Employment in the Municipality of Pictou County ranges from resource based to technology based and from multi-national companies to small owner managed businesses. According to Pictou Regional Development Agency (RDA), the unemployment rate is 9.5% and about one quarter of employment is in the trades, transportation sector, and equipment operation based on the 2006 census data (Pictou RDA, 2012). Several small businesses exist in or near the host community of McLellans Brook, including retail and equipment operators.

The Proponent is committed to using local contractors whenever it is commercially reasonable to do so. For example, the construction of the single 1.5MW wind turbine in Sheet Harbour in 2011 by the Proponent involved half of the project costs being raised by Nova Scotian investors. In addition, the BOP design and construction contracts were issued to local firms, adding to the local economy and knowledge base.

5.0 Consultation

5.1 Community

On three separate occasions of June 24 and August 31, 2011, and April 18, 2012, the Proponent engaged the community of McLellans Brook, Churchville and surrounding areas. The first two meetings were facilitated by representatives from the Town of New Glasgow (the Town) in Churchville at the Churchville Community Hall, which is located approximately 2km west of the Project site. The community meetings were advertised by the Town of New Glasgow by sending letters (by mail and some hand delivery) to all watershed residents and to those living in close proximity to the watershed. The community meetings were held to introduce and discuss the proposed MBWF, and gauge community support for the MBWF.

The first community meeting was attended by approximately 15 community members, and the meeting lasted about one and a half hours. The Proponent provided preliminary Project information explaining the proposed location of the MBWF, the make and model of the WTGs, the COMFIT program, and opportunities for local ownership and investment. The floor was opened to comments and questions on each topic discussed. The community meeting was an opportunity for members of the Churchville and surrounding area residents share their thoughts and concerns with the Proponent. The Proponent noted community concerns for incorporation in project planning and site layout. Turbine layout and noise levels from the operational turbines were the main concerns discussed at the June 24th meeting.

The second meeting was advertised by the Proponent using the same methods described for the first meeting, with help from the Town of New Glasgow for advertising and logistics. The Proponent took into consideration the concerns of the residents at the first community meeting, and shifted the layout of the MBWF approximately 1km east of the original site. The community information session lasted two hours and included a review of the new site plan, the proposed construction schedule, and the requirements for approvals, including the need for an EA. Residents appeared generally satisfied with the proposed layout; prior concerns regarding quality of life issues pertaining to visual intrusion and noise were mitigated with the revised turbine layout. Residents requested updated scheduling as the development of the Project progressed. The Proponent gathered contact information from each of the residents in attendance.

The Proponent is committed to continuing to engage the residents of the Churchville-McLellans Brook area, and will do so through specified mailouts and via the Proponent webpage (http://wattswind.com/portfolio/mclellans-brook/), in conjunction with further community meetings.

The Proponent hosted a third community information session on the 18th of April 2012. The meeting was advertised via individual mailouts to the nearest residents of the Project. Over 80 mailouts were hand delivered in mailboxes, and three advertisements were placed on community mailboxes in the communities of McLellans Brook and Churchville. The Proponent also took the opportunity to communicate with each available resident during the handing out of community notices. Particular attention was paid to the residents nearest the MBWF site. Figure 4.5 indicates residents nearest to the

MBWF, whom the Proponent believes were well informed of the April 18th community meeting.

The door to door meetings with the nearest residents were conducted with a detailed map of the Project location and a copy of the site map for the residents to keep. The methodology for the analysis of noise, siting of turbines from their respective residence, and project timeline were all discussed with the nearest residents who were available for communication. Questions surrounding turbine make and model, site layout and project schedule were asked during the door to door visits.

There were approximately 30 residents in attendance at the April 18th meeting. The Proponent explained the project timeline, construction schedule and reviewed the location and layout of the proposed wind turbines. A large map (i.e., 32 inch by 48 inch) was brought to the community meeting and posted on the wall for the local residents to view the proposed turbine locations, the municipal setbacks, and relative locations of their houses and properties from the Project boundary. Proponent contact information was also given to the attendees of the meeting, and a sign-in sheet was handed around to collect attendee contact information.

The Proponent is committed to open and transparent communication with residents and stakeholders affected by the operation of the MBWF. The possibility of forming a community liaison committee (CLC) was suggested by the Proponent at the most recent community meeting. Residents were encouraged to contact the Proponent if there is interest in forming a CLC. A CLC will be formed if sufficient interest exists in the community.

Community engagement, including meetings, mailouts and use of the website, will continue as the Project proceeds. The Proponent expects to schedule another meeting prior to site work (i.e., clearing and grubbing) likely before April 2013. Refer to Appendix 11 for supporting materials of the community consultation details to date.

5.2 Aboriginal Peoples

The Proponent has engaged and continues to engage various aboriginal stakeholders in Nova Scotia including; KMK, PLFN, PMN, MAPC, and the OAA. Table 4.6 outlines communications and meetings that were held between the Proponent and various First Nation representatives.

Table 4.6: Summary of Aboriginal Engagement Activities

First Nation Entity	Date	Action	Attendees	Meeting topic	Location
Maritime Aboriginal Peoples Council (MAPC)	Wednesday, April 13th, 2011	Formal Meeting	Josh McNeely, Roger Hunka (MAPC)	All COMFIT projects engagement protocols, MAPC roles	Truro, NS (MAPC Offices)
Kwilmu'kw Maw-klusuaqn (KMK)	Tuesday, May 10th, 2011	Formal Meeting	Eric Christmas, Twila Gaudet (KMK)	All COMFIT projects (mapping, Watts Wind	Truro, NS (KMK Offices)

				CEDIF), Watts Wind Project, potential for partnerships with First Nations of NS	
Pictou Landing First Nation	July, 2011; January 2013	Informational letter and documenta-tion sent to Band Chief with subsequent update	Addressed to Council of Pictou Landing Band, Site 6	see Appendix 12	N/A
Paq'nkek First Nation	July, 2011	Informational letter and documenta-tion sent to Band Chief	Addressed Chief Gerard Julian	see Appendix 12	N/A
Office of Aboriginal Affairs (OAA)	April 13th, 2012	Formal Meeting	Alvaro Loyola	Proponent discussed MEKS require-ments, MBWF description	OAA offices
KMK	various	Phone calls and breakfast meetings Eric Christmas	Eric Christmas (Phone call to Twila Gaudet who suggested Eric was best point of contact for continuing discussions with KMK)	All ComFIT projects and also MB in particular.	various
Office of Aboriginal Affairs (OAA)	November 21st, 2012	Informal Meeting	Justin Houston	Discussion regarding general Aboriginal engagement practises	Mi'kmaq Learning Seminar
Office of Aboriginal Affairs (OAA)	November 26th, 2012	Formal Meeting	Justin Houston, Beata Dera	Review of Project and engagement completed to date	OAA offices

Meeting with the KMK resulted in the understanding by the Proponent that further Project information should be made available to the KMK as development progressed. Communication with the KMK will be ongoing.

To date, no concerns have been shared with the Proponent on the Project as proposed or on the engagement approach used. The Proponent will continue to update the First Nations community as the Project proceeds.

5.3 Regulatory

The Proponent has consulted with numerous Municipal, Provincial and Federal representatives regarding the proposed MBWF. Consultations to date and future plans are described below.

Municipal consultations

On April 18th, 2012, the Proponent met with Brian Holland, the CAO of the Municipality of the County of Pictou, and Andy Thompson, Councillor for the district in which the MBWF is located. The purpose of the meeting was to exchange details regarding the proposed Project schedule, the specific location of the Project and background information about the Proponent. The Proponent has also met with the Water Works Operator and the Town Engineer on prior occasions.

On two separate occasions, the Proponent met with the development officer for the Municipality of Pictou County to discuss the MBWF. The meeting discussions were focused on the Municipal bylaws governing the installation of wind turbines in the Municipality of Pictou County, and the completion of a development permit.

The Proponent will continue to engage the Municipality, the Water Works Operator and the Watershed Advisory Board as appropriate.

Provincial consultation

The Proponent has met with various Provincial regulators regarding the development and construction of the MBWF project. The Proponent has either met or corresponded with NSDOE, NSE, OAA, NSDNR, and the Department of Communities Culture and Heritage. These interactions have assisted the Proponent in scoping the EA, including defining the appropriate field work and consultation activities, and in Project planning and design.

The Proponent will continue to engage Provincial regulators throughout the development, construction and operation of the MBWF.

Federal consultation

The Proponent has consulted with various Federal entities regarding the construction of the MBWF. Environment Canada (via CWS), the Canadian Coast Guard, NAV Canada, Transport Canada and DND were all contacted regarding the development of the MBWF. Like their Provincial counterparts, these have assisted in the preparation of this EA and Project planning and design.

The Proponent will continue to engage Federal regulators throughout the development, construction and operation of the MBWF as appropriate.