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# EAST DURHAM WIND ENERGY CENTRE Bat Monitoring Report and Environmental Impact Study

Prepared for: NextEra Energy Canada, ULC 5500 North Service Road, Suite 205, Burlington, ON L7L 6W6

Project No. 1217

Date: November 2012



# DRAFT

# **EAST DURHAM WIND ENERGY CENTRE** Bat Monitoring Report and Environmental Impact Study

# **Project Team:**

Staff	Role
Andrew Ryckman	Project Manager/Biologist
Charlotte Moore	Terrestrial and Wetland Biologist
Jason Kerr	Terrestrial and Wetland Biologist
Matt Dil	Terrestrial and Wetland Biologist
Nelson Zabel	Terrestrial and Wetland Biologist
Pamela Tucciarone	Terrestrial and Wetland Biologist
Colin Oaks	Aquatic Biologist
Michael Ewaschuk	Aquatic Biologist
Sierra Gillies	Aquatic Biologist
Erica Frey	GIS Technician
Shawn MacDonald	GIS Technician

Report submitted on November 8, 2012

AM-

Andrew G. Ryckman

# **Table of Contents**

1.0	Introd	duction	1
2.0	Reco	rds Review	3
2.1	Recor	ds Review Methodology	3
2.2	Recor	ds Review Results	3
3.0	Site I	nvestigation	6
3.1	Staff F	Roles	6
3.2	Surve	y Dates	9
3.3	Site In	vestigation Methods	11
3.	.3.1	Identification of Candidate Significant Bat Habitats	11
3.	.3.2	Identification of Generalized Candidate Significant Bat Habitats	12
3.4	Site In	vestigation Results	13
3	.4.1	Bat Hibernacula	13
3.	.4.2	Bat Maternity Colony Habitats	13
3.	.4.3	Generalized Bat Maternity Colony Habitat	13
3.5	Site In	vestigation Summary	19
4.0	Evalu	ation of Significance	20
4	.1.1	Staff Roles	20
4	.1.2	Evaluation Dates	21
4.2	Evalua	ation of Significance Methods	23
4	.2.1	Identification of Suitable Trees	23
4	.2.2	Bat Exit Surveys	23
4.3	Evalua	ation of Significance Results	25
4	.3.1	Bat Maternity Colony Habitats	25
4.4	Evalua	ation of Significance Summary	29
5.0	Envir	onmental Impact Study	31
5.1	Overv	iew of EIS	31
5.2	Poten	tial Impacts to Significant Bat Habitat	32
5	.2.1	Habitat Loss	32
5	.2.2	Noise Disturbance	33
5	.2.3	Operational Bat Mortality	33
5.3	Appro	ach to Impact Study	34
5	.3.1	Project Location Within Confirmed Significant Bat Habitat	35
5	.3.2	Project Location Within 120m of Confirmed Significant Bat Habitat	35
5	.3.3	Project Location In, or Within 120m, of Treated as Significant Bat Habit	tat35
5	.3.4	Generalized Mitigation Measures	40
5.4	Summ	nary of Commitments	41
5	.4.1	Pre-Construction Monitoring Commitments	41
5	.4.2	Construction Mitigation Measures	43
5	.4.3	Post-Construction Monitoring Commitments	44
6.0	Sumr	nary and Conclusions	46
7.0	Refer	ences	48

# List of Figures

Figure 1.	Project Area and Natural Features	2
Figure 2.	Candidate Bat Maternity Colony Habitat	17
Figure 3.	Generalized Candidate Significant Bat Maternity Colony Habitat	18
Figure 4.	Bat Exit Survey Locations	27

# List of Tables

Table 1. Table 2.	Summary of Records Consulted for the East Durham Wind Energy Centre Summary of Significant Wildlife Habitats Identified Through Records Near the East	3
Durh	nam Wind Energy Centre Project Area	4
Table 3.	Site Investigation Survey Dates for the East Durham Wind Energy Centre 1	0
Table 4.	General Characteristics Used to Identify Candidate Significant Bat Habitats Within the	
East	t Durham Wind Energy Centre 1	1
Table 5.	Summary of Site Investigation Results and Consideration for Potential Bat Maternity	
Colo	ony Habitats for the East Durham Wind Energy Centre 1	5
Table 6.	Summary of Potential Bat Maternity Colony Habitats within 120m of or Overlapped by	
the E	East Durham Wind Energy Centre 1	9
Table 7.	Evaluation of Significance Survey Date for the East Durham Wind Energy Centre 2	2
Table 8.	Bat Habitat Evaluation of Significance Criteria 2	:4
Table 9.	Bat Exit Survey Results for Candidate Bat Maternity Colony Habitat BMA-001 2	6
Table 10	. Evaluation of Significance for Candidate Significant Bat Maternity Colony Habitats	
withi	in 120m of the East Durham Wind Energy Centre 2	8
Table 11	. Summary of Bat Habitats within 120m of the East Durham Wind Energy Centre 2	9
Table 12	. Summary of Potential Impacts to Significant Bat Habitat within the East Durham Wind	
Enei	rgy Centre Project Area 3	;1
Table 13	. Potential Impacts, Mitigation Measures, and Survey Methods for Bat Habitats that hav	e
beer	n Treated as Significant	6
Table 14	. Summary of Potential Effects and Mitigation Measures for Generalized Wildlife Habita	t
durir	ng the Construction and Decommissioning Phases of the East Durham Wind Energy	
Cent	tre4	0
Table 15	. Summary of Treated as Significant Bat Maternity Colony Habitats and Proximity to	
Proje	ect Location for the East Durham Wind Energy Centre4	-1
Table 16	. Summary of Pre-construction Monitoring Commitments for Bat Habitats at the East	
Durh	nam Wind Energy Centre 4	2
Table 17	. Summary of Construction Phase Mitigation Measures Recommended for the East	
Durh	nam Wind Energy Centre 4	4
Table 18	. Summary of Post-construction Monitoring Commitments at the East Durham Wind	
Enei	rgy Centre 4	5

List of AppendicesAppendix ISite Investigation Field NotesAppendix IIEvaluation of Significance Field Notes

# 1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in March 2011 by NextEra Energy Inc. to conduct assessments of bat habitats at the proposed East Durham Wind Energy Centre. These assessments are part of the requirements for the larger Natural Heritage Assessment (NHA) that is being completed and submitted by LGL Ltd.

The proposed East Durham Wind Energy Centre is located approximately 45km south of the City of Owen Sound and 8km east of the Town of Durham, Ontario (see Figure 1). This wind energy generating facility is proposed to be 23MW in size, consisting of up to 14 operational 1.6-100MW wind turbine generators, although locations for 16 turbines will be sited. To meet noise compliance requirements two of the turbines have been proposed to be de-rated. These two turbines are still the GE 1.6-100 with LNTE that use noise-reduced operation (NRO). One turbine is 1.34 MW and is using NRO 100 and the second turbine is 1.39 MW using NRO 101.

The facility will include supporting infrastructure and construction activities associated with the installation and decommissioning of the facility. This includes construction areas, temporary laydown areas, buried 34.5kV electrical collection lines, a transformer substation, overhead 44kV transmission line, access roads, a meteorological tower, and an operations/maintenance building. Both chosen turbine models stand approximately 80m to the height of the hub with a blade length of 50m.

The installation of each turbine will involve a subterranean concrete base, and a temporary above-ground lay-down area where turbine components will be stored. Access roads will be required throughout the project area and will be left unpaved and topped with a layer of gravel. Connector cabling will be underground and will primarily follow the placement of the access roads. Minor grading activities and site alteration is expected to occur along proposed access road routes and at turbine locations. The transmission line will be installed along the road right-of-way on municipal property.



# 2.0 Records Review

# 2.1 Records Review Methodology

In accordance with the REA Regulation, NRSI has consulted several online, published, and agency resources specific to the potential for candidate significant bat habitat. The results of this detailed records review have been listed in Table 1 below. As the lead author of the full Natural Heritage Assessment, LGL has conducted a more thorough review of other resources pertaining to other natural features and wildlife habitats that may not be specifically discussed here. These can be found in the East Durham Wind Energy Centre Natural Heritage Assessment (LGL 2012).

Information Source	Consultation Date(s) (2012)	Type of Records Reviewed
Ministry of Northern Development and Mines, Ontario Geological Survey	August 7	Significant Wildlife Habitat (Karst of Southern Ontario and Manitoulin Island, Abandoned Mines Information System)
County of Grey Official Plan (2000)	August 7	Woodlands
Municipality of West Grey Official Plan Draft (2012)	August 8	Woodlands
Ministry of Natural Resources, NHIC and Biodiversity Explorer	August 7	Significant Wildlife Habitat
Atlas of the Mammals of Ontario (Dobbyn 1994)	August 7	Significant Wildlife Habitat

Table 1.	Summary	of Records	Consulted	for the	East	Durham	Wind	Energy	Centre
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# 2.2 Records Review Results

Based on results of the records review, there are no known bat hibernacula or maternity colonies known from within 120m of the project location. However, there are 18 woodlands within 120m of wind turbines, and 14 woodlands overlapped by proposed project components, which may provide suitable habitat for bat maternity colonies.

There are no known abandoned mines within 120m of the project location. However, there is inferred karst topography overlapping the project area, which is susceptible to the creation of geologic features, such as caves, which may be suitable for bat hibernacula (OGS 2011). As a result there are no known features which may be suitable for bat hibernacula within 120m of the project location, but there may be previously

unknown features within areas of inferred karst which could provide suitable habitat for bat hibernacula. These will be considered in the site investigation.

Bat species that are known from the vicinity of the project area include eastern smallfooted bat (*Myotis leibii*), northern long-eared bat (*Myotis septentrionalis*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), and hoary bat (*Lasiurus cinereus*) (Dobbyn 1994). Little brown bats and northern longeared bats are considered Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2012), but are not listed as a Species at Risk in Ontario (OMNR 2012a). As well, the eastern small-footed bat has an SRANK of S2S3, but is not listed as a Species at Risk in Ontario (OMNR 2012a). As a result, all three species are considered a species of conservation concern for the purposes of the NHA. Important habitat for these species includes hibernacula and maternity colonies, and as such the specific habitat for these species will be included within the consideration of hibernacula and maternity colonies as part of the regular habitat considerations within this report. A summary of significant wildlife habitats identified through the records review can be found in Table 2.

Wildlife Habitat Type	Present Within 120m of Project Location	Present Within Project Location	Details	Site Investigation Required
Seasonal Concer	tration Areas			
Bat Hibernacula	Unknown	Unknown	No abandoned mines, but there is inferred karst topography <120m from and overlapping the project location. Site investigation will be conducted to identify any potential caves.	Yes
Bat Maternity Colonies	Unknown	Unknown	Project located <120m from, and overlapping, woodlands that may contain suitable trees.	Yes
Species of Conse	ervation Concern			
S1-S3, and SH Species and Communities	Unknown	Unknown	Little brown bat and northern long-eared bat are considered Endangered by COSEWIC and eastern small-footed bat has an SRANK of S2S3.	Yes (to be considered under above categories)

 Table 2. Summary of Significant Wildlife Habitats Identified Through Records Near the

 East Durham Wind Energy Centre Project Area

Wildlife Habitat Type	Present Within 120m of Project Location	Present Within Project Location	Details	Site Investigation Required
			These three species have been known to occur in the vicinity of the project area.	

# 3.0 Site Investigation

Comprehensive site investigations were completed in order to document environmental and biological characteristics of the East Durham Wind Energy Centre in relation to bats and bat habitats as required by the REA Regulation and the requirements of the Ministry of Natural Resources (MNR). These site-specific field investigations focused on habitat assessments to support and build on the information assembled during the records review phase of the project, in order to help identify candidate significant bat habitats. The results of these site investigations will be used to identify and map the boundaries of wildlife habitats within 120m of the project location. Information collected at this stage will subsequently be used to help evaluate the significance of identified wildlife habitats.

## 3.1 Staff Roles

The requirements of the REA Regulation indicate that the name and qualifications of staff participating in the site investigation should be included. As a result, the qualifications and roles of key staff participating in the site investigations at the East Durham Wind Energy Centre have been outlined below.

### Andrew G. Ryckman, B.Sc.

Andrew is a Terrestrial and Wetland Biologist with 7 years of environmental experience. He routinely manages the natural heritage aspects of renewable energy projects, with specific expertise relating to bats and herpetofauna. Andrew is certified in Ecological Land Classification (2010), and has successfully completed a Bat Conservation International (BCI) Acoustic Monitoring Workshop (2008).

Andrew's role in the project was to act as the Project Manager, overseeing all aspects of the Natural Heritage Assessment relating to bats, including all associated field work and reporting. He was the main contact point for agency staff and assisted with the preparation of all appropriate reports.

### Charlotte S. Moore, B.E.S.

Charlotte is a Terrestrial and Wetland Biologist with over three years of experience in butterfly ecology and various other environmental projects. Charlotte has completed her Bachelor of Environmental Studies and is a candidate for a Master of Environmental Studies (2013) at the University of Waterloo. Her Masters research will involve measuring the success of past restoration efforts using butterfly abundance and diversity in the riparian zones of several creeks. She specializes in natural resource inventories and evaluations including the use of Ecological Land Classification (ELC), bat habitat assessments, breeding bird surveys and reptile studies, and is certified in the OMNR Wetland Evaluation System (2012). Charlotte has participated in numerous wind-related projects throughout Ontario. These projects have spanned all components of the Natural Heritage Assessment under the Renewable Energy Act. The projects have included wind farms with over 120 turbines (>180MW).

Charlotte assisted with the bat habitat assessments and was the main author for this report.

#### Matt Dil, B.Sc., M.E.S.

Matt is a Terrestrial Biologist with five years of experience in avian biology and other areas of environmental research including agriculture and soil science. Matt recently completed his Masters in Environment and Resource Studies at the University of Waterloo and prior to this he completed a Bachelor of Science in Biology at the University of Victoria. He completed his Master's thesis, which investigated the use of biochar (charcoal) as a soil amendment and climate change mitigation strategy. Past field technician positions included Species at Risk surveys for the British Columbia Ministry of Environment on Vancouver Island, and endangered songbird research with Texas A&M University in central Texas.

Matt conducted bat habitat assessments within the project area.

#### Pamela Tucciarone, B.Sc.

Pamela graduated from the University of Toronto in a Biology Specialist program. She has more than 3 years of practical work experience, focusing on urban forestry, insect identification, and insect pest management. During this time period, she specialized in detecting the presence of the emerald ash borer and delineating the extent of its infestation. Pamela is a certified arborist (2011) and is certified in the Northeastern Ecological Land Classification system for Ontario (2011). Pamela has participated in field investigations and reporting for several REA solar and wind power projects in southern and northern Ontario.

Pam completed bat habitat assessments for the East Durham Wind Energy Centre.

### Colin Oaks, F.W.T., B.Sc.

Colin has recently graduated from the University of Guelph with an honours B.Sc. in Environmental Sciences and a major in Ecology. He currently works as an aquatic biologist at NRSI. Previous positions have provided him with more than three years of practical work experience in the environmental field. His areas of expertise include fish community assessments, benthic invertebrate surveys, and species identification. He also has experience conducting wildlife habitat surveys, including bat habitat assessments, as well as mapping and mammal trapping.

Colin assisted with bat habitat assessments throughout the project area.

#### Michael Ewaschuk, B.Sc.

Michael has over 10 years of experience in the field of aquatic ecology working for government agencies, non-profit organizations, Remedial Action Plans (Hamilton Harbour and Bay of Quinte), and private consulting firms. Michael has worked extensively with the Headwater Classification Guidelines (CVC and TRCA March 2009), which provide methodology to assessing flow permanency in drainage features, which is a key distinction between a water body and nonwater body in the REA guidelines.

Michael carried out bat habitat assessments throughout the project area.

#### Sierra Gillies

Sierra is an Aquatic Biologist at NRSI working as a co-op student from the University of Waterloo. She is currently in her third year of undergraduate studies in Environment and Resource Studies gaining experience in the environmental field. Sierra has four months experience working with NRSI primarily dealing with fish identification and sampling as well as bat habitat assessments, amphibian call surveys and breeding bird surveys.

Sierra assisted with bat habitat assessments within the project area.

## Erica Frey, B.E.S.

Erica graduated from the University of Waterloo with a B.E.S. in Urban Planning and a diploma in Geographic Information Systems (GIS). As a GIS Analyst, Erica specializes in renewable energy projects. This work includes mapping of natural features, vegetation communities, habitat delineation, and terrestrial and aquatic monitoring. Additionally, Erica has experience with 3D modelling and analysis and field experience collecting GPS data, conducting wildlife surveys and performing post construction monitoring for wind energy developments.

Erica assisted with bat habitat assessments within the project area.

### Shawn MacDonald B.A., GIS-AS

Shawn has more than 3 years experience in renewable energy mapping and asset management systems. As a Geographic Information Systems (GIS) Analyst Shawn specializes in projects relating to wind, solar and hydro electric power. Shawn has a variety of project and field experience using GIS, GPS and AutoCAD technology throughout all stages of a renewable energy project. This experience is not limited to renewable energy alone as Shawn has been involved in a number of projects relating to terrestrial and aquatic habitat mapping, environmental restoration and spatial/3D analysis.

Shawn's role in the Project was as GIS technician and map creator. He reviewed and collected all available background mapping resources to compile into Project mapping.

# 3.2 Survey Dates

In accordance with the REA Regulation, NRSI recorded dates, times, duration, and weather conditions during each site investigation. This information has been summarized below in Table 3. Detailed descriptions of staff roles and qualifications can be found above in Section 3.1.1 of this report, and detailed field forms can be found in Appendix I of this report.

						Weather Conditions		
Staff	Purpose	Date (2012)	Feature ID	Start Time	Duration (hours)	<b>Temp.</b> (°C)	Beaufort Wind Scale	Cloud Cover (%)
Matt Dil, Michael Ewaschuk	Qualitative assessment of cavity tree density, area search for caves or crevices	May 31	BMA-001	13:30	3.5	20	1	75%
Matt Dil, Michael Ewaschuk	Qualitative assessment of cavity tree density, area search for caves or crevices	June 1	BMA-001	09:00	4	15	3	100%
Pamela Tucciarone, Sierra Gillies	Qualitative assessment of cavity tree density, area search for caves or crevices	June 7	BMA-003	10:07	1.25	18	1	20%
Pamela Tucciarone, Sierra Gillies	Qualitative assessment of cavity tree density, area search for caves or crevices	June 7	BMA-004	14:40	1.25	24	1	0%
Pamela Tucciarone, Sierra Gillies	Qualitative assessment of cavity tree density, area search for caves or crevices	June 7	BMA-007	08:31	3.75	17	1	5%
Pamela Tucciarone, Sierra Gillies	Qualitative assessment of cavity tree density, area search for caves or crevices	June 8	BMA-009	14:00	1.75	24	1	5%
Charlotte Moore, Colin Oaks	Qualitative assessment of cavity tree density, area search for caves or crevices	June 21	BMA-010	11:22	3.5	29	3	5%
Charlotte Moore, Colin Oaks	Qualitative assessment of cavity tree density, area search for caves or crevices	June 21	BMA-008	15:41	1.0	30	2	100%
Matt Dil, Erica Frey	Qualitative assessment of cavity tree density, area search for caves or crevices	June 28	BMA-002	12:47	4.75	28	0	20%

#### Table 3. Site Investigation Survey Dates for the East Durham Wind Energy Centre

# 3.3 Site Investigation Methods

# 3.3.1 Identification of Candidate Significant Bat Habitats

The Draft Significant Wildlife Habitat Ecoregion 6E Criterion Schedule Addendum (OMNR 2012b) outlines general characteristics that may be used to identify candidate significant bat habitats, including seasonal concentration areas. The general characteristics used to identify candidate seasonal concentration areas relating to bat habitats are outlined in Table 4 below.

Table 4.	<b>General Characteristics L</b>	Ised to Identify Candida	e Significant Bat	Habitats
Within th	e East Durham Wind Ene	rgy Centre		

Bat Habitat	Significant Wildlife Habitat Ecoregion 6E Criteria Schedule Addendum
Bat Hibernacula	Caves, mine shafts, underground foundations, Karsts or one of the following Community Types: Crevice (CCR), Cave (CCA). Does not include buildings (OMNR 2012b).
Bat Maternity Colonies (OMNR 2011a, 2012)	Any of the following Community Types: Deciduous Forest (FOD), Mixed Forest (FOM) that have a density of ≥10 cavity trees/ha (snags or cavity trees) which are >25cm dbh. Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Maternity roosts are not found in caves and mines in Ontario (OMNR 2012b).

Site investigations were conducted in May and June of 2012 and followed the most recent MNR guidance document, *Bats and Bat Habitats: Guidelines for Wind Power Projects* (OMNR 2011a). This document dictates that the number of cavity trees (>25cm dbh) per hectare should be determined using 0.05ha plots (circular plots with a radius of 12.6m), which are randomly placed throughout each woodland being investigated. The document stipulates that a minimum of 10 plots should be used for woodlands that are 10ha or less in size, with one additional plot for every additional hectare for larger woodlands (up to a maximum of 35 plots). NRSI followed this protocol for all site investigations completed by randomly selecting circular plots 12.6m in radius within the portions of woodlands for which access was granted. Following clarification of the intention of the guidance documents during a field session with MNR in March of 2012, only live or dead trees >25cm dbh containing cavities were counted within these plots. Field notes for these assessments are included in Appendix I.

#### 3.3.2 Identification of Generalized Candidate Significant Bat Habitats

As the potential for operational impacts has been determined to be limited to areas within 120m of proposed wind turbines, as measured from blade tip (OMNR 2011b), woodlands located within 120m of, but not overlapped by, other project components (i.e. access roads, cabling, etc.) may be treated as significant, following Appendix D of the Natural Heritage Assessment Guide (OMNR 2011b). Generalized candidate significant wildlife habitat mitigation measures are applied in the EIS to address potential impacts to these habitats during construction only, as there will be no operational impact on bat habitats within 120m of these non-turbine project components. However, not all woodlands have the potential to contain a sufficient quantity of suitable snags or cavity trees to indicate they may contain a significant bat maternity colony. As a result, not all woodlands located further than 120m from wind turbines, but less than 120m from other project components, will be considered as generalized candidate significant wildlife habitat. NRSI has utilized the Ecological Land Classification information collected by LGL in order to narrow down the list of woodlands considered as generalized candidate significant wildlife habitat for bat maternity colonies.

A woodland is identified by NRSI as generalized candidate significant wildlife habitat for bat maternity colonies if it consists of suitable deciduous or mixed mid-age to mature forests with the canopy stand description (top 4 species) containing one or more of the following species: white pine (*Pinus strobus*), maple (*Acer* spp.), aspen (*Populus* spp.), ash (*Fraxinus* sp.), oak (*Quercus* sp.). These species are identified as tree species providing good cavity habitat in the 2011 *Bats and Bat Habitats: Guidelines for Wind Power Projects* document (OMNR 2011a). In addition these woodlands must contain a sufficient quantity of trees and snags >25cm dbh to allow for the potential for ≥10 suitable trees per hectare to occur (at least occasionally occurring live trees >25cm dbh and rarely occurring snags >25cm dbh). In addition, potential forested habitats that could not be specifically accessed to sufficiently assess size class analysis, but were located within 120m of other (non-turbine) project components were automatically considered generalized candidate significant wildlife habitat.

If a natural area consists solely of any of the following criteria, it is not considered as generalized candidate significant wildlife habitat: plantation; has a canopy dominated

(>75%) by coniferous trees; has <60% canopy cover; contains a significant proportion of weedy tree species such as common buckthorn (*Rhamnus cathartica*) or common apple (*Malus pumila*); or contains <10 suitable cavity trees (>25cm dbh) per hectare.

# 3.4 Site Investigation Results

The majority of the East Durham Wind Energy Centre is dominated by agricultural habitats, including both actively tilled cropland and pasture. Fallow fields, hedgerows, and woodlands are also present throughout the project area. NRSI used habitat criteria outlined by the 6E Ecoregion Criterion Schedule (OMNR 2012b), and *Bats and Bat Habitats: Guidelines for Wind Power Projects* (OMNR 2011a) to compare site-specific habitat conditions to potential bat habitats. The results of the site investigation are provided in the sections below.

# 3.4.1 Bat Hibernacula

According to the 2012 Addendum to the SWHTG, caves, mine shafts, underground formations and karsts are considered examples of locations where bat hibernacula may be found (OMNR 2012b).

No candidate bat hibernacula were identified by NRSI biologists within the East Durham Wind Energy Centre project area.

# 3.4.2 Bat Maternity Colony Habitats

NRSI conducted assessments within potential bat maternity colony habitats using the plot-based approach to calculate the number of snags or cavity trees per hectare within each woodland according to the *Bats and Bat Habitats: Guidelines for Wind Power Projects* (OMNR 2011a). Table 5 indicates the size, composition, attributes, and functions of those habitats that are considered potential bat maternity colony habitats. All assessed candidate bat habitat, along with those that have been treated as significant habitat, have been shown on Figure 2.

# 3.4.3 Generalized Bat Maternity Colony Habitat

A total of 23 woodlands have been identified as containing suitable deciduous or mixed mid-age to mature forests with the canopy stand description (top 4 species) containing one or more of the following species: white pine (*Pinus strobus*), maple (*Acer* spp.),

aspen (*Populus* spp.), ash (*Fraxinus* sp.), oak (*Quercus* sp.), which are located within 120m of a project component without an operational impact. These woodlands are considered generalized candidate significant bat maternity colony habitats and will have mitigation outlined in the EIS section of this report. These habitats can be found on Figure 3.

	Turbine		Qualitative Assessment Quantitative Assessment				Evaluation of	
Area ID	No. (<120m)	Size (ha)	Qualitative Characteristics of Habitat	Number of Sample Plots	# Cavity Trees/ha	Attributes	Bat Habitat Function	Significance Required (Y/N)
BMA-001	T1	15.2	This woodland consists primarily of mid-age sugar maple trees, with some white ash species and few American beech, Eastern hemlock and ironwood.	18	10.0	Several cavities found on multiple sugar maples, all between 29-38cm dbh. Cavities were found between 6m and 10m from the ground.	Habitat for bat maternity colonies	Yes
BMA-002	Т3	51.0	This woodland consists primarily of mid-aged sugar maple, with some American beech and birch dry-fresh forest, with few black cherry trees present. Very few trees have cavities.	35	5.1	Very few trees have cavities and many trees are at the lower end of dbh requirement.	None	No
BMA-003	Τ7	29.1	This woodland consists mainly of sugar maple species, with some black cherry and white elm.	22 <sup>1</sup>	6.4	No trees with high quality potential habitat	Insufficient habitat for bat maternity colonies	No
BMA-004	T10	3.7	This woodland is dominated by sugar maple.	8 <sup>1</sup>	2.5	Only a single cavity found on the site.	Insufficient habitat for bat maternity colonies	No
BMA-005	T10	7.3	This woodland is dominated by sugar maple.	N/A – no access to property	N/A – no access to property	No access to determine attributes	Unknown	Yes (Treated as Significant)
BMA-006	T11	6.2	This woodland is dominated by scotch pine and contains some sugar maple and black cherry.	Studies to be completed	Studies to be completed	No access to determine attributes	Unknown	Yes (Treated as Significant)

 Table 5. Summary of Site Investigation Results and Consideration for Potential Bat Maternity Colony Habitats for the East

 Durham Wind Energy Centre

Area ID	Turbine No. (<120m)	Size (ha)	Qualitative Assessment	Quantitative Assessment				Evaluation of
			Qualitative Characteristics of Habitat	Number of Sample Plots	# Cavity Trees/ha	Attributes	Bat Habitat Function	Significance Required (Y/N)
BMA-007	T16	1.5	This woodland is dominated by sugar maple.	Studies to be completed	Studies to be completed	Studies to be completed	Unknown	Yes (Treated as Significant)
BMA-008	Т8	8.3	This woodland consists of sugar maple, with some American beech.	10	4.0	Only two cavities found in the site.	Insufficient habitat for bat maternity colonies	No
BMA-009	T17	28.1	This woodland consists of sugar maple, with some white ash and very few Freeman's maple.	17 <sup>1</sup>	1.2	Only one cavity found in the site. Inclusions of conifers reduced site potential.	Insufficient habitat for bat maternity colonies	No
BMA-010	T14	59.0	This woodland is dominated by sugar maple, with some eastern hemlock and eastern white cedar.	35	4.6	Some cavities found, however many were low or in ill-suited tree species.	Insufficient habitat for bat maternity colonies	No

<sup>1</sup> In some instances (3), the size of the woodland where site access was available did not allow for the full number of plots to be conducted.



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CEEN ST		1 4895500
SAUGL	Legend	
	Candidate Habitat (Assessed)	
	Not Candidate Habitat (Assessed)	
	Assumed Significant (Could Not Assess)	
TORRY ST	Project Area (120m Buffer)	
	MET Tower	9
	Proposed Turbine	9400
	Collection Line	48
	- Access Road	
Inne	Substation	
	Laydown Area	
	Construction Area	
	• Utility Line	
	Highway	
	- Primary Road	00
	Secondary Road	8925
	Watercourse	4
8	Waterbody	
	Wooded	
	Provincially Significant Wetland	