

APPENDIX H  
POST CONSTRUCTION BIRD AND BAT  
MONITORING PROGRAM

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January 14, 2013

**Mr. Dan Roscoe**  
**Scotian WindFields Inc.**  
108F Trider Crescent  
Dartmouth, NS B3B 1R6

Dear Mr. Roscoe,

**Re: Post-Construction Bird and Bat Monitoring Program  
Martock Ridge Community Wind Project**

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## **INTRODUCTION**

Scotian WindFields Inc., Scotian Wind Inc., and WEB Wind Energy North America Inc. have proposed to construct a 6.0 MW wind turbine development in the community of the Three Mile Plains, near Windsor, Nova Scotia (the Project). As part of the Environmental Assessment (EA) the Proponent has developed the following post-construction monitoring plan for birds and bats (the Plan). The objective of the Plan is to document and evaluate any changes in species diversity or abundance at the Project site as a result of Project operation and associated activities.

### **Site Description**

The proposed Project is located within the District of West Hants and is located approximately 7 km southeast of the Town of Windsor, centered at 4975562.97 N and 412080.95 E (20T; NAD 83). The Project site consists of approximately 53.4 ha of forested resource land owned by the Town of Windsor and is located west of Panuke Road and directly northeast of Mill Lakes. Adjacent lands are primarily undeveloped resource lands owned by the Town of Windsor (Drawing 1, attached).

The majority of the Project site is forested with mixed wood stands accounting for 47% of the cover type. This forest consists of red maple (*Acer rubrum*) and white birch (*Betula papyrifera*). Common herbaceous species, including bracken (*Pteridium aquilinum*), bunchberry (*Cornus canadensis*), and goldthread (*Coptis trifolia*) are characteristic of the ground cover.

### **Site Sensitivity**

Site sensitivity and level of concern were determined according to the document "Wind Turbines and Birds – A Guidance Document for Environmental Assessment" (CWS 2007a). The Project consists of three turbines, and as such is considered a 'Small' project. Pre-construction surveys at the Project site identified avian species assessed as threatened under the *Species at Risk Act* (SARA) and/or listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The Project is therefore classified as having a 'Very High' potential sensitivity. This combination of facility size and site sensitivity yields a Category 4 Level of Concern for the Project.

## BASELINE SURVEYS

Baseline surveys were completed for avifauna and bats to gain insight into which species were utilizing the area during different times, and to identify species of conservation interest potentially occurring at or near the Project site. These surveys incorporated both a desktop review and field components.

### Desktop Review

The desktop component included a review of available data from the Maritime Breeding Bird Atlas (MBBA 2011), Nova Scotia Significant Species and Habitats database (NSDNR 2012), and the Atlantic Canada Conservation Data Centre (ACCDC 2012).

For the purposes of this assessment, species of conservation interest included:

- species assessed by SARA (SARA 2012) as endangered, threatened, or of special concern;
- species listed by COSEWIC (COSEWIC 2012) as endangered, threatened, or of special concern;
- species protected under the *Nova Scotia Endangered Species Act* (NSES 2007); and,
- species listed in the NSDNR General Status Ranks of Wild Species in Nova Scotia as “Red” or “Yellow”.

Desktop results identified sightings for 96 avian species of conservation interest within 100 km of the Project site, including 15 possible breeders within the MBBA map square 20MQ17. Sightings for three bat species of conservation interest within 100 km of the Project site were recorded.

### Avian Surveys

Pre-construction (baseline) avian surveys were completed at the Project site between March 2012 and November 2012 as follows:

- Winter survey (area search) on March 20, 2012;
- Spring migration surveys (stop-over counts) on April 19, May 1, and May 31, 2012;
- Breeding surveys (stop-over counts) on June 16 and July 16, 2012; and
- Fall migration surveys (stop-over counts) on October 2, October 26 and November 6, 2012.

These surveys were designed in consultation with NS Department of Natural Resources (NSDNR) and Canadian Wildlife Service (CWS), and conformed to protocols outlined in the document “Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds” (CWS 2007b).

There were 58 species identified at or near the Project site, including thrushes, sparrows, warblers, birds of prey, and other passerine and non-passerine species. Ten species of conservation interest were identified, as follows, suggesting that the general area may be composed of areas useful to important bird habitat:

- Black-backed Woodpecker (*Picoides arcticus*) – “Yellow” (NSDNR 2010);

- Boreal Chickadee (*Poecile hudsonicus*) – “Yellow” (NSDNR 2010);
- Common Nighthawk (*Chordeiles minor*) - “Red” (NSDNR 2010), “Threatened” (COSEWIC 2012); “Threatened” (SARA 2012), “Threatened” (NSES 2007);
- Eastern Wood-pewee (*Contopus virens*) – “Yellow” (NSDNR 2010);
- Golden-crowned Kinglet (*Regulus satrapa*) – “Yellow” (NSDNR 2010);
- Gray Jay (*Perisoreus canadensis*) – “Yellow” (NSDNR 2010);
- Pine Grosbeak (*Pinicola enucleator*) – “Red” (NSDNR 2010);
- Pine Siskin (*Spinus pinus*) – “Yellow” (NSDNR 2010);
- Ruby-crowned Kinglet (*Regulus calendula*) – “Yellow” (NSDNR 2010); and
- Yellow-bellied Flycatcher (*Empidonax flaviventris*) – “Yellow” (NSDNR 2010).

The mature, mixed woods habitat at the Project site provides habitat for a number of migrant, breeding, and resident species throughout the year. The bird community at the Project site strongly reflects the forested nature. Forest-dwelling species dominate the bird community at the Project site in all seasons. The presence of mature forest species like Pileated Woodpecker (*Dryocopus pileatus*) and Barred Owl (*Strix varia*), combined with the presence of conifer associated species such as Golden-crowned Kinglet and Pine Siskin, suggest that the forests at the Project site offer a suitable mixture of softwoods and hardwoods and feature an old-growth component. Sheltered habitats allow for the Project site to maintain relatively high species diversity during the winter months, although habitat homogeneity limits species diversity during migration and breeding.

The absence of water bodies within the Project site boundaries indicates that it is unlikely that waterfowl use the Project site directly, although American Black Duck (*Anas rubripes*) and Canada Goose (*Branta canadensis*) were observed flying over the Project site during the spring and fall migration, respectively. It is likely that these waterfowl pass over the Project site on the way to nearby Mill Lake and Panuke Lake, or, in the case of the Canada Goose, to agricultural fields adjacent to Highway 14. The possibility exists that waterfowl using the area as a flyover route may interact with Project infrastructure, although waterfowl fatalities at wind energy facilities are known to be very low (Kingsley and Whittam 2005).

Similarly, the limited wetlands at the Project site likely accounted for the absence and/or low numbers of swamp associated species including Gray Jay, Swamp Sparrow (*Melospiza georgiana*), and Common Yellowthroat (*Geothlypis trichas*), as well as aerial insectivores like Tree Swallow (*Tachycineta bicolor*).

### Bat Surveys

Field surveys of bat populations were conducted at the Project site for 17 consecutive days from September 4 to September 20, 2012 using an AnaBat SD2 Detector. Suitable locations for the detector were limited at the Project site due to the prevalence of heavily forested areas with high canopies which could potentially prevent acoustic signals from reaching the microphone. As such, the detector was deployed in a small treed swamp adjacent to an access road, as this location featured a distinct clearing.

In total, 6,184 files were recorded, of which only 35 files were determined to be bat generated ultrasound. All remaining files were extraneous noise likely caused by wind gusts and precipitation. Most echolocation calls were recorded between September 4 and 7 and associated with *Myotis* species bats [i.e., Little brown bat (*Myotis lucifugus*) and Northern long-eared bat (*M. septentrionalis*), common species in Nova Scotia. No attempt was made to identify the *Myotis* species calls to species because of the difficulty in achieving defensible identifications (Broders 2011). Despite this, there were echolocation calls with characteristics consistent with both the Northern long-eared and the Little brown bat. Of the 35 calls identified, 13 were categorized as unknown species. These calls were clearly bat generated ultrasound; however, the quality of the files was not sufficient to render a positive identification. Most of the unknown calls were likely *Myotis* spp. due to the frequency and slope.

As expected, average nightly bat activity peaked between 19:00 and 20:00 which coincides with sunset and resultant bat emergence.

## POST-CONSTRUCTION AVIAN MONITORING PROGRAM

Wind energy installations have the potential to impact birds either directly through collisions with project infrastructure or indirectly through habitat alteration and/or sensory disturbance (Kingsley and Whittam 2005; Arnett *et al.* 2007; Kuvlevsky *et al.* 2007). The proposed monitoring programs will evaluate both potential direct and indirect impacts during different times of the year and via different monitoring techniques. The monitoring programs have been designed to capture changes in the diversity and abundance of bird species at the Project site, relative to the community observed during baseline surveys. All monitoring surveys will be designed in consultation with officials from NSDNR and CWS, and will conform to protocols outlined in the document "Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds" (CWS 2007b). Survey locations used in the baseline program (Drawing 2, attached) will be used to ensure comparability of the results with the monitoring program and will be conducted on days when weather conditions meet or exceed criteria outlined in the document "Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds" (CWS 2007b).

The monitoring program will be evaluated following completion of the first year. Should significant changes in species abundance, diversity, and/or distribution be detected (as determined through consultation with CWS), the program may be extended to encompass subsequent years.

### Breeding Birds

Methodology for breeding bird monitoring will involve the following elements:

- point count methodology;
- two surveys, at least one week apart, conducted in late June/early July following the commencement of Project operation; and
- surveys will be conducted during the first four hours after sunrise to encompass peak singing times for breeding passerines.

### Overwintering Birds

Methodology for overwintering bird monitoring will involve the following elements:

- area search methodology;
- one survey completed in January/February following the commencement of Project operation; and
- surveys will be four hours in duration, commencing as close to sunrise as possible.

### Migrating Birds

Methodology for monitoring of migrants will involve the following elements:

- three spring migration surveys, at least one week apart, completed in late April/early May;
- three fall migration surveys completed from September to November; and
- surveys will be four hours in duration, commencing as close to sunrise as possible.

### Bird Mortalities

Although the number of birds killed by collisions with wind energy infrastructure has been demonstrated to be low (EC *et al.* 2012), particularly relative to other anthropogenic infrastructure (Erickson *et al.* 2005), the potential does exist for bird mortality as a result of the Project. Mortality surveys will be completed to evaluate the correctness of the predicted mortality effects of the Project on the resident and migrant bird community, as outlined in the approved EA.

Mortality surveys will be conducted for a period of one year following the commencement of Project operation. Mortality surveys will consist of three main components:

- carcass searches;
- scavenger removal trials; and
- searcher efficiency trials.

Carcass searches will be completed during the periods of peak bird activity, namely spring and fall migration. The schedule of these carcass searches will consist of the following:

- semi-weekly for 6 weeks, beginning late April; and
- semi-weekly for 8 weeks, beginning in late August.

Carcass searches will begin at first light, to ensure minimal loss of carcasses due to scavengers. Data collection will comply with recommendations as outlined in the Wind Energy Bird and Bat Monitoring Database maintained by NatureCounts (2012). The search effort will be focused at each turbine base and will extend out 50 m in each direction to encompass an area of 7,854 m<sup>2</sup>. Carcass searches, including scavenged carcasses, will be completed along linear transects, spaced less than 10 m apart and walked at a pace of 1.8 km/hr. Special attention will be given to tall grass clumps, shrubs, and openings to animal burrows. Any evidence of actual or scavenged carcasses, will be noted including species, condition of the carcass, estimated time of death, and the probable cause of

death (including justification to why this cause of death was chosen). In addition, the location of the carcass will be recorded with a GPS.

If the carcass cannot be identified, a photo will be taken for future identification through consultation with an expert birder. Carcasses will be removed to avoid replication; this will be completed in accordance with federal, provincial, and municipal laws. A salvage permit under the *Migratory Birds Convention Act* (1994) will be acquired, as will the necessary permit(s) required under *SARA* for salvage of any designated species at risk recovered during the carcass searches. An additional permit will be obtained from NSDNR for the collection of carcasses of those bird species under provincial jurisdiction, including but not limited to raptors.

Any injured birds will be captured, if possible, and taken to a wildlife rehabilitation centre or vet clinic for treatment or euthanasia.

Carcass removal trials are necessary to correct for bird mortalities that may be removed by wildlife prior to carcass searches taking place. These trials will involve placing one or two carcasses (obtained from carcass searches at the Project site and/or other sites) at various georeferenced locations within the search radius of the turbine and monitoring the time required for the carcasses to be removed by scavengers. Planted carcasses will be marked to distinguish from actual turbine-related fatalities, while not attracting/repelling potential scavengers. Carcass trials will be repeated once each season during the annual cycle for a period of one year. Carcasses used for these trials may include those recovered during carcass searches or fresh carcasses from other sources including farming operations and provincial firearms programs (CWS 2007).

Searcher efficiency trials are necessary to correct for the proportion of carcasses present that may be missed by the search team. These trials will involve placing carcasses at random, georeferenced locations, undisclosed to the search team on the evening prior to the trial, and counting the number of carcasses recovered by the search team. Trials will be conducted throughout the year at random intervals, with at least 20 carcasses used in total.

## **POST-CONSTRUCTION BAT MONITORING PROGRAM**

Bat mortalities at wind energy facilities typically exceed those for birds (EC *et al.* 2012). To evaluate the extent of bat mortality resulting from the Project, post-construction mortality monitoring will be carried out. This monitoring will consist of the following:

- carcass searches;
- scavenger removal trials; and
- searcher efficiency trials.

### **Bat Mortalities**

Semi-weekly carcass searches will be completed at each turbine location during the period of peak bat activity: May 1 to September 30. Searches will be undertaken in the calendar year of the commencement of Project operation or the year immediately following, if Project operation

commences after September 30. Bat carcass searches will coincide with bird mortality surveys when possible and will employ the same search protocol. Data collection will comply with recommendations as outlined in the Wind Energy Bird and Bat Monitoring Database maintained by NatureCounts (2012). Bat carcass removal trials and searcher efficiency trials will be completed in conjunction with those for birds and will employ the same methodology. Additional trials will be completed in the summer months. Extra care will be taken to ensure minimal health effects to field surveyors. Persons handling carcasses will take the proper precautions by having an updated rabies pre-exposure vaccination.

## **CONCLUSION**

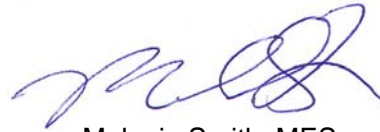
The proposed post-construction monitoring program for avifauna and bats will use established protocols to evaluate potential impacts of the Project on the local bird and bat community in a scientifically defensible manner. The goal will be to identify potential mortality patterns that will then guide the implementation of mitigation procedures. Following the completion of the first year of monitoring, a report will be provided to CWS, NSE, and NSDNR, detailing the methodology and findings of the monitoring program and providing recommendations for future monitoring and/or mitigation, as required.

If you have any questions, please contact us.

Thank you,



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## REFERENCES

ACDC (Atlantic Canada Conservation Data Centre). 2012. Data report 4824: Three Mile Plains, NS. 13 pp.

Arnett, E.B., Inkley, D.B., Johnson, D.H., Larkin, R.P., Manes, S., Manville, A.M., Mason, J.R., Morrison, M.L., Strickland, M.D., and R. Thresher. 2007. Impacts of wind energy facilities on wildlife and wildlife habitat. Wildlife Society Technical Review 07-2. The Wildlife Society, Bethesda, Maryland, USA. 49 pp.

Broders, H.G. 2011. Analysis of ultrasonic Anabat recordings with inferences on bat species composition and activity at the site of a proposed wind turbine farm at Glen Dhu, Nova Scotia. p19.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2012. Wildlife Species Search. Accessed November 16<sup>th</sup>, 2012 from [http://www.cosewic.gc.ca/eng/sct1/index\\_e.cfm](http://www.cosewic.gc.ca/eng/sct1/index_e.cfm).

CWS (Canadian Wildlife Service). 2007a. Wind Turbines and Birds – A Guidance Document for Environmental Assessment . 46 pp.

CWS (Canadian Wildlife Service). 2007b. Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds. 33 pp.

Erickson, W.P., Johnson, G.D., and D.P. Young, Jr. 2005. A summary and comparison of bird mortality from anthropogenic causes with an emphasis on collisions. USDA Forest Service General Technical Report PSW-GTR-191: 1029-1042.

EC (Environment Canada), Canadian Wind Energy Association (CANWEA), Bird Studies Canada (BSC), and the Ontario Ministry of Natural Resources (OMNR). 2012. Wind energy bird and bat monitoring database: summary of the findings from post-construction monitoring reports. 22 pp.

Kingsley, A., and B. Whittam. 2005. Wind turbines and birds: A background review for environmental assessment. 81 pp.

Kuvlevsky, W.P., Jr, Brennan, L.A., Morrison, M.L., Boydston, K.K., Ballard, B.M., and F.C. Bryant. 2007. Wind energy development and wildlife conservation: challenges and opportunities. *Journal of Wildlife Management* **71**: 2487-2498.

MBBA (Maritime Breeding Bird Atlas) 2011. 2<sup>nd</sup> Edition. Accessed on November 20, 2012 from <http://www.mba-aom.ca/english/index.html>

*Migratory Birds Convention Act*. 1994. Published by the Minister of Justice. Accessed on November 20, 2012 from <http://laws-lois.justice.gc.ca/PDF/M-7.01.pdf>

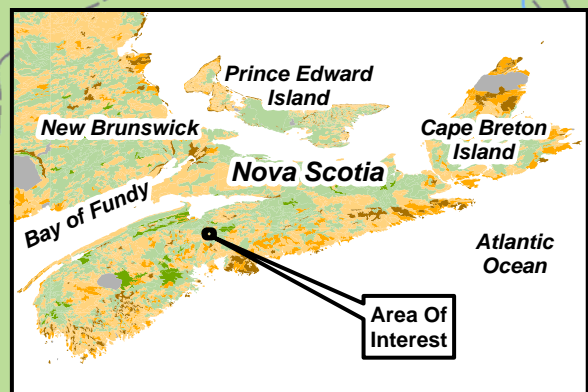
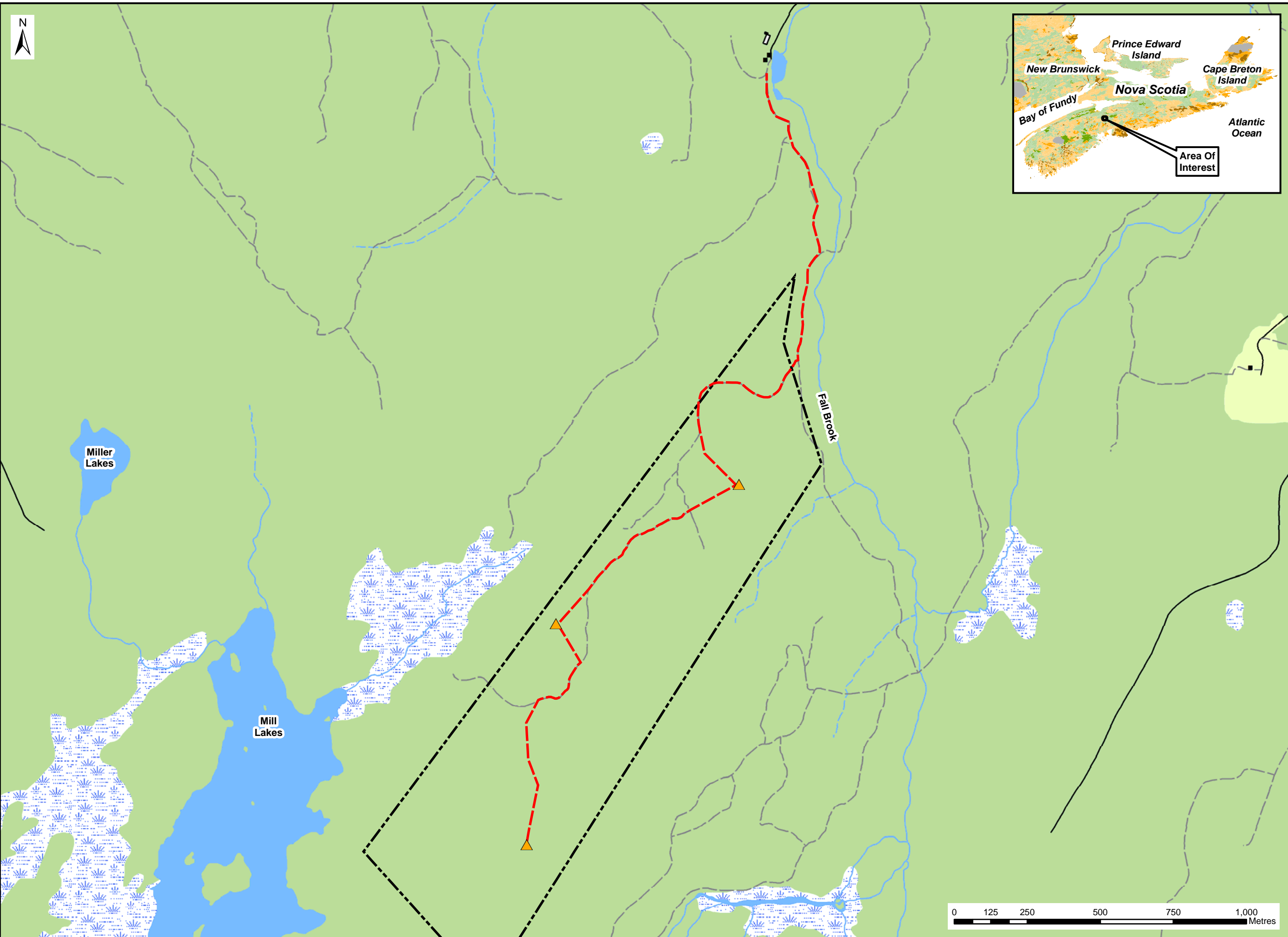
NatureCounts. 2012. Wind energy bird and bat monitoring database. Accessed on November 16<sup>th</sup>, 2012 from <http://www.bsc-eoc.org/birdmon/wind/partners.jsp>.

NSESA (*Nova Scotia Endangered Species Act*). 2007. Nova Scotia Endangered Species Act as of 2007. Accessed November 16<sup>th</sup>, 2012 from <http://www.gov.ns.ca/natr/wildlife/biodiversity/species-list.asp>.

NSDNR (Nova Scotia Department of Natural Resources) 2010. Wild Species 2010: The General Status of Species in Canada – Nova Scotia Species. Accessed November 16<sup>th</sup>, 2012 from <http://www.wildspecies.ca/wildspecies2010/downloads.cfm?lang=e>.

NSDNR (Nova Scotia Department of Natural Resources). 2012. Significant Species and Habitats Database. Accessed November 16<sup>th</sup>, 2012 from <http://www.gov.ns.ca/natr/wildlife/habitats/hab-data/>.

SARA (*Species at Risk Act*). 2012. Species at Risk Public Registry. Accessed November 16<sup>th</sup>, 2012 from [http://www.sararegistry.gc.ca/default\\_e.cfm](http://www.sararegistry.gc.ca/default_e.cfm).



**Notes:**

1. Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.

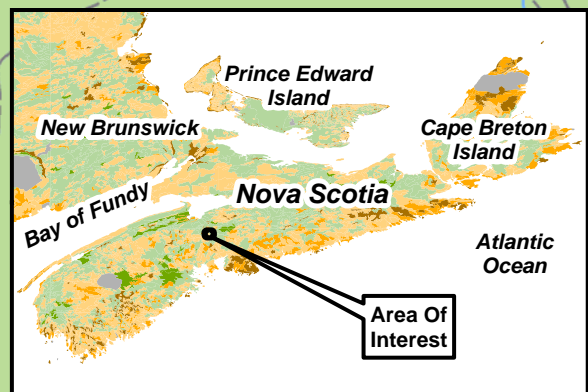
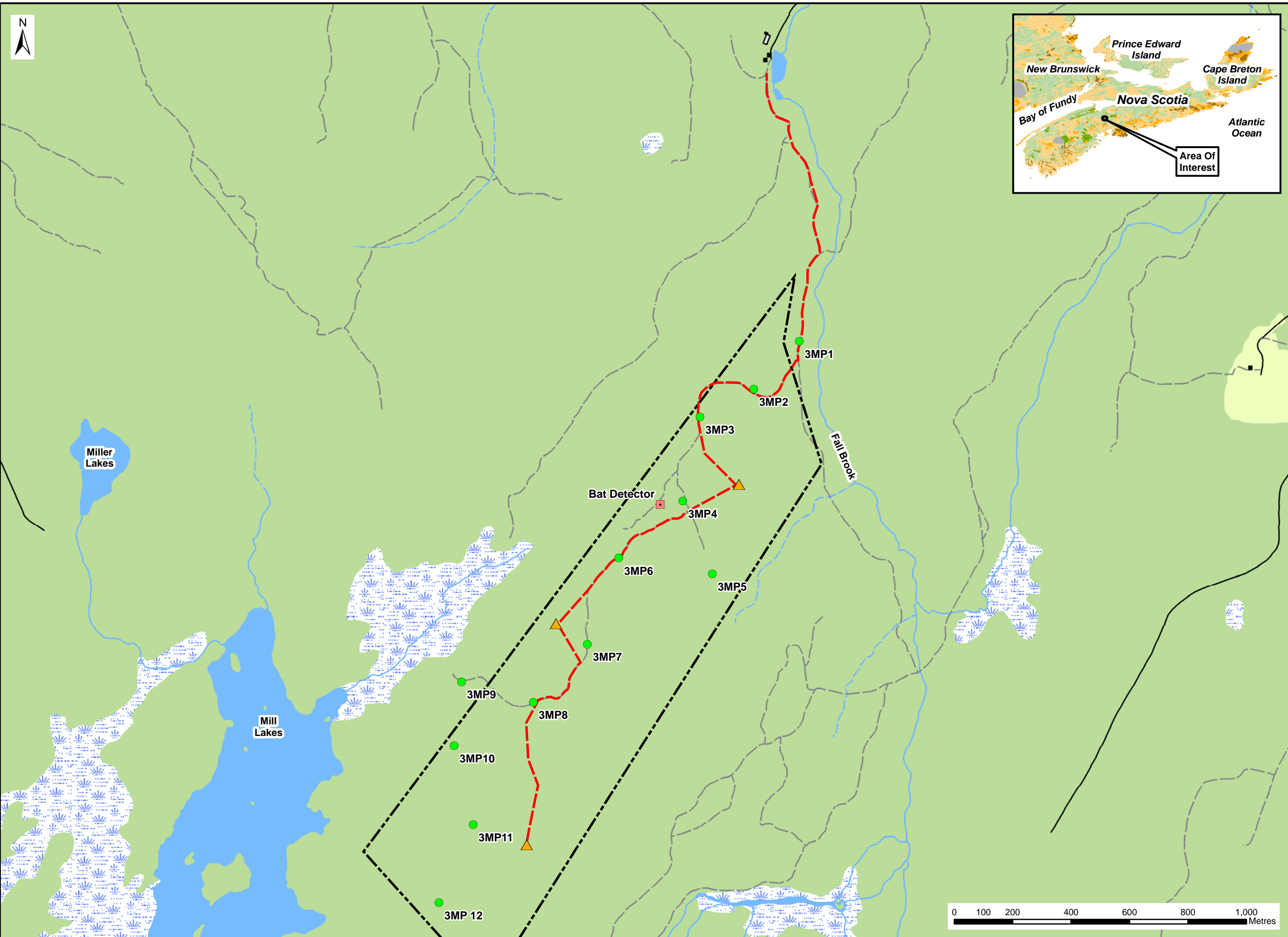
- Legend:**
- Proposed Turbine
  - Proposed Road
  - Project Site Boundary
  - Building
  - Major Roads and Highways
  - Roads
  - Access Roads / Trails
  - Mapped Stream
  - Indefinite Stream
  - Water Bodies
  - Mapped Wet Area
  - Cleared Area
  - Large Structure

**Turbine and Road Layout**



Date: August 2012	Project #: 12-4402
Scale: 12,000	Drawing #: <b>1</b>
Drawn By: H. Serhan	
Checked By: M. Henley	





- Notes:**
1. Reference: Digital Topographic Mapping By Nova Scotia Geomatics Centre.
  2. Projection: NAD83(CSRS), UTM Zone 20 North.
  3. GPS Points Taken Are Typically To +/-5m Accuracy.

- Legend:**
- Proposed Road
  - Project Site Boundary
  - Proposed Turbine
  - 2012 Bat Detector Location
  - 2012 Bird Survey Locations
  - Building
  - Roads
  - Access Roads / Trails
  - Large Structure
  - Mapped Stream
  - Indefinite Stream
  - Water Bodies
  - Mapped Wet Area
  - Cleared Area

**Martock Bird Survey And Bat Detector Locations**



Date: October 2012	Project #: 12-4402
Scale: 1:12,000	Drawing #: <b>2</b>
Drawn By: H. Serhan	
Checked By: G. Gregory	

