BIRD AND BAT CONSERVATION STRATEGY
for the
ANTRIM WIND ENERGY PROJECT

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Table of Contents

1 INTRODUCTION

Antrim Wind Energy, LLC (AWE) is dedicated to producing clean, reliable, renewable power while demonstrating respect and stewardship for the natural environment. As the sponsor of the Antrim Wind Energy Project (Project), AWE submits the following Bird and Bat Conservation Strategy (BBCS) as evidence of its approach to responsible wind energy development. AWE believes that the Project will be a net-benefit to the health and prosperity of the host community and the wider New England region.

1.1 Project Description

The Antrim Wind Energy Project (the Project) is proposed to be located in the northwest portion of the Town of Antrim, in Hillsborough County, New Hampshire. The Project site is located on a ridgeline that starts approximately 0.75 miles south of NH Route 9 and runs south-southwest, for approximately 2.5 miles.

The Project will produce electricity using wind turbine electrical generators installed on tubular steel towers. The turbines will be horizontal axis, upwind rotor turbines typical of those currently in use in utility-scale wind projects in New England and throughout the United States. The Project will consist of nine (9) turbines in the 3.2 MW size class with an expected plant generating capacity of 28.8 MW (rated). Proposed access to the Project site is from Route 9 up the north slope of Tuttle Hill ridge.

The entirety of the Project is located in the sparsely settled rural conservation zoning district in Antrim on approximately 1,870 acres of private lands leased by AWE from six landowners. Post-construction, the total direct impact area (including access and spur roads, work pads, staging areas, turbine pads, substation and operations & maintenance building) will be approximately 11.3 acres.

The Project's proposed Point of Interconnection (POI) is Public Service of New Hampshire's (PSNH) 115kV Line L163, which sits in a PSNH transmission corridor contained within the Project's leased boundary. The POI is located approximately halfway

between Route 9 and the northern most turbine location. The interconnection facility will consist of a new three breaker ring bus substation to be built adjacent to the existing 115kV line and along the Project's main access road. See Attachment A for a detailed site map. Importantly, no new high voltage transmission lines will be constructed as a result of the Project.

1.2 Corporate Policy on Bird and Bat Conservation

AWE recognizes that wind power generation has the potential to impact bird and bat species, and is committed to minimizing these impacts for the sake of the ecosystems, species and the communities they benefit. AWE also understands that renewable power generation, as an alternative to fossil fuel energy sources, benefits the environment and its inhabitants as a whole. By instituting a comprehensive Bird and Bat Conservation Strategy (BBCS), AWE believes that the benefits of the Antrim Wind Energy Project will far outweigh its impacts and will provide significant positive contributions to both the human and natural environments.

In that spirit, AWE is committed to working cooperatively with state and federal agencies and non-governmental organizations to promote the reasonable protection of bird and bat species during all phases of the Project's development, construction and operation. AWE is dedicated to incorporating the latest, state of the art knowledge and best management practices in the field of bird and bat protection at wind farms and this is reflected in its pre-construction assessments, project design, construction, post-construction monitoring, and long-term adaptive management.

Over the course of the Project's operating life, AWE pledges to design and operate the Antrim Wind Energy Project in a manner which provides decades of clean, renewable energy to the public while effectively reducing project impacts to bird and bat species, thereby balancing the health of the environment with society's growing need for electricity.

1.3 Purpose of the BBCS

In fulfillment of AWE's commitment to environmental stewardship, AWE has developed this site-specific Bird and Bat Conservation Strategy (BBCS) to reduce potential impacts to birds and bats as a result of construction and operation of the Antrim Wind Energy Project. In formulating the BBCS, AWE incorporated recommendations and guidance from the following sources: the U.S. Fish and Wildlife Service (USFWS) Draft Land-Based Wind Energy Guidelines (USFWS 2011b); USFWS's Final Land-Based Wind Energy Guidelines (USFWS 2012); USFWS's Eagle Conservation Plan Guidance – Module 1 – Land-based Wind Energy, Version 2 (USFWS 2013); USFWS's Bird Protection Plan Guidelines (APLIC and USFWS, 2005); and the Edison Electric Institute's Avian Power Line Interaction Committee (APLIC). This BBCS also draws upon: the results of pre-construction bird and bat studies conducted at the project site; results from relevant post-construction surveys conducted to date at similar facilities; the latest science regarding options for effectively avoiding and minimizing potential impacts to birds and bats; and direct correspondence with the USFWS and the New Hampshire Fish and Game Department (NHFGD). This BBCS also incorporates conditions recommended by the NH Site Evaluation Committee (NHSEC). AWE met with USFWS on May 27, 2015, to review this plan and the status of existing survey data for northern long-eared bat surveys. A subsequent email from USFWS on June 1, 2015 stated that bat survey data performed at the AWE Project is valid for at least ten years unless changes in northern long-eared bat populations warrant adjustments of that timeframe.

Potential impacts to birds and bats that are typically associated with wind power facilities include: direct, turbine-associated mortality through either collision or barotrauma; and indirect impacts such as habitat loss, displacement and increased energy demands due to turbine avoidance.

The BBCS is structured around an adaptive management framework and includes detailed provisions for avoiding, reducing, and, if warranted, mitigating for these potential impacts to birds and bats. The BBCS will be a living document throughout an initial Evaluation Phase (described in Section 7). During the Evaluation Phase, AWE will

work with USFWS and NHFGD to evaluate the findings of post-construction studies, formulate recommendations and definitions, and incorporate them into the BBCS on a prospective basis. The monitoring, reporting and adaptive management programs described in this BBCS will allow this plan to respond and adapt to both actual results and unforeseen or changing (biological or technological) circumstances over the life of the Project.

1.4 Goals and Objectives

This BBCS has been developed to be consistent with the most recent USFWS Land-Based Wind Energy Guidelines, dated March 23, 2012. The goal of this BBCS is to minimize Project's impacts to birds and bats in a scientifically sound, and commercially reasonable manner. AWE intends to achieve this goal by incorporating into the BBCS the following actions:

- Study baseline mortality and injury rates during the first three years of project operation, and work with USFWS and NHFGD to establish management strategies and, if applicable, acceptable mortality thresholds;
- Implement a permanent (for the life of the Project) informal wildlife mortality monitoring and reporting program and an immediate alert procedure for biologically significant events;
- Implement a tiered consultation strategy to guide decision-making and allow for modifications to the BBCS, based on actual results and unexpected events over the life of the Project; and
- Study the effectiveness of a curtailment strategy on minimizing bat mortality and work with USFWS and NHFGD to determine if and how curtailment might be applied as a long-term management strategy for the Project.
- Permanently conserve approximately 908 acres of valuable forestland in the immediate vicinity of the Project to preserve important and diverse habitat types for birds, bats and other species.
- Making a $100,000 commitment to the New England Forestry Foundation ("NEFF") to fund the acquisition of additional permanent conservation lands in southern New Hampshire.

2 PROTECTION OF BIRD AND BAT SPECIES IN NEW HAMPSHIRE

There are several laws which protect avian and bat species in the United States and in New Hampshire. These include:

- The federal Endangered Species Act;
- The New Hampshire Endangered Species Conservation Act;
- The federal Migratory Bird Treaty Act and;
- The Bald and Golden Eagle Protection Act.

The legal protection status of bird and bat species in New Hampshire, pursuant to these laws, is described in the following subsections.

2.1 Federal and State Endangered Species Acts

The federal Endangered Species Act (ESA) protects threatened and endangered plants and animals and the habitats in which they are found. Protection of birds and mammals under the ESA is administered by the USFWS. The law requires federal agencies, in consultation with the USFWS, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a "taking" of any listed species of endangered fish or wildlife.

The State of New Hampshire has its own Endangered Species Conservation Act (NH RSA 212-A[1]) that protects all non-domesticated species of wildlife indigenous to the state. The list of New Hampshire's endangered and threatened wildlife is maintained by the NHFGD.

According to the New Hampshire Endangered Species Conservation Act (NH ESCA) "Endangered" species are those in danger of being extirpated from the state, while

[1] Note that under RSA 212-A:13, III, the provisions of RSA 212-A or any rule promulgated under that statute shall not interfere in any way with the siting or construction of any energy facility as defined in RSA 162-H:2.

"Threatened" species face the possibility of becoming "endangered." Some of New Hampshire's listed species are also listed under the federal ESA.

In addition to those species listed as threatened or endangered, New Hampshire also maintains a list of species of "special concern". Species listed as "special concern" include: (a) those that could become "threatened" in the foreseeable future if conservation actions are not taken or that were recently recovered enough to be removed from the endangered and threatened category, and; (b) those for which a large portion of their global or regional range (or population) occurs in New Hampshire and where actions to protect these species' habitat will benefit the species' global population. Species that do not meet the criteria for "endangered", "threatened", or "special concern", but that are still biologically rare, as indicated by the State and Global Ranks, are also listed as rare in New Hampshire.

Table 1 lists New Hampshire's rare bird and bat species and identifies each species' rank and listing.

Table 1: Rare Bird and Bat Species of New Hampshire

Name	Rank		Listing	
	Global	*State*	*Federal*	*State*
Rank Prefix: **G** = Global Rank; **S** = State Rank; **T** = Global or State Rank for a subspecies or variety **Rank Suffix:** **1** = Critically imperiled; **2** = Imperiled; **3** = Vulnerable; **4** = Apparently secure ; **5** = Secure; **B** = Breeding population; **N** = Non-breeding population; **H** = Occurred historically, not seen recently; **X** = Extirpated; **NR/U** = Not ranked / Unknown; **Q** = Questionable taxonomy; **?** = Uncertain **Listing Codes:** **E** = Endangered; **T** = Threatened; **SC** = Special Concern				
Birds				
American Bittern (*Botaurus lentiginosus*)	G4	S3B	--	--
American Kestrel (*Falco sparverius*)	G5	S3B	--	SC
American Pipit (*Anthus rubescens*)	G5	S2B	--	SC
American Three-toed Woodpecker (*Picoides dorsalis*)	G5	S2	--	T
Arctic Tern (*Sterna paradisaea*)	G5	S1B	--	SC
Bald Eagle (*Haliaeetus leucocephalus*)	G5	S2	--	T
Bank Swallow (*Riparia riparia*)	G5	S3B	--	SC
Bicknell's Thrush (*Catharus bicknelli*)	G4	S2S3B	--	SC
Cerulean Warbler (*Dendroica cerulea*)	G4	S3B	--	SC
Cliff Swallow (*Petrochelidon pyrrhonota*)	G5	S3B	--	SC
Common Loon (*Gavia immer*)	G5	S2B	--	T
Common Moorhen (*Gallinula chloropus*)	G5	S2B	--	SC
Common Nighthawk (*Chordeiles minor*)	G5	S1B	--	E
Common Tern (*Sterna hirundo*)	G5	S2B	--	T
Eastern Meadowlark (*Sturnella magna*)	G5	S3B	--	SC
Golden Eagle (*Aquila chrysaetos*)	G5	SHB	--	E
Golden-winged Warbler (*Vermivora chrysoptera*)	G4	S2B	--	SC
Goshawk (*Accipiter gentilis*)	G5	S3	--	--
Grasshopper Sparrow (*Ammodramus savannarum*)	G5	S2B	--	T
Great Blue Heron (Rookery) (*Ardea herodias*)	G5	S4B	--	--
Henslow's Sparrow (*Ammodramus henslowii*)	G4	SHB	--	--
Horned Lark (*Eremophila alpestris*)	G5	S3B	--	SC
King Rail (*Rallus elegans*)	G4	SHB	--	--
Least Bittern (*Ixobrychus exilis*)	G5	S1B	--	SC
Least Tern (Sterna antillarum)	G4	SHB	--	E
Loggerhead Shrike (*Lanius ludovicianus*)	G4	SHB	--	--
Marsh Wren (*Cistothorus palustris*)	G5	S3B	--	--
Nelson's Sharp-tailed Sparrow (*Ammodramus nelsoni*)	G5	S3B	--	SC
Northern Harrier (*Circus cyaneus*)	G5	S1B	--	E
Olive-sided Flycatcher (*Contopus cooperi*)	G4	S3B	--	SC

Name	Rank		Listing	
	Global	***State***	***Federal***	***State***
Osprey (*Pandion haliaetus*)	G5	S3B	--	SC
Peregrine Falcon (*Falco peregrinus anatum*)	G4T4	S2	--	T
Pied-billed Grebe (*Podilymbus podiceps*)	G5	S2B	--	T
Piping Plover (*Charadrius melodus*)	G3	S1B	T	E
Purple Martin (*Progne subis*)	G5	S1B	--	SC
Roseate Tern (*Sterna dougallii dougallii*)	G4T3	S1B	E	E
Rusty Blackbird (*Euphagus carolinus*)	G4	S3B	--	SC
Saltmarsh Sharp-tailed Sparrow (*Ammodramus caudacutus*)	G4	S3B	--	SC
Seaside Sparrow (*Ammodramus maritimus*)	G4	S1B	--	SC
Sedge Wren (*Cistothorus platensis*)	G5	S1B	--	E
Sora (*Porzana carolina*)	G5	S3B	--	SC
Spruce Grouse (*Falcipennis canadensis*)	G5	S3	--	SC
Upland Sandpiper (*Bartramia longicauda*)	G5	S1B	--	E
Vesper Sparrow (*Pooecetes gramineus*)	G5	S2S3B	--	SC
Whip-poor-will (*Caprimulgus vociferus*)	G5	S3B	--	SC
Willet (*Catoptrophorus semipalmatus*)	G5	S3B	--	SC
Bats				
Eastern Red Bat (*Lasiurus borealis*)	G5	S3?B	--	SC
Hoary Bat (*Lasiurus cinereus*)	G5	S3B	--	SC
Indiana Bat (*Myotis sodalis*)	G2	SNA	E	--
Northern Long-eared Bat (*Myotis septentrionalis*)	G4	S3	--	SC
Silver-haired Bat (*Lasionycteris noctivagans*)	G5	S3B	--	SC
Small Footed Bat (*Myotis leibii*)	G3	S1	--	E
Tricolored Bat (*Pipistrellus subflavus*)	G5	S1N,SUB	--	SC
Bat Hibernacula				
Bat hibernaculum	GNR	S1	--	--

Source: New Hampshire Natural Heritage Bureau, 2011

2.2 Bird Protection

2.2.1 The Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA, as amended (16 U.S.C. 703–712; 40 Stat. 755) prohibits the "take" of migratory birds, their eggs, feathers or nests. The MBTA defines "take" to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, selling, purchasing, possessing or transporting any migratory bird, nest, egg, or part thereof. As of 2012, a total of 1,007 bird species are protected by the MBTA; 58 of these are currently legally hunted as game birds (USFWS 2011c). A migratory bird is any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle.

The United States Fish and Wildlife Service (USFWS) is primary entity responsible for ensuring the implementation and enforcement of the MTBA.

2.2.2 Bald and Golden Eagle Protection Act

Bald eagles and golden eagles are protected under the MBTA, described above. In addition, these species are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d, 54 Stat. 250). The Bald and Golden Eagle Protection Act (Eagle Act) is the primary law protecting bald and golden eagles in the U.S. and in New Hampshire. The Eagle Act prohibits take of bald and golden eagles, including their parts, nests, or eggs. The statutory definition of "take" includes to take, possess, purchase, sell, transport, pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest or disturb eagles.

The USFWS is primarily responsible for ensuring the implementation and enforcement of the Eagle Act. On September 11, 2009, the USFWS issued its final rule regarding take permits for bald and golden eagles (50 CFR Parts 13 and 22). According to this rule, wind power projects which are deemed likely to incur take of eagles or their nests would need to obtain a programmatic take permit.

2.3 Bat Protection

Eight species of bats occur in New Hampshire, based upon their normal geographical range (NHFGD 2010). These are:

- little brown bat (*Myotis lucifugus*)
- northern long-eared bat, (*Myotis septentrionalis*)
- eastern small-footed bat (*Myotis leibii*)
- silver-haired bat (*Lasionycteris noctivagans*)
- tri-colored bat (*Perimyotis subflavus*)
- big brown bat (*Eptesicus fuscus*)
- eastern red bat (*Lasiurus borealis*), and
- hoary bat (*L. cinereus*).

As shown in Table 1, several of these species are of interest to the NHFGD: the eastern small-footed bat is state-listed as endangered, and five species (eastern red bat, silver-haired bat, hoary bat, northern long-eared bat, and tri-colored bat) are species of special concern in the state. Little is known about the distribution of any of these species in New Hampshire and very is little is known about their summer breeding habitat (NHFGD 2005; DeGraff and Yamasaki 2001). With the exception of the small-footed bat, which possibly uses rocky crevices on cliffs or crevices on buildings for summer roosting, the five state-listed species of special concern all apparently roost in trees (NHFGD 2005).

In addition to the species listed above, a single record exists for the federally endangered (and New Hampshire S1 ranked) Indiana Bat in New Hampshire. Aside from this record, there is no known population of Indiana bats in New Hampshire and this species is not managed within the state (because there is too little distribution data available to develop conservation or management strategies) (Veilleux and Reynolds 2005). Although the *New Hampshire Wildlife Action Plan* (NHFGD 2005) identified the Indiana bat (*M. sodalis*) as potentially occurring in the state, current available resources suggest that it is not present or is unlikely to be present (NHFGD 2011a, Reynolds 2007).

On October 2, 2013 the USFWS proposed to list the northern long-eared bat as endangered, due to population decline caused by White-nose Syndrome (WNS). This emerging disease has spread throughout the New England states in the past five years and has resulted in the unprecedented decline of all 6 bat species that hibernate in caves or mines in the northeast (NHFGD 2011b). The northern long-eared bat was listed as threatened on May 4, 2015.

3 TIERED SITE ASSESSMENT METHODOLOGY

In accordance with the USFWS Land-Based Wind Energy Guidelines ("USFWS Guidelines"; USFWS 2012), AWE has applied a tiered approach to assessing potential risk to bird and bat species associated with the proposed Antrim Wind Energy Project.

Preliminary site evaluation and site characterization assessments have been performed to determine site suitability, and are described herein (see Section 4). These assessments are consistent with Tier 1 and Tier 2 as described within the USFWS Guidelines. In accordance with Tier 3 of the USFWS Guidelines, numerous environmental field studies have also been performed; the scope, duration and results of these Tier 3 field studies and evaluations are also described herein (see Section 5). This BBCS describes how the results of Tier 3 studies have been and/or will be applied to inform project design, construction and operation.

Furthermore, this BBCS defines post-construction monitoring and reporting commitments consistent with Tier 4 of the USFWS Guidelines. Finally, an adaptive management plan is proposed for addressing potential changes and unexpected events over the life of the Project. This plan provides a framework for any unforeseen, future Tier 5 study considerations that may arise. It also provides a framework to assess and introduce any future technological advances that are financially feasible and that offer benefits to bird and bat species while preserving the Project's commercial viability.

4 PRELIMINARY SITE EVALUATION AND SITE CHARACTERIZATION

AWE's preliminary site evaluation and site characterization assessed numerous factors that are critical to the appropriate siting of an economically viable and environmentally sound wind project. These efforts have been conducted in a thorough manner and adequately address Tiers 1 and 2 of the USFWS Guidelines.

In general, the most viable wind sites include: sufficient projected wind speeds at turbine hub height to produce power in commercial quantities; proximity to adequate transportation; proximity to electric transmission or distribution infrastructure capable of handling the new generation; adequate setbacks from residences or other inhabited structures to ensure public safety; the absence of known sensitive ecological resources that may be disturbed such as critical wildlife habitats, major wetlands, and other sensitive areas ; and previous environmental impacts and/or commercial activities on site. Based on these criteria, the proposed site of the Antrim Wind Energy Project constitutes a well-sited wind power project location.

During its preliminary investigation, AWE confirmed that there are no current conservation restrictions on the site that would limit the development of the Project. In addition, desktop GIS review of known environmental factors did not reveal the presence of any known critical habitats or endangered species. Also, there are no known occurrences of species of habitat fragmentation concern, and there are no known critical areas of concentration for species of concern. In a letter dated October 13, 2011, the USFWS confirmed, based on available information, that no federally listed or proposed threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service were known to occur in the project area.

Importantly, the proposed Project site is located approximately ½ mile from a PSNH transmission corridor where the Project proposes to interconnect to the grid. This eliminates the need for a new transmission corridor and line, thereby avoiding

numerous potential impacts associated with such development (e.g. bird electrocution, wire strikes, habitat alteration, edge effects, etc.) The site is also located approximately ¾ mile from Route 9, a substantial state highway that can handle transportation of turbine components and construction equipment. The proximity of this existing highway minimizes the need for extensive access improvements, again reducing the potential impacts associated with creating such access (such as habitat alteration, fragmentation, etc.).

Furthermore, the site does not support sensitive high elevation alpine habitats, thereby eliminating any potential impacts to such sensitive habitats. Finally, much of the northern slope of Tuttle Hill has been heavily logged in the past decade and, as recently as 2012, logging operations (unrelated to the Project) have impacted the site. The fact that much of the proposed Project area is already altered by industrial logging activity reduces the potential incremental impact of the Project on existing natural habitats.

In summary, the preliminary site assessment and site characterization validates AWE's conclusion that this is an appropriate site for continued development of a wind energy facility. When applied to Tier 1 and Tier 2 of the USFWS Guidelines, the findings of these preliminary assessments indicate that the overall probability of significant adverse impacts as a result of the proposed Project is low. As such, these findings indicate that advancement to Tier 3 studies is justified.

5 PRE-CONSTRUCTION BIRD AND BAT ASSESSMENTS

In the spring of 2011, AWE initiated consultation with various regulatory agencies to identify the scope of wildlife studies to be performed relevant to the Project, consistent with Tier 3 of the USFWS Guidelines. Consulting agencies included USFWS, NHFGD, New Hampshire Natural Heritage Bureau (NHNHB), New Hampshire Department of Environmental Services (NHDES), United States Army Corps of Engineers (USACE), and United States Environmental Protection Agency (USEPA). As a result of this consultation, the following pre-construction biological studies were identified as necessary to assess the potential impacts of the proposed Project on bird and bat species:

- Breeding bird surveys;
- Diurnal raptor migration surveys;
- Radar surveys for nocturnal bird migration;
- Rare raptor nesting surveys;
- Acoustic bat monitoring; and
- Bat mist nesting surveys.

All of the above listed studies have been completed as of fall, 2011. In addition (as a result of further consultation with NHFGD and USFWS in April 2012), a Tier 3 study to assess eagle use within the area of proposed development was performed in 2012.

All pre-construction studies were designed to be consistent with the methods and protocols recommended by state and federal regulatory agencies for proposed wind power projects. They were also designed to be consistent with surveys conducted in the past at other similar projects in New Hampshire and throughout New England. The specific protocol for each study was designed in consultation with USFWS and NHFGD. The scope, duration and results of bird and bat studies associated with the proposed Antrim Wind Energy Project are described in the following subsections (5.1, 5.2). A summary of potential risks to specific species as a result of the Project's construction and operation is provided in Section 5.3.

The results and findings of pre-construction studies have been compiled in stand-alone formal reports which will be included with Antrim Wind Energy, LLC's Application for a Certificate of Site and Facility submitted to the New Hampshire Site Evaluation Committee (SEC). The results and findings of these studies have been incorporated into the Project's preliminary planning and design (e.g. wetlands have been avoided, which provide important habitat and foraging opportunities for bird and bat species). They will also be accounted for, to the extent necessary and feasible, during the Project's final design and construction plans to avoid, reduce, and minimize potential impacts on birds and bats.

The findings of these Tier 3 studies will also provide the baseline, pre-construction reference data upon which the Tier 4 post-construction monitoring, reporting and adaptive management efforts will be based.

5.1 Bird monitoring

5.1.1 Breeding Bird Surveys

A breeding bird survey for the Antrim Wind Energy Project was performed in June of 2011. The goal of this survey was to document the pre-construction presence, diversity and relative abundance of breeding bird species in the proposed area of development. The specific objectives of the breeding bird survey were to:

- produce a comprehensive list of breeding bird species in the Project area;
- compile a species index and relative abundance for birds breeding in the Project area;
- calculate frequency of occurrence for each species;
- characterize habitat that is available for species which occur in the Project area; and
- qualitatively assess the general patterns of breeding bird use in the vicinity of the proposed Project.

The breeding bird survey used point count methods based on those used for the Vermont Institute of Natural Science's *Mountain Birdwatch* program (VINS 2005) and Bird Studies Canada's *High Elevation Landbird Program* (*HELP*) (Whittam & Ball 2002, and 2003).

Point counts were conducted at 12 locations along the ridge of Tuttle Hill and Willard Mountain. Point count locations were spaced at least 250 m apart and were located in representative habitat types within and adjacent to the proposed Project area. Six of the points were located in close proximity to areas that will be directly disturbed by the proposed development; the other six were located outside of the area of direct disturbance. Each point count location was visited twice during the study period. All surveys were conducted at dawn (between 4:30 AM and 8:30 AM).

Habitat parameters associated with point count locations were quantified using methods described by James and Shugart (James and Shugart 1970), who developed a methodology specifically for making habitat measurements associated with estimating bird populations. This methodology is still used by the national Breeding Bird Survey (USGS 2009), as well as other current studies.

A total of 131 individual birds, representing 25 different species, were documented during the formal breeding bird surveys. Biologists observed an additional 14 species incidentally while present in the Project area to perform the breeding bird survey, but not during the formal survey procedure. These observations constitute a total of 39 bird species recorded in the Project vicinity during the breeding season of 2011. Table 2 below summarizes the list of breeding bird species identified formally during breeding bird surveys, as well as the incidental observations.

The most frequently observed bird species, in terms of relative abundance, were ovenbird and blackburnian warbler: 17 individuals of each species were observed, constituting a 12.98% relative abundance for each. The next most abundant species were red-eyed vireo (n=14) and myrtle warbler (n=12), at 10.69% and 9.16% relative

abundance, respectively. The relative abundance of each species documented is presented in Table 2.

The assemblage and relative abundance of birds observed is typical for New England, given the habitats found within and adjacent to the study area. No rare birds or birds of conservation concern were observed during formal breeding bird surveys. Incidental observations of the common nighthawk, a state listed endangered species, were made in the vicinity of Willard Mountain and Tuttle Hill in June of 2011. One of these observations was auditory and consisted of aerial vocalizations in the area of Willard Mountain. The other observation was visual and auditory, and consisted of several nighthawks foraging over the valley to the north of Tuttle Hill. All of the nighthawks heard and observed at both locations were outside of the proposed Project area.

Table 2: Breeding Bird Species Identified Within the AWE Project Vicinity

Breeding Bird Species Observed within the Antrim Wind Energy Project Vicinity				
Common Name	**Latin Name**	**Residence***	**Number Observed**	**Relative Abundance**
Species Observed During Formal Breeding Bird Surveys				
American Goldfinch	*Carduelis tristis*	L/US	1	0.76%
Black and White Warbler	*Mniotilta varia*	NT	5	3.82%
Blackburnian Warbler	*Dendroica fusca*	NT	17	12.98%
Black-capped Chickadee	*Poecile atricapillus*	L	2	1.53%
Black-throated Blue Warbler	*Dendroica caerulescens*	US/NT	10	7.63%
Blue Jay	*Cyanocitta cristata*	US/L	4	3.05%
Cedar Waxwing	*Bombycilla cedrorum*	L/US	2	1.53%
Chesnut-sided Warbler	*Dendroica pensylvanica*	NT	2	1.53%
Common Yellowthroat	*Geothlypis trichas*	NT	2	1.53%
Eastern Wood Pewee	*Empidonax*	NT	4	3.05%
Golden-crowned Kinglet	*Regulus calendula*	L/US	2	1.53%
Hairy Woodpecker	*Picoides villosus*	L	6	4.58%
Hermit Thrush	*Catharus guttatus*	US	9	6.87%
Magnolia Warbler	*Dendroica magnolia*	NT	3	2.29%
Morning Dove	*Zenaida macroura*	US/L	1	0.76%
Myrtle Warbler	*Dendroica coronata*	US/NT	12	9.16%
Ovenbird	*Seiurus aurocapillus*	US/NT	17	12.98%
Purple Finch	*Carpodacus purpureus*	L/US	1	0.76%
Red-breasted Nuthatch	*Sitta canadensis*	L/US	2	1.53%
Red-eyed Vireo	*Vireo olivaceus*	NT	14	10.69%
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	NT	3	2.29%
Scarlet Tanager	*Piranga olivacea*	NT	3	2.29%
Slate-colored Junco	*Junco hyemalis*	L/US	5	3.82%
Winter Wren	*Troglodytes troglodytes*	US	2	1.53%
Veery	*Catharus fuscescens*	NT	2	1.53%
Total Species Observed During Formal Surveys		***25***		
Total Individuals Observed During Formal Surveys			***131***	
Species Recorded as Incidental Observations during Summer 2011				
American Redstart	*Detophaga ruticilla*	NT		
Barred Owl	*Strix varia*	US/L		
Blue-headed Vireo	*Vireo solitarius*	US/NT		
Broad-winged Hawk	*Buteo platypterus*	NT		
Brown Creeper	*Certhia americana*	na		
Common Nighthawk	*Chordeiles minor*	NT		
Cooper's Hawk	*Accipiter cooperii*	US/L		
Least Flycatcher	*Empidonax minimus*	NT		
Pileated Woodpecker	*Picadae*	L		
Red-tailed Hawk	*Buteo jamaicensis*	US/L		
Ruffed Grouse	*Bonasa umbellus*	L		
TurkeyVulture	Cathartes aura	US		
Wild Turkey	*Meleagris gallopavo*	L		
Yellow-bellied Sapsucker	*Sphyrapicus varius*	US		
Total Species Observed Incidentally		***14***		
Total Breeding Bird Species Recorded in 2011		***39***		
* L – Local year round resident; US – Migrates within US; NT – Neotropical migrant				

5.1.2 Diurnal Raptor Migration Surveys

Surveys for diurnal migrating raptors were performed during the spring and fall seasons of 2011. The purpose of these migration surveys was to document the numbers, species, and flight patterns of migrating raptors within and immediately adjacent to the proposed Project area. The main objectives of daytime bird migration surveys were to:

- Assess species composition, relative abundance, distribution, and spatial patterns of use by raptors migrating during daytime hours in and around the proposed Project area;
- Identify routes used by daytime migrating raptors passing through/near the proposed Project area;
- Document flight heights and use of topographical features in and near the proposed Project area;
- Evaluate potential impacts of project development and operation on migrating raptors; and
- Evaluate potential for collisions at proposed turbine sites.

The protocol for diurnal raptor migration surveys at the proposed Antrim Wind Energy Project followed standards set forth by the Hawk Migration Association of North America (HMANA 2011), and by HawkWatch International (HawkWatch International 2011, Hoffman and Smith 2003). The study methods were also consistent with similar studies conducted at other proposed wind energy facilities in New Hampshire.

Spring surveys for migrating raptors were performed in mid March through late May, 2011. Fall surveys were performed between mid September and late November, 2011. Early survey dates (in March), and late survey dates (in November) were intended to capture the passage of species, such as bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), whose migration period is temporally extended.

Surveys were performed on multiple survey dates during each season. Sampling was performed based upon favorable weather for migration. In spring, fair weather days with southerly or southwesterly winds were favored. In fall, surveys favored fair weather

days with strong north to northwest winds, particularly following the passage of a cold front.

On each survey date, data was generally collected for eight consecutive hours between 9 AM to 5 PM. This timeframe encompasses the peak hours of thermal development and associated raptor movement. Detailed raptor observation data were collected continuously during each survey onto specialized data sheets; the flight path of each raptor observed was also recorded on a topographical map of the survey area. Weather conditions (including wind speed and direction, temperature, cloud cover, visibility, etc.) were also recorded at the commencement of and periodically throughout daily observations.

The spring 2011 diurnal raptor migration survey for the proposed Antrim Wind Energy Project consisted of 65 total hours of observation across 9 dates between March 25 and May 15. The fall survey consisted of 147.5 total hours of observation across 21 dates between September 1 and November 20.

In spring, a total of 441 individual raptors[2], representing eleven species were identified within the immediate vicinity of the proposed Antrim Wind Energy Project. The vast majority of individuals observed were turkey vultures, which comprised 54% (n=237) of all observations. The next most abundant species observed were broad winged hawks and red-tailed hawks at 18% (n-77) and 14% (n=60) relative abundance, respectively. Table 3 lists all species observed in spring 2011and their relative abundance.

In fall, a total of 978 individual raptors, representing 10 species were identified. The vast majority of these were broad-winged hawks, which comprised approximately 70% (n=689) of all observations. A total of 471 of these individuals were recorded on one date: September 18. The majority of these broad-wings passed in a few large aggregations ("kettles"). For a relative comparison, on the same date (September 18), Carter Hill Observatory (in Concord, NH) recorded a total of 7,212 broad-winged hawks

[2] For the purpose of this study, the term "raptors" refers to all members of Order Falconiformes; this order currently includes the family Cathartidae (New World vultures), which includes turkey vultures.

and Pack Monadnock Observatory (in Peterborough, NH) recorded 5,208. Large, temporally concentrated fall movement of broad-winged hawks is typical in New England. Red-tailed hawks and turkey vultures were the next most frequently observed species at approximately 8% and 6% relative abundance, respectively. Table 3 lists all species observed and their relative abundance.

Table 3: Species List and Relative Abundance of Diurnally Migrating Raptors, Spring and Fall 2011.

Common Name	Binomial Nomenclature	Total Individuals Observed		Percent Relative Abundance	
		Spring	Fall	Spring	Fall
Accipiter spp. (small)	(n/a)	2	23	0.45%	2.35%
American Kestrel	*Falco sparverius*	1	0	0.23%	0.00%
Bald eagle	*Haliaeetus leucocephelus*	3	11	0.68%	1.12%
Broad-winged hawk	*Buteo platypterus*	77	689	17.46%	70.45%
Buteo spp.	(n/a)	30	22	6.80%	2.25%
Cooper's hawk	*Accipiter cooperii*	3	15	0.68%	1.53%
Falcon spp.	(n/a)	1	1	0.23%	0.10%
Golden eagle	*Aquila chrysaetos*	0	3	0.00%	0.31%
Merlin	*Falco columbarius*	0	3	0.00%	0.31%
Northern Goshawk	*Accipiter gentilis*	1	0	0.23%	0.00%
Northern Harrier	*Circus cyaneus*	5	0	1.13%	0.00%
Osprey	*Pandion haliaetus*	5	5	1.13%	0.51%
Peregrine Falcon	*Falco peregrinus*	1	0	0.23%	0.00%
Raptor spp.	(n/a)	13	48	2.95%	4.91%
Red-shouldered hawk	*Buteo lineatus*	0	1	0.00%	0.10%
Red-tailed hawk	*Buteo jamaicensis*	60	75	13.61%	7.67%
Sharp-shinned hawk	*Accipiter striatus*	2	19	0.45%	1.94%
Turkey vulture	*Cathartes aura*	237	63	53.74%	6.44%
TOTAL		441	978		

The overall passage rate in spring 2011was 6.78 raptors per hour of effort (441 raptors/65 hours) with a range of 1.88 to 14.25. The overall passage rate in fall was 6.63 raptors per hour of effort (978 raptors/147.5 hours) with a range of 0 to 61.75. These passage rates were compared to data from the five most comparable (in terms of proximity and geographic similarity) hawk watch sites for which data was available across the same sampling period. The spring average at Antrim (6.78 raptors per hour of effort) is similar to the spring average of 5.78 raptors per hour of effort among five regional hawk watch

sites. The spring maximum of 14.25 raptors per hour of effort is well below the regional maximum of 49.08. The fall average of 6.63 raptors per hour of effort is well below the regional average of 21.83; likewise, the fall max of 61.75 raptors per hour of effort is significantly lower than the regional max of 730 raptors per hour of effort.

Flight height (above ground level) was estimated for raptors that used the ridge area and upper slopes of Tuttle and Willard Mountains, as these are the areas where potential development has been considered or proposed over the course of project development. The remaining birds were recorded as "outside" of the proposed Project area. Flight height estimates were grouped into 3 categories: 0-50 feet above the ground, 50-500 feet above the ground, and 500+ feet above the ground. Estimation of raptor elevation can be influenced by such factors as perspective, distance, topography, and individual observer perception. For this reason, the flight height categories were designed conservatively to produce the most conservative potential risk estimate, with field observers also erring on the side of caution around the 50-500-foot category.

Of 441 total raptors observed in spring 2011, 216 (49%) flew over the area of potential development. Of the birds that did fly over the area of potential development (n=216), 162 of them (or 37% of all birds observed) were judged to have flown within the 50-500-foot above ground range. Of the 162 birds that flew within this range, 108 of them were turkey vultures.

Of 978 total raptors observed in fall 2011, 460 of them (47%) were observed to fly over the area of potential development. Of the birds that did fly over the area of potential development (n=460), 296 of them (30% of all raptors recorded) were judged to have flown within the 50-500-foot above ground range. Of the 296 birds that flew within this range, 168 of them were broad-winged hawks; 104 of these passed in kettles on the single date of September 18.

Threatened or Endangered raptor species that were observed during spring and fall migration surveys for the proposed Antrim Wind Energy Project include:

- bald eagle (State Threatened);
- golden eagle (State Endangered);
- peregrine falcon (State Threatened); and
- northern harrier (State Endangered).

A total of 14 bald eagles were recorded (3 in spring and 11 in fall); 7 of these never flew within the proposed Project area. Of those bald eagles that did fly within the proposed Project area (n=7), 6 were judged to have passed within the 50-500 foot above-ground range. A total of 3 golden eagles were observed in the fall of 2011; one of these never flew within the proposed Project area. The remaining 2 golden eagles were judged to have passed within the 50-500 foot above-ground range within the proposed Project area. The single peregrine falcon that was observed in the spring of 2011 did not pass within the proposed Project area. Northern Harriers were documented on 5 occasions in the spring of 2011; three of these never flew within the proposed Project area, while 2 (a male and female together) were judged to have passed within the 50-500 foot above-ground range.

In addition to the threatened and endangered species listed above, three state listed species of special concern were also observed; these are American kestrel, northern goshawk, and osprey. One American kestrel was observed in the spring: it did not fly within the proposed Project area. One northern goshawk was also observed in the spring: it did not fly within the proposed Project area. Ten total osprey were observed (5 in the spring and 5 in the fall). None of the 5 osprey recorded in the spring flew within the proposed Project area. In the fall, one osprey did not fly within the proposed Project area, one flew in the 0-50-foot above ground range, and 3 were judged to have passed within the 50-500 foot above-ground range.

Overall, the observed species assemblage, relative abundance, and passage parameters were as expected for southern New Hampshire. Potential risk to these species as a result of the proposed Project is discussed in Section 5.3.

5.1.3 Nocturnal Migration Surveys

Nocturnal radar surveys for bird migration were performed for the proposed Antrim Wind Energy Project in 2011. These studies served to assess and characterize nocturnal bird migration patterns in the proposed Project area. The objective of the study was to document the overall passage rates for nocturnal bird migration in the vicinity of the Project area, including the level of migration activity, and migrants' flight direction and flight altitude.

A Furuno 12 kilowatt (kW) X-band marine radar was operated from one location (near the meteorological tower on the northeastern end of Tuttle Hill) within the Project area from sunset to sunrise each survey night for the duration of each survey period as outlined below, weather permitting. Marine radars cannot detect targets in heavy or consistent rain, so sampling occurred on nights with generally clear weather.

Spring radar surveys were conducted from sunset to sunrise on 30 nights between April 18 and May 26, 2011 resulting in 284 total hours surveyed. Fall radar surveys were conducted during 30 nights between August 17 and October 8, 2011 resulting in 327 total hours surveyed.

Video samples were analyzed using specialized digital analysis software. Data analysis included the removal of insects based on flight speed and the calculation of migration passage (traffic) rates over the radar location. Passage rates (expressed in targets/kilometer/hour) were summarized hourly for each night as well as the overall mean and median nightly passage rates for the entire season. The mean flight direction of recorded targets was calculated for each night of data collected. These were also summarized by night and for the entire season. Mean flight height of targets and percentage of targets below maximum turbine height was determined using the vertical data and summarized by hour, night, and season.

Results from this study were compared to results from other similar studies performed in similar locations in the northeast to present the range of results found at publicly

available pre-construction studies and show where Antrim falls within that range. Of these studies, further comparisons were made to those projects that were conducted at locations in the same region as Antrim (New England) and were conducted at projects that are now either permitted or operational. These include (but may not be limited to):

- Granite Wind Project in Errol, Coos County, New Hampshire (Stantec Consulting Services Inc. 2007a and b) – Permitted and under construction;
- Groton Wind Project in Groton, New Hampshire (Stantec Consulting Services Inc. 2008a and b) - Permitted;
- Lempster Wind Project in Lempster, New Hampshire (Woodlot Alternatives, Inc. 2006a and 2007a) – Permitted and Operational;
- Sisk Wind Project in Franklin County, Maine (Stantec Consulting Services Inc. 2009) - Permitted;
- Sheffield Wind Project in Caledonia County, VT (Woodlot Alternatives, Inc. 2006b) – permitted and operational; and
- Stetson Wind Project in Washington County, Maine (Woodlot Alternatives, Inc. 2007b) – permitted and operational.

Spring Results

The overall mean passage rate for the entire spring survey period was 223 ± 23 targets per kilometer per hour (t/km/hr), and nightly passage rates varied from 6 ± 3 t/km/hr on May 17 to 1215 ± 299 t/km/hr on May 20.

Individual hourly passage rates varied between nights and throughout the season, and ranged from 0 t/km/hr during various hours of various nights, to 2279 t/km/hr during the 7th hour of May 20. For the entire season, mean passage rates increased rapidly between hours one and two after sunset, then gradually increased to the 6th hour after sunset before steadily declining until sunrise.

Mean flight direction through the Project area in the spring was generally northeast (44° ± 49°), but varied between nights.

The seasonal mean flight height of targets was 305 ± 1 meters (m; 1000 ft [']) above the radar site, and nightly flight heights ranged from 135 ± 31 m to 486 ± 85 m. Flight heights, when analyzed for the anticipated 150 m (492') height of the proposed turbines; indicate that the percentage of targets flying below turbine height ranged from 7 to 63 percent with a seasonal average of 30 percent.

These results are within the range of those recorded at other radar studies conducted at other proposed wind projects in the northeast. Of note, the spring average passage rate at the Project (223 ± 23 t/km/hr) is the lowest recorded spring passage rate recorded at any wind project site in New Hampshire and is at the low end of the range of results from among other spring radar studies conducted at proposed wind projects on forested ridges in the east. See Attachment B for a summary of nocturnal passage rates. Results from other projects range from 147 t/km/hr at the Stetson Wind Project in Washington County, Maine (Woodlot Alternatives, Inc. 2007b) to 1020 t/km/hr at the New Creek Wind Project in Grant County, WV (Stantec Consulting Services Inc. 2008c).

The spring average flight height (305 ± 1 m) is near the mid-range of average flight heights recorded at other radar studies conducted on forested ridges in the east, and is above the proposed turbine height (150 m). Comparative results range from 210 m at the Stetson Wind Project in Washington County, Maine (Woodlot Alternatives, Inc. 2007b) to 552 m at the Sheffield Wind Project in Caledonia County, VT (Woodlot Alternatives, Inc. 2006b). Both of these projects have been permitted and are now operational.

Fall Results

The overall passage rate for the entire fall survey period was 138 ± 9 targets per kilometer per hour (t/km/hr). Fall nightly passage rates varied from 4 ± 2 t/km/hr on October 1 to 538 ± 71 t/km/h on August 26. Individual hourly passage rates varied between nights and throughout the season, and ranged from 0 t/km/hr during various

hours of various nights to 839 t/km/hr during the 2nd hour of August 26. For the entire season, mean passage rates increased rapidly between the 1st and 3rd hours after sunset, then gradually declined until sunrise.

Mean flight direction through the Project area in the fall was generally southwest (217° ± 56°), but varied between nights.

The fall seasonal mean flight height of targets was 203 ± 1 m (666') above the radar site. The average nightly flight height ranged from 147 ± 23 m on August 24 to 266 ± 45 m on September 9. The percent of targets observed flying below 150 m was 40 percent for the season and varied nightly from 25 percent (169 targets) on September 9 to 56 percent (74 targets) on August 18 (Figure 2-9). For the entire fall season, the mean hourly flight heights were lowest during 1st and 10th hour after sunset.

The fall average flight height (203 ± 1 m) is among the lowest average flight heights recorded among other fall radar studies conducted at proposed wind projects on forested ridges in the east. Comparative study results ranged from 287 m at the Sisk Wind Project in Franklin County, Maine (Stantec Consulting Services Inc. 2009) to 583 m at the Liberty Gap Wind Project in Pendleton County, West Virginia (Woodlot Alternatives, Inc. 2005). Of note, the recorded flight height at the proposed Project of 203 ± 1 m is still above the proposed turbine height (150 m) for the Project. The nightly average flight height was below the proposed turbine height on only one night (August 24) and at the proposed turbine height on only one night (October 1) out of a 30 night season. It should be noted, however, that passage rates on these nights were very low: 38 t/km/hr on August 24 and 4 t/km/hr on October 1.

The fall average passage rate at the Project (138 ± 9 t/km/hr) is the lowest recorded fall passage rate at any wind project site in New Hampshire and is at the low end of the range of results of other fall radar studies conducted at proposed wind projects on forested ridges in the east. See Attachment B for a summary of nocturnal passage rates. Comparative study results range from 91 t/km/hr at the Sheffield Wind Project in

Caledonia County, VT (Woodlot Alternatives, Inc. 2006b) to 811 t/km/hr at the New Creek Wind Project in Grant County, WV (Stantec Consulting Services Inc. 2008c).

5.1.4 Rare Raptor Nesting Survey

An assessment of rare raptor nesting within a 10-mile radius of the proposed Antrim Wind Energy Project was conducted in 2011, consistent with USFWS recommendations. The purpose of rare raptor nest surveys associated with the proposed Project was to determine the current status of bald eagle, golden eagle, and peregrine falcon breeding activity in the Project area and surrounding vicinity. Specific study objectives included:

- confirm presence or absence of bald eagle, golden eagle and peregrine falcon nesting activity at any known nest sites (current or historical) or suitable habitat within roughly a 10-mile radius of the proposed Project;
- monitor the proposed Project vicinity for bald eagle, golden eagle, or peregrine falcon activity that may indicate nesting at previously undocumented sites through incidental observations during other field surveys; and
- map (if found) bald eagle, golden eagle, or peregrine nest site locations within or adjacent to the proposed Project vicinity.

A desktop research exercise, including data inquiries, was conducted to ascertain the location of any historic nest locations or potential nesting habitats for the species being assessed. This exercise found that no territorial golden eagles have been documented during the breeding season in New Hampshire in nearly three decades. All of the State's historic golden eagle nesting sites are located in the White Mountains or in the Lake Umbagog region, all of which are considerably north of the proposed Project area. It was also found that the State's current peregrine falcon population occupies territories which occur mostly in the White Mountains. A few additional nests occur on cliffs in the far northern portion of the state, and one nest is located in an urban site (on a building) in the city of Manchester, in southern New Hampshire. All known peregrine falcon breeding sites in New Hampshire are on cliffs with the exception of the site in the City of Manchester. The closest known peregrine falcon nesting site relative to the

proposed Antrim Wind Energy Project is the urban location in the City of Manchester; this location is over 25 miles away from the proposed Project. No high quality nesting habitat for golden eagles or peregrine falcons was identified within 10 miles of the proposed Project. For these reasons, the potential for nesting establishment by golden eagles or peregrine falcons within 10 miles of the Project area was estimated to be extremely low. Conversely, it was determined that there are several areas of potential bald eagle breeding habitat within a 10 mile radius of the proposed Antrim Wind Energy Project. Given the recent success and expanding population of this species, establishment of nest sites (and breeding home ranges) within 10 miles of the Project area was deemed possible. Furthermore, data from the New Hampshire Audubon identified one historic bald eagle nest site within a 10-mile radius of the proposed Project. This nest site, located in an historic bald eagle territory on Nubanusit Lake in Nelson, NH, was occupied most recently in 2010. Based on the findings of this exercise, and associated consultation with the agencies, it was decided that the rare raptor nest survey for this area should focus on bald eagle nesting.

Pursuant to this consultation, on May 6, 2011, an aerial survey was conducted in an effort to identify and document bald eagle nesting activity within a 10-mile radius of the proposed Antrim Wind Energy Project.

During the aerial survey, two biologists (both experienced in conducting aerial bird and wildlife surveys) visually inspected the shoreline and islands of 34 lakes and ponds that were identified as having potential bald eagle breeding habitat (i.e. ponds greater than 35 acres in size) and which were located (at least partially) within a 10-mile radius of the proposed Project area. The survey was performed from a helicopter which flew as low and as slowly as possible. The survey was performed during favorable weather conditions, which consisted of calm to light winds and clear conditions with unlimited visibility.

During the survey, bald eagle nesting was confirmed at Nubanusit Lake. One adult bald eagle was observed sitting on a nest located on the north shore, on the far west end of the north arm of Nubanusit Lake. At least two chicks (in gray down) were also

confirmed on the nest during the flight. This nest is located approximately 3.4 miles from proposed turbine #9, which is the closest proposed turbine associated with the Project.

Nubanusit Lake is a known historic bald eagle nesting territory which has been occupied for 15 years (1997-2011). Nesting was documented in 13 of these years. This 15-year-long occupation constitutes the second most persistent bald eagle territory documented within the State of New Hampshire since 1988 (a territory at Lake Umbagog has been occupied during 22 years of monitoring (New Hampshire Audubon 2010). The female at this territory was banded as a fledgling (in Massachusetts) in 1992 and has been confirmed present at Nubanusit Lake since 1999; in October of 2011, this female was found mortally injured at 19 ½ years of age (New Hampshire Audubon 2011). It is expected that a new female will occupy the matriarchal vacancy at Nubanusit Lake.

The Nubanusit Lake bald eagle territory is one of 41 occupied territories identified in New Hampshire as of 2014. The number of occupied bald eagle territories has been increasing in New Hampshire: the 41 occupied territories in 2014 represent a "record-high". Bald eagle territories have been increasing significantly recently, from 10 occupied territories in 2005, to 22 occupied territories in 2010, to the currently high number of 41 (http://wildnh.com/Newsroom/2014/Q4/eagle.html).

5.1.5 Eagle Use Survey

Based on the findings of the rare raptor nesting survey conducted in 2011 (which identified an active bald eagle nest which is approximately 3.4 miles from the nearest proposed Project turbine), USFWS requested additional eagle use data for the area of proposed development. This data would allow the USFWS to perform a qualitative prediction of potential risk to bald eagles as a result of Project development.

Eagle use data for the Project was collected from mid-May through August, 2012. The eagle use survey consisted of two survey events per month over the course of the

survey period. Each survey entailed approximately 6 hours of continuous observation generally spanning from late morning to mid-afternoon. Surveys were performed from a vantage which allows a view of the majority of the area of proposed development. The primary vantage for eagle use surveys was the same as that used during fall raptor migration surveys, on the southeast flank of Willard Mountain. This vantage provided for visibility of all proposed wind turbine generator development locations for the Project. We conservatively estimate that we could see approximately 1,457 acres within a two mile radius, which includes the proposed project area and airspace above. The Willard Mountain survey location was scoped based on the availability of obtuse views of the area of proposed development. This location provided an obtuse horizontal view of the ridgeline where development has been proposed. On the vertical plane, this location provided views of: the Meadow Marsh valley on the south side of Tuttle Hill; the majority of the southeastern facing slope of Tuttle Hill and the northeastern slope of Willard Mountain; significant areas of the Tuttle Hill ridgeline; and, a broad expanse of airspace over the landscape. Furthermore, the meteorological tower on the east summit of Tuttle Hill was visible, providing a landmark of known elevation which operated as a scale of reference. All data have been provided to the USFWS to inform the agency's bald eagle risk assessment.

Data were gathered that are sufficient to satisfy the prescriptions and data needs described within the Draft USFWS Eagle Conservation Plan Guidance (2011), the Draft Eagle Conservation Plan Guidance Module 1 – Land-Based Wind Energy Technical Appendices (2012), and the most current U.S. Fish and Wildlife Service Eagle Conservation Plan Guidance – Module 1 – Land-based Wind Energy Version 2 (2013). In total, 36 total hours of observation were performed across 6 dates between May 15 and August 31. Surveys dates occurred on June 1, June 18, July 3, July 20, August 7 and August 20.

No bald eagles were observed during the entire Eagle Use Survey effort. This null observation accounts for the visible portions of Project area as well as the entire viewshed available from the Willard Mountain vantage location.

5.2 Bat monitoring

5.2.1 Acoustic Monitoring

Passive acoustic bat surveys for the proposed Antrim Wind Energy Project were performed in 2011. The purpose of this passive acoustic bat echolocation monitoring survey was to sample and document bat activity patterns and species composition within the Project area during spring, summer and fall seasons, when bats are known to be active.

A total of six bat detectors were deployed in the Project area by April 15, 2011. Two detectors were deployed in the guy wires of an existing meteorological tower at the east end of the Tuttle range. The remaining four detectors were deployed throughout the Project area, suspended from trees along forested corridors and adjacent to wetlands where bats would likely travel or forage. The detectors were removed in late October, 2011.

Anabat II detectors (Titley Electronics Pty Ltd.) were used for data collection based upon their widespread use for this type of survey, their ability to be deployed for long periods of time, and their ability to detect a broad frequency range, which allows detection of all species of bats known to occur in New Hampshire. Detectors were programmed to begin monitoring at one half hour before sunset each night and end monitoring at one half hour after sunrise each morning.

All data collected was visually inspected to screen out bat calls, and each call file was qualitatively identified to guild and to species, when possible. This method of guild identification represents a conservative approach to bat call identification. Once all call files were identified and categorized in appropriate guilds, nightly tallies of detected calls were compiled to provide an index of bat activity. Detailed weather data as recorded by the meteorological tower on Tuttle Hill was obtained. These data were applied to describe bat activity levels in relation to site-specific weather variables

that have been documented to affect rates of bat mortality at operational wind projects in the Northeast.

Spring Results

Spring acoustic bat surveys were conducted between April 7 and June 1, 2011. The six detectors recorded a total of 1,483 bat call sequences yielding an overall detection rate of 4.9 bat call sequences per detector-night.

Rate of detection varied among individual detectors (ranging from 5 sequences at the high detector on the met tower, to 760 sequences at a lower elevation, forested site). Detection rates also varied by night, ranging from 0.1 sequences per detector-night, to 14.1 sequences per detector-night. These types of variation are typical of this type of survey.

Bats within the *Myotis* genus comprised the greatest overall percentage of detected call sequences (32 %) recorded in the spring; however, most of these sequences were recorded at a single detector over only a few nights. The big brown bat/silver-haired bat guild was the second most commonly identified guild, comprising 31 percent of the total call sequences recorded. Most call sequences within this guild were identified as big brown bats or big brown/silver-haired bats, and only a small fraction were classified as silver-haired bats. Hoary bats comprised 12 percent of bat call sequences recorded; this species was recorded at all six detectors. The eastern red bat/tri-colored bat guild was the least commonly detected guild, comprising only 1 percent of the recorded call sequences. Twenty-four percent of call sequences were classified as "unknown" due to their relatively short length or quality.

Overall, spring 2011 acoustic bat surveys documented variable activity levels within the Project area, with May activity increasing relative to April's.

Summer/Fall Results

Summer/fall acoustic bat surveys were conducted between June 1 and October 23, 2011. The six detectors recorded a total of 35,450 bat call sequences yielding an overall detection rate of 52.4 bat call sequences per detector-night.

Among sampling locations, detection rates ranged from 2.6 to 126.2 bat call sequences per detector-night. Typical of this type of survey, activity levels varied considerably among nights within the survey period and among detectors. Bats within the big brown bat/silver-haired bat (BBSH) guild comprised the greatest overall percentage of detected call sequences (48%, n=17,006). The majority of BBSH calls were recorded at the low detector positioned on the met tower. The eastern red bat/tri-colored bat guild comprised 15 percent of the recorded call sequences. The Myotis guild comprised 12 percent and the hoary bat guild comprised 5 percent of the recorded call sequences. Twenty of the call sequences were classified as "unknown" due to their relatively short length or quality.

Of note, hoary bats were detected at five of the six detectors during the summer/fall study period, and species belonging to the *Myotis* guild and the eastern red bat/tri-colored bat guild were recorded by all six detectors.

Overall, summer/fall 2011 acoustic bat surveys documented variable activity levels within the Project area, although results suggest that activity was highest in July and August.

5.2.2 Bat Mist Netting Survey

A bat mist netting survey was conducted for the proposed Project in the summer of 2011, subsequent to a consultation with the NHDFG and the USFWS on June 21, 2011 to agree upon protocol for a mist net survey at the proposed Project. The primary objective of this summer survey was to document the potential presence of the eight bat species known to occur in the region.

Since there currently is no prescribed protocol for each bat species known to occur in New Hampshire, the federal Indiana Bat Survey Protocol was followed. (USFWS 2007). The bat mist net survey was conducted at four survey sites, as agreed upon during consultation with the agencies. Two of these sites were located at the south end of the proposed area of Project development, on or near Willard Mountain; one site was located in a wetland near the center of the proposed Project area; and one site was located near the existing meteorological tower on Tuttle Hill, at the northeast end of the proposed Project area. There were no suitable mist net sites on the immediate summits of Tuttle Hill or Willard Mountain, so sites were placed slightly off the peaks where better canopy closure provided more suitable mist net set locations.

The location of mist net sites was based on habitat features that may be selected by foraging little brown and northern long-eared bats, as well as eastern small-footed bats. Good-quality bat capture sites were sought; such sites are located in potential travel corridors such as forest roads, trails, streams, or other linear corridors that serve to funnel traveling bats into mist nets.

Mist net surveys were conducted on eight survey nights, which commenced on July 12, 2011 and were completed on July 28, 2011. During each sampling event, two mist net sets were erected over trails, roads, or across forest gaps. Each mist net set contained three vertically-stacked nets.

One bat was captured during 41 total survey hours among the four survey sites. This juvenile, male, big brown bat (Eptesicus fuscus), weighing 17.25 grams, was captured

on July 27, 2011 at the northeastern survey site (located downslope from the meteorological tower on Tuttle Hill). This bat was banded with NHFG band # 43152. No other bats were captured during the bat mist netting survey.

Low capture rates were not unexpected for this survey location. Mist net surveys can be biased toward those species that fly beneath the forest canopy such as North American *Myotis* species; as such, the relative abundance of expected captures is expected to trend toward *Myotis* species. In New England, high concentrations of *Myotis* species are generally expected at low elevations, where temperatures tend to be warmer and more stable than at higher elevations; however, *Myotis* bats are still expected to be present and active in lower concentrations at higher elevations such as ridge tops. For these reasons, it was expected that this study would result in the capture of at least some myotis bats. The capture of only one bat (which was not a *Myotis* species) was not the expected outcome of this effort. While not known definitely, the capture of only a single individual may be evidence of diminished populations of bats as a result of white-nose syndrome (WNS).

White-nose syndrome (WNS) is an emerging disease that has spread throughout the New England states in the past five years and has resulted in the unprecedented decline of all 6 bat species that hibernate in caves or mines in the northeast. *Myotis* species have been most affected by this disease. Of note: the USFWS listed the northern long-eared bat on May 4, 2015, as threatened, due to population decline caused by White-nose Syndrome (WNS). This emerging disease has spread throughout the New England states in the past five years and has resulted in the unprecedented decline of all 6 bat species that hibernate in caves or mines in the northeast (NHFGD 2011b). As noted earlier, after consultation with USFWS in 2015 and review of the studies performed and Project changes proposed, USFWS agreed that no further preconstruction studies would be required for northern long-eared bats or other species.

5.3 Potential Project Impacts to Birds and Bats

Potential impacts to birds and bats during operation of the proposed Project include indirect and direct forms of impacts. Indirect impacts may include fragmentation, habitat loss, displacement, or increased energy demands through turbine avoidance during migration or foraging. Direct impacts include turbine-associated mortality through either collision or barotrauma.

Indirect impacts, particularly habitat impacts, have largely been addressed in the siting and design phases of the Project, as previously described. As previously noted, no species of habitat fragmentation concern is known to occur; this, coupled with the compact footprint of the Project on the landscape (9 turbines arranged on approximately 57 acres of development), minimizes impacts associated with fragmentation. Likewise, displacement and turbine avoidance issues are expected to be negligible, given the small area and overall footprint of the Project. For these reasons, this BBCS focuses on the direct impact of collision and barotrauma. Direct mortality impacts to birds and bats that may potentially be expected at the Project are discussed below.

It is important to note that in advance of the submittal of AWE's application to the SEC and the development of this BBCS, AWE has secured binding letters of intent with six private landowners and the Harris Center for Conservation Education and the Town of Antrim to enact local land conservation agreements which will protect approximately 908 acres of land adjacent to the proposed Project. This undeveloped land encompasses forest, wetlands and streams in the immediate vicinity of the Project. Conservation of this land will permanently preserve large tracts of valuable foraging and nesting/roosting habitat for bird and bat species as well as other wildlife species. AWE has also entered into a land conservation funding agreement with the New England Forestry Foundation ("NEFF") whereby AWE will fund $100,000 for the acquisition of new permanent conservation lands in southern New Hampshire.

5.3.1 Potential Impacts to Birds

In the past, developers have conducted extensive pre-construction risk assessments to calculate expected mortality at their proposed facilities, and this includes AWE. Recent studies have shown, including studies performed at the operational Groton Wind Project in New Hampshire, that there is little correlation between pre-construction risk assessments and actual documented mortality of bird species at wind farms (de Lucas et al. 2008, Ferrer et al. 2011, Sharp et al. 2011, Taucher et al. 2012, Stantec 2013). As such, it is difficult to predict expected mortality rates at a proposed facility from pre-construction survey data alone and post construction data at nearby and regional operational wind projects is a more accurate predictor of risk. In response to these scientific findings, this BBCS is designed to allow AWE to work continuously with USFWS and NHFGD in order to adapt to actual results and unknown circumstances, so that unexpected events and changes over time may be addressed.

In general, bird mortality documented during post-construction studies at 27 wind facilities in New England and New York is low, with a total of 1,160 bird fatalities (not corrected for searcher or removal biases) documented among all 27 facilities (Stantec 2014 unpublished). The majority of these fatalities were passerines (79%; n=922). The range of fatality estimates for known wind farms studies in Maine and New Hampshire is 0.44 birds per turbine per study period to 10.4 birds per turbine per study period. (Stantec 2014 unpublished).

Large, episodic bird mortality events have been documented at certain wind projects as well as at tall communication towers, lighted buildings, and other structures (Avery 1979, Shire et al. 2000, Longcore and Gauthreaux Jr. 2008, Gehring et al. 2009,). In general, the majority of bird collisions at existing wind projects tends to occur during spring and fall migration, and appears to involve nocturnally migrating songbirds. As such, impacts to nocturnal migrants tend to occur exclusively at night. Nocturnal bird mortality events have been correlated with inclement weather events and certain artificial lighting scenarios.

Project lighting plans, as described in this BBCS, have been designed to minimize lighting-associated mortality events.

While most bird mortality at wind farms tends to be associated with nocturnally migrating songbirds, collisions are also known to occur during the breeding season. Risk of collision for breeding birds is expected to occur primarily during evening or morning courtship behavior, daytime foraging and territory establishment, and during initial flying by juvenile birds. Population-level effects have not been attributed to collision mortality at wind projects or other structures (Loss et al. 2013).

Pre-construction bird studies for the Project generally found bird assemblage and use to be comparable to that of similar (in terms of topography and habitat) areas in New Hampshire and New England. Based on observations at operational wind projects in the region, bird collisions at the Antrim Wind Energy Project are expected to occur at a low frequency. Impacts are not expected to occur at a degree which would adversely affect populations.

A recent study shows that bald eagles exhibit a high rate of avoidance of operational wind turbines (Sharp et al. 2011). In fact, no bald eagle mortalities have been documented at wind farms in New England to date. In addition, the Project location is not good habitat for bald eagles. Bald eagles nesting habitat is typically in close proximity (< 1 mile) to larger waterbodies, such as lakes, ponds, rivers, wide streams, or large wetlands. This is primarily because their preferred prey is fish, however they also feed opportunistically on many other prey items such as waterfowl, small mammals, turtles, and carrion. Nesting in close proximity to waterbodies provides the eagles with a relatively high abundance and diversity of food items. Eagles are considered visual hunters and prefer to forage from an elevated perch or on the wing and forage in areas with good visibility that are not heavily wooded. The terrain at the location of the Project is heavily wooded and the waterbodies that are found in the immediate area are small headwater streams that are mostly intermittent. The wetlands are small forested wetlands except where they are in cleared utility ROW. For these reasons there

is a low probability that bald eagles foraging in the vicinity of the Project. Therefore, it is expected that any bald eagles in the Project's vicinity are likely to successfully avoid contact with turbines.

NHFG has expressed concern regarding the potential occurrence of the State-endangered common nighthawk at the site due to the close proximity of the site to the existing Lempster wind project. The Lempster wind project experienced a turbine related mortality of a common nighthawk. That project had also identified a nighthawk nest on the ground during its preconstruction surveys. No such nests were observed at the Antrim Wind Project site during any of the formal or informal surveys, nor is there suitable habitat for such nests. AWE has agreed to vegetation restoration efforts at the Project that address this concern and will minimize the creation of any new suitable nesting habitat for common nighthawks. Therefore it is unlikely that common nighthawks will nest at the site, and will not be subjected to increase collision risk. While risk to nighthawks is expected to be low, uncertainty is always present when attempting to predict risk from preconstruction surveys efforts. In order to minimize already low risks to nighthawks, AWE also has entered into a Memorandum of Understanding (MOU) with NHFG and The Audubon Society of New Hampshire (ASNH) to provide for monitoring for nesting nighthawks on the site and continued consultation with the parties to the MOU. Details of the agreement are included in Sections 7.1.1 and 9 of this BBCS.

5.3.2 Potential Impacts to Bats

As previously discussed, of eight species of bats expected to occur in the state of New Hampshire, one (the eastern small-footed bat) is state-listed as endangered, and five (eastern red bat, silver-haired bat, hoary bat, northern long-eared bat, and tri-colored bat) are state species of special concern.

Furthermore, the USFWS has proposed to list the northern long-eared bat as endangered, due to population decline caused by White-nose Syndrome (WNS). This

emerging disease has spread throughout the New England states in the past five years and has resulted in the unprecedented decline of all 6 bat species that hibernate in caves or mines in the northeast (NHFGD 2011b). *Myotis* species have been most affected by this disease. The northern long-eared bat was listed as threatened in May 4, 2015.

The total bat fatality recorded between 2006 and 2013 of post-construction studies at 26 wind farms in New England and New York was 2,053 (not corrected for searcher or removal biases) (Stantec 2014 unpublished). The majority of these fatalities were recorded in New York (84%; n = 1,729), where bat fatalities ranged from 0.7 to 40.4 bats per turbine per study period. In Maine and New Hampshire, bat fatalities range from 0.17 to 6.78 bats per turbine per study period. (Stantec 2014 unpublished). None of the bat mortalities observed at New England wind farms consisted of northern long-eared bats.

Long distance migratory bat species are thought to be the most vulnerable to collision mortality at wind projects in general based on results of mortality surveys at operational projects. (Stantec 2014 unpublished, Taucher et al. 2012, Arnett and Baerwald 2013, West 2014). Long-distance migratory bats that are expected to occur within range of the Project include the eastern red bat, silver-haired bat and hoary bat. Although the majority of documented bat fatalities at existing wind projects is related to long-distance migratory species, some mortality among resident bat species is also associated with the spring and fall migration periods, and during the summer pup rearing period.

Bat fatalities at wind farms are also known to be affected by other factors, such as weather variables. It has been shown that most bat fatalities tend to occur during low wind speeds over relatively short periods of time (Arnett et al. 2008, Hein et al. 2014, West 2014). Operational measures which curtail turbine cut-in at low wind speeds between dusk and dawn have been shown to reduce bat mortality at some wind farms.

Baerwald, et al. (2009) found that curtailment of turbines at low wind speeds reduced bat fatalities by between 57% and 60%. Studies performed at the Casselman Wind Project in Pennsylvania found that curtailment reduced bat fatalities at individual turbines at rates from 44% to 93%. (Arnett et al. 2010). Arnett et al. (2010) concluded that curtailing operations offers an effective mitigation strategy for reducing bat fatalities at wind energy facilities.

For this reason, even though bat mortality at New England wind farms has been low and studies conducted at the Antrim Project site indicate that the site is comparable to other New England wind project sites, this BBCS proposes a study to assess an operational curtailment strategy to minimize bat fatality at the Project, should actual fatalities materialize and mitigation is deemed appropriate. This proposed study is described in detail in Section 8.

Based on the accumulated knowledge of bat mortality at wind farms in New England, mortality at the Project is expected to be low. In light of the WNS epidemic, however, the level of biologically significant mortality may change and therefore will be addressed during the adaptive management process as implemented by this BBCS.

5.3.3 Cumulative Impacts and Net Benefit

According to the USFWS Land-Based Wind Energy Guidelines (USFWS 2012), "Cumulative impacts are the comprehensive effect on the environment that results from the incremental impact of a project when added to other past, present, and reasonably foreseeable future actions." Based on the results of Tier 1, 2, and 3 assessments to date, Project impacts to birds and bats are expected to be low. Meanwhile, the Project has the potential to provide numerous benefits to human and natural communities, including birds and bats. This balance is expected to result in an overall net benefit to these communities. Some of the Project's specific benefits are described in the following paragraphs.

AWE is providing for the permanent conservation of 908 acres of undeveloped forest land immediately adjacent to the Project area and funding $100,000 towards the acquisition of additional off-site conservation lands. These significant conservation benefits represent a contribution to preserving important wildlife habitat in the area, and will help sustain local wildlife populations. It also represents a direct benefit to local bird and bat species which rely on undeveloped forested areas for foraging, nesting and roosting. Further information with regard to these conservation benefits is provided in Section 8.1 of this BBCS.

Furthermore, the Project represents a new source of clean, renewable energy that will displace output from fossil fuel generation plants, which produce environmental pollutants that negatively affect regional air and water quality. A December 2013 report issued by Environment New Hampshire found that in 2012 New Hampshire wind projects wind projects resulted in 157,267 tons of avoided carbon dioxide emissions (the equivalent of taking 32,764 cars off the road) and saved over 70,265,000 gallons of fresh water consumption (Schneider, Dutzik, & Sargent 2013). The Antrim project will increase the amount of avoided carbon dioxide emissions and water savings. Collectively, the current and expected reduction in carbon dioxide emissions due to increased wind energy represents a significant reduction in the production of greenhouse gases and this supports AWE's position that the proposed Project will provide net benefit (or a positive net impact) in terms of air quality. In turn, improved air quality will positively affect the physical environment and its fauna, including birds and bats.

In summary, direct losses of individual birds and bats as a result of Project operations are expected to be low, and are not expected to impose population level impacts; however, bird and bat populations as a whole are expected to benefit from diminished toxic air emissions. The enhancements to air and water quality discussed above, together with the direct land conservation benefits, will constitute a net benefit to the environment and the species which depend on it, including birds and bats.

6 DEVELOPMENT AND CONSTRUCTION PHASE AVOIDANCE AND MINIMIZATION

Several avoidance and minimization measures have been or will be executed during Project siting, design, construction and maintenance in order to minimize risk to bird and bat species. These are described in the following subsections.

6.1.1 Project Siting and Design

The following paragraphs describe measures previously employed or to be employed during siting, design, construction and operation that will avoid or minimize potential impacts to birds and bats upon construction and operation of the Project.

Project Siting

As previously discussed in Section 4, AWE applied rigorous screening criteria to establish a well-sited Project that minimizes potential impacts associated with access, transmission and alteration of natural habitats. The close proximity of the proposed Project to existing infrastructure minimizes the overall area of disturbance and eliminates the need for new transmission lines. Furthermore, the Project will be constructed on previously impacted lands (as recently as 2012 by industrial timber harvesting), thereby greatly reducing the overall impact of Project construction and development on natural habitats.

Structure Layout and Design

Final turbine layout and facility design has taken into account the findings of the Tier 3 biological assessments and has avoided identified sensitive areas (such as wetlands and vernal pools) to the extent feasible.

Collector System Design and Interconnection Proximity

The Project will interconnect to PSNH's 115 kV Line L163 via a three breaker ring bus substation located adjacent to the Project access road and contained within the

Project's leased boundary. The interconnection substation will be a standard three phase 115 kV transmission level substation designed and constructed by PSNH. A 34.5 kV - 115 kV collector substation will be located adjacent to the interconnection substation and provide an interface between PSNH and the Project. A single 34.5 kV three phase collector line will be constructed from the collector substation to the individual turbines. This collector line will be a combination of overhead and underground facilities. All collector system facilities (substation & lines) will be designed and constructed consistent with industry standards, PSNH and ISO-NE requirements, applicable local, state and federal codes and good utility practice.

Furthermore, the Project collector lines and substation will be designed and constructed to meet or exceed the most recent recommendations of the Edison Electric Institute's Avian Power Line Interaction Committee (APLIC), as necessary and applicable.

Operational Lighting

Operational lighting will be minimized to the maximum extent practicable. Project design will incorporate minimum intensity lighting on all Project structures where feasible.

No steady burning lights will be left on at the facility buildings and substation unless necessary for safety or security; in such cases, manual lighting, motion detector lighting or infrared light sensors will be used whenever possible to avoid continuous lighting. Any required facility lights will be shielded downward to minimize skyward illumination, and will not use high intensity, steady burning, bright lights such as sodium vapor or spotlights. Motion detector or manual lights will be used above tower doors and at the operations and maintenance building for nighttime maintenance visits.

AWE will implement a protocol to confirm that manual lighting controls on buildings and Project facilities are always off at night unless required for specific ongoing tasks or in the event of an emergency response.

Turbine and Met Tower Lighting

Turbine lighting will be minimized to the maximum extent practicable. Lighting will be limited to that required by the Federal Aviation Administration (FAA) or as required to meet other safety concerns. Permanent meteorological tower(s) will also utilize the minimum lighting as required by the FAA.

Wind turbine lighting will be limited to FAA required obstruction avoidance lighting. Based on FAA determinations for the Project, six (out of 9 total) turbines will be lit, and all lights within the facility will illuminate synchronously. FAA required lights are anticipated to be flashing red strobes (L-864) that operate only at night. The lowest intensity lighting as allowed by the FAA will used.

To the extent possible, USFWS recommended lighting schemes will be used on the nacelles to the extent they are consistent with FAA requirements, including reduced intensity lighting and lights with short flash durations that emit no light during the "off phase".

In addition, AWE has reached an agreement with the Appalachian Mountain Club ("AMC") whereby AWE has agreed to install a radar activated lighting system that will control the FAA obstruction lighting. This system will only activate the nighttime FAA obstruction lights in the event that there is an aircraft flying at low altitude at night in close proximity to the Project, which will almost eliminate this nighttime light source. AWE has agreed to ensure that this system is installed within one year of the FAA issuing its revised advisory circular approving the use of this technology.

6.1.2 Project Construction and Maintenance

The following construction phase measures will be executed during Project construction. These measures will result in avoidance of construction activities in the vicinity of sensitive habitats during critical periods in bird and bat life cycles, and minimization of impacts to wildlife habitat and resources.

Tree Clearing

Tree clearing activities will be timed to minimize impacts to bats and birds. AWE will use its best efforts to ensure tree clearing occurs during the period between October 1 – March 31 in accordance with New Hampshire Fish and Game and NHSEC recommendations. This timing will help to avoid mortality of roosting bats, nesting birds, and their respective young.

A New Hampshire licensed forester will also manage the tree clearing effort, following best management and forestry practices such as those contained in the publication Good Forestry in the Granite State.

Furthermore, prior to any tree removal, the limits of proposed clearing will be clearly demarcated with flagging tape, orange construction fencing, or similar. This will prevent inadvertent over-clearing and minimize the extent of tree removal.

Minimization of Soil Disturbance and Promotion of Natural Revegetation

Clearing and construction activities will apply practices which reduce soil disturbance and allow for the reestablishment of natural vegetation. Where possible, vegetation will be cleared without grubbing or removal of stumps or tree roots. All construction equipment will be restricted to designated travel areas to reduce impacts. Construction clearings, storage yards, staging areas, or temporary roads that are not needed for long-term operation of the Project will be allowed to revegetate after commissioning of the Project. Best management practices that limit erosion, including revegetation, are proposed as part of the NH Department of Environmental Services (NHDES) Alteration of Terrain application. Annual vegetation surveys will be performed by Project operations personnel in conjunction with regular balance of plant inspections and will document revegetation progress. Reports will be submitted to NHDES and NHFG for a period of three years following construction. If turbines require substantial maintenance during operations, the Project will employ the same measures as used during construction to limit clearing of vegetation and disturbance of soil.

Invasive Species Avoidance

Best management practices will be used to avoid the introduction and spread of invasive species. Construction vehicles and equipment that arrive from other areas will be regularly cleaned. In an effort to preserve natural habitat to the extent possible, areas to be revegetated will be re-seeded with native seed (to the extent possible pending seed availability) following construction. Re-seeding will be consistent with state permit requirements to avoid the introduction of invasive plant species.

Protection of Water Quality

Best Management Practices for construction activities will minimize degradation of water quality from storm water runoff and sediment from construction. A plan note will be incorporated into the construction contract requiring that contractors adhere to all provisions of National Pollutant Discharge Elimination System (NPDES) permits and the Storm Water Pollution and Prevention Plan (SWPPP). Federal and state measures will be adhered to for handling toxic substances to minimize danger to water and wildlife resources from spills.

Minimization of Fire Potential

Fire potential will be minimized and managed in accordance with the fire safety plan described in AWE's application.

6.1.3 Bird and Bat Enhancement Options

As previously discussed, AWE is providing for the permanent conservation of 908 acres of undeveloped forest land immediately adjacent to the Project area and funding $100,000 towards the acquisition of additional off-site conservation lands. These significant conservation benefits represent a contribution to preserving important wildlife habitat in the area, and will help sustain local wildlife populations. It also represents a direct benefit to local bird and bat species which rely on undeveloped forested areas for foraging, nesting and roosting. Further information with regard to

these conservation benefits is provided in Section 8.1 of this BBCS. Additionally, the Project will result in significant benefits relevant to air and water quality; these benefits are described in detail in Section 5.3.3.

7 POST-CONSTRUCTION EVALUATION AND MANAGEMENT

Post construction evaluation and management efforts for the proposed Project have been (and will continue to be, per this BBCS) designed in consultation with NHFGD and USFWS, and are in accordance with the USFWS Land-Based Wind Energy Guidelines (USFWS 2012). Specifically, these efforts address questions outlined in Tier 4 of the USFWS guidelines. Post construction evaluation and management will include formal bird and bat mortality studies, a supplemental acoustic bat study, and evaluation of a curtailment mitigative strategy to reduce injury and mortality for bats. The results of these Tier 4 studies (coupled with Tier 3 study information) will provide the basis for understanding actual Project impacts to birds and bats, and will provide a foundation for future stewardship. This information will also inform future decisions regarding Tier 5 consultation and studies, if ever warranted.

Post construction evaluation and management of risk to bird and bat species will begin with a post-construction "Evaluation Phase". The Evaluation Phase will coincide with the first three years of operations, beginning on the Project's Commercial Operations Date (COD). The COD is expected to occur by July 2017. Objectives during the Evaluation Phase will include:

- documenting baseline mortality rates and patterns for birds and bats;
- evaluating potential mitigation options including the effectiveness of turbine curtailment at low wind speeds to reduce mortality for the first year; and,
- assessing the cost of implementing such a curtailment program.

Management objectives to be assessed during the Evaluation Phase will be analyzed separately across the following management groups:

- long-distance migratory bats,
- other bat species,
- nocturnally migrating birds,
- breeding birds, including common nighthawks,

- bald and golden eagles, and
- diurnally migrating raptors.

For each management group, the overall management objective is to avoid, minimize and/or reduce mortality rates in a scientifically sound and commercially reasonable manner.

The Evaluation Phase will require rigorous post-construction field evaluations, including a post-construction mortality survey, a post-construction acoustic bat monitoring survey, and a curtailment evaluation study. These studies are described below in Section 7.1.

At the conclusion of the Evaluation Phase, AWE will work with consulting agencies (USFWS and NHFGD) to develop more specific management objectives for each identified species group, if warranted. Management determinations will take into account: baseline mortality rates in comparison to those documented at other wind projects; potential ecological impacts of baseline mortality rates, including cumulative impacts; and the degree to which management actions are feasible and effective in reducing mortality.

Management of risk to bird and bat species over the life of the Antrim Wind Energy Project will be guided by an adaptive management strategy. This strategy is described in detail in Section 9.

7.1 Evaluation Phase Field Studies

Evaluation Phase field studies will include: a post-construction bird and bat mortality study; an acoustic bat monitoring study; and a curtailment evaluation study. Taken together, these studies will correlate bat activity with mortality rates at specific turbines and assess the effectiveness of reduced cut-in speeds (curtailment) at reducing bat mortality. These studies will also serve to establish baseline mortality rates for all bird and bat species at the Project and assist AWE, USFWS and NHFGD in establishing thresholds of mortality that will trigger the adaptive management process.

7.1.1 Post-Construction Bird and Bat Mortality Study

Throughout the Evaluation Phases, the Project will perform a three-year formal post-construction bird and bat mortality monitoring study. The post-construction bird and bat mortality monitoring effort will include:

- Standardized searches for birds and bats from April 15 through October 15 each year;
- Common nighthawk nesting surveys, performed concurrent with standardized searches. Common nighthawk nesting surveys shall occur as follows:
    - There shall be three surveys per year, one in each of the periods June 1 -15, June 16 – 30, and July 1 – 5.
    - The surveys shall not occur less than 14 days apart.
    - The surveys shall occur either between the hours of 8:00-9:30 PM or 3:30-5:00 AM.
    - Surveys shall occur during times when wind speeds are 10 MPH or less and when there is no rain.
- Searcher efficiency trials to estimate the percentage of carcasses found by searchers; and
- Carcass removal trials to estimate the length of time that carcasses remain in the field for possible detection.

A detailed mortality monitoring study protocol will be developed in consultation with NHFGD and USFWS. It is expected that all 9 of the Project turbines will be searched (in order to provide control data for treated and untreated turbines per the curtailment evaluation study described below). It is also expected that each turbine pad will be surveyed approximately once every 5 days for the duration of the study period.

Of note: turbine pads will be treated with erosion control mulch and seeded with native seed mixes subsequent to construction. It is expected that resultant vegetative growth will be minimal at the time of mortality search efforts.

To augment formal standardized mortality searches, the Project will complete a full three years of eagle carcass searches. In time periods outside of the formal mortality survey window, these searches will be performed once per week, by adequately trained operations and maintenance staff.

The results of the initial formal study will help inform the need for any future adaptive management initiatives (including Tier 5 consultation and studies, if warranted). Following each of the first three years of operation, mortality (and injury) will be entered in an electronic database, summarized, and reported under the provisions of a Wildlife Mortality Monitoring Program (see Section 9). This annual report will assess the year's injury and mortality data, and will include a discussion, as appropriate, on other performance indicators relevant to this BBCS. If necessary, the report will also make recommendations for improvement. This BBCS summary report will be provided to the USFWS and NHFGD annually, by January 30 of the year following the monitoring.

7.1.2 Acoustic Bat Surveys

During the Evaluation Phase, the Project will conduct post-construction acoustic bat surveys between May 1 and October 15. Acoustic survey data will be used to correlate bat activity levels measured at rotor height to corresponding bat mortality levels.

Acoustic detectors will be deployed on the nacelle of a select number of study turbines distributed throughout the Project area and will be programmed to record on a nightly basis from at least 30 minutes prior to sunset until 30 minutes after sunrise.

Data will be analyzed and summarized by detector, detector night, and for the spring, summer, and fall seasons, including categorization by species and guild where appropriate. Where appropriate, bat call sequences will be individually marked and categorized by species group or "guild" based on visual comparison to reference calls.

7.1.3 Curtailment Evaluation Study

During pre-construction consultation, representatives from USFWS and NHFGD expressed concern over the potential for the Project to cause bat mortality, at a time when certain bat species are being affected by White Nose Syndrome (WNS: see Section 2.3). NHFGD suggested that turbine curtailment may be a viable means of avoiding and minimizing bat mortality at the proposed Project. For this reason, AWE will assess the effectiveness of a curtailment strategy to reduce impacts to bats during the first year of the evaluation phase. This study effort will help AWE, NHFGD and USFWS better understand the effectiveness of curtailment at an operating wind project in the State of New Hampshire, where documented bat mortality at wind developments has been low.

For bats, the highest risk periods include nights with low wind speeds (less than 5.0 m/s), particularly during the fall migration and swarming period. The highest numbers of fatalities among bat species at wind facilities have occurred in late summer and early fall, coinciding with the migratory period, which occurs between mid-August and late September in the eastern U.S. (Kunz et al. 2007, Arnett et al. 2008, Taucher et al. 2012, Arnett and Baerwald 2013).

The results of mortality surveys at operational wind projects to date suggest that long-distance migratory bat species are more vulnerable to collision mortality than other bat species, with three species apparently at the greatest risk: the foliage-roosting hoary bat; eastern red bat; and the cavity-roosting silver-haired bat (Kunz et al. 2007, Arnett et al. 2008, Taucher et al. 2012, Arnett and Baerwald 2013). All three of these bat species have the potential to occur in the Project area.

This curtailment study will follow conditions set forth at other recently approved wind developments in the northeast, including the Bull Hill Wind Project, in Maine (Stantec Consulting Services Inc. 2014). During the first year of the Evaluation Phase, the Project will apply the following operational parameters to 5 of the project's 9 turbines:

- Higher Cut-In Speed: cut-in speed will be raised to 5.0 meters/second (m/s) at turbine hub height. The cut-in speed of 5.0 m/s was selected based on results from studies recently completed at the Casselman Wind Farm in Somerset County, Pennsylvania (Arnett et al. 2010) and studies described in Section 5.3.2. The remaining turbines will be allowed to operate at a normal cut-in speed (approximately 3.5 m/s) without curtailment or operational modifications in place. These turbines will represent an experimental control;
- Timing: Operational control limitations will be applicable from July 15th through September 30th during nighttime hours (roughly ½ hour after sunset until sunrise, when bats are active). This period coincides with higher documented mortality events at other operational wind projects, as well as the formal mortality surveys during the Evaluation Phase.

The operational control measures will be implemented through the Project's supervisory control and data acquisition (SCADA) system. The SCADA system provides an effective means to manage and document turbine curtailment based on real-time wind data from the site.

The curtailment study will provide AWE, NHGFD, and USFWS the data necessary to determine whether a curtailment strategy has the potential to reduce significantly any future bat fatality at the Project in a commercially reasonable manner. Based on the results of the curtailment study, the Project will be able to:

- assess the potential biological benefits, in terms of expected reduction in mortality;
- Estimate the long term cost and financial viability of implementing curtailment as a long term mitigation strategy; and
- recommend an operational control program, if warranted, which balances the Project's financial viability with positive outcomes in avoiding and reducing bat fatality at the Project.

The results and recommendations of this study will be subject to the phased consultation process described under the adaptive management strategy (see Section 9). This process will determine if curtailment should be implemented as an operational mitigative measure. This study and adaptive management consultation will guide the ultimate operational curtailment plan, if deemed necessary.

8 OPERATIONAL MITIGATIVE ACTIONS

8.1 Conservation Benefits

As previously mentioned, AWE is providing for the permanent conservation of 908 acres of undeveloped forest land immediately adjacent to the Project area and funding $100,000 towards the acquisition of additional off-site conservation lands. This represents a significant contribution to preserving important wildlife habitat in the vicinity of the Project.

The area of conservation involves six properties for which AWE, the Harris Center for Conservation Education (HCCE), or the Town of Antrim, and the respective landowners (collectively “the Parties”) have entered into binding letters of intent to execute conservation easement agreements within 180 days of commercial operations. These agreements all state that "The Parties further recognize that, if the Project proceeds, the Agreement and Easement will make a valuable contribution to the conservation interests of stakeholders in this region." The properties for which conservation easement agreements have been obtained are depicted on a map provided in Attachment C.

Parts of some of the properties subject to conservation will contain portions of the Project development (Ott, Cotran, Antrim Limited Partnership, Paul Whittemore and the Whittemore Trust see Attachment C), while one (Micheli) does not have any development associated with the Project. Respectively, approximately 14.4, 10.2, 16, 0.9, and 3.3 acres (for a total of approximately 44.8 acres) of the Ott, Cotran, Antrim Limited Partnership, Paul Whittemore and Whittemore Trust properties will be directly impacted by Project development. As previously discussed, much of this initial impact area will be allowed to revegetate after Project construction is complete.

After project decommissioning, the vast majority of all six properties will be conserved in an undeveloped state in perpetuity.

The area designated for conservation is undeveloped and forested. In general, the area contains a variety of forest cover types that are typical of the lower hills, slopes, and headwater areas of the Monadnock region of southwestern New Hampshire. The cover types are in various stages of succession, ranging from recently cleared forest to intact mature stands of hardwood, softwood, and mixed forest. According to a natural community assessment performed during Project pre-construction assessments, none of the natural communities identified on the site are considered rare or unusual. These lands, however, have been identified as open space worthy of protection in both the Antrim Master Plan of 2010 and the Antrim Open Space Committee Open Space Plan adopted by the Town of Antrim in 2006. Both plans state that preservation of unfragmented forest areas in the western portion of Antrim, including the properties to be conserved, is one of the principal objectives of its residents. These lands also constitute typical habitat for many of New Hampshire's wildlife species, including birds and bats. The conservation proposal will also protect a significant area of land identified in the New Hampshire Wildlife Action Plan (NHFG 2005; NHFG 2010). Specifically, 313.11 acres of Highest Ranked Habitat in New Hampshire, 156.3 acres of Highest Ranked Habitat in Biological Region, and 438.59 acres of Supporting Landscape will be protected by the AWE conservation proposal.

The land conservation funding agreement between AWE and the New England Forestry Foundation ("NEFF") requires that AWE make a payment of $100,000 to NEFF within 30 days of the Project's commercial operations date. NEFF will use the funds to acquire new permanent conservation lands in southern New Hampshire, whether by a fee purchase or the purchase of a perpetual easement. Any new conservation land acquisition with these funds shall be required to be in perpetuity and shall forever extinguish all development rights except for sustainable forestry operations.

This conservation area represents a direct benefit to local bird and bat species which rely on undeveloped forested areas for foraging, nesting and roosting, and will help to sustain local wildlife populations.

8.2 Environmental Benefits

As described in detail in Section 5.3.3, the Project represents a new source of clean, renewable energy that will displace output from fossil fuel generation plants, which produce environmental pollutants that negatively affect regional air and water quality. This displacement will result in a significant reduction in toxic air emissions and preservation of water quality. There are specific environmental benefits to these improvements (see Section 5.3.3). Collectively, the expected reductions in the production of toxic air emissions support AWE's position that the proposed Project will provide net benefit (or a positive net impact) in terms of air quality. In turn, improved air quality will positively affect the physical environment and its fauna, including birds and bats.

Direct losses of individual birds and bats as a result of Project operations are expected to be low, and are not expected to impose population level impacts; however, bird and bat populations as a whole are expected to benefit from diminished toxic air emissions. For these reasons, AWE believes that net benefits to bird and bat populations as a result of Project operation are likely.

8.3 Additional Mitigative Actions for Bats

Bat fatalities directly attributable to AWE are expected to be low, based on the results of pre-construction surveys and the precedents at other facilities in the state and in New England (Stantec 2014 unpublished). Despite this expectation, AWE is offering to assess and implement (if Evaluation Phase studies and consultation deem such measures feasible, practical and effective) an operational curtailment protocol as a means of reducing risk to bat species. AWE believes that the curtailment study is the best use of limited post-construction biological funds. Not only will it have more scientific and commercial value, but it will enable the Project to implement, if deemed necessary during the Evaluation Phase, timely operational mitigative measures which are known to reduce risk to bats, rather than simply to perform studies that will result in no-action (at best) or the same (at worst).

In light of recent population declines as a result of white-nose syndrome in bats, even low mortality of some species could possibly become biologically significant over the life of the Project. The operational mitigative strategy assessed within this BBCS, in the form of curtailment, may help to avoid and reduce impacts to bats most susceptible to the WNS such as the *Myotis* species. This strategy may also reduce risk to the resident and migratory bats which may use the Project area.

The implementation of a long-term (beyond the 1-year Curtailment Evaluation Phase) operational mitigative strategy in the form of turbine curtailment will be assessed following completion of the Curtailment Evaulation Phase. Questions about if and how long-term curtailment measures should be implemented at the Project will be made in consultation with USFWS and NHFGD via the adaptive management process described in Section 9.

8.3.1 Curtailment Evaluation Phase

At the conclusion of the curtailment study during the Evaluation Phase, AWE will collaborate with USFWS and NHFGD to review effectiveness of the management treatment and cost and feasibility of management treatment options. The ultimate goal of the BBCS is to avoid and minimize levels of mortality for each species group such that they meet a reasonable threshold. Given the lack of existing baseline mortality data from the Project and the lack of data on the effectiveness of various curtailment strategies in a variety of landscapes, meaningful and defensible mortality thresholds cannot be established for the Project until the results of evaluation phase studies are available. Ultimately, the determination of what is "reasonable" will depend on the baseline mortality rate at the Project, and how it compares to mortality rates at similar projects. This "reasonableness" test will have to take into account the cost of potential management options in terms of Project financial viability, and balance these considerations with positive outcomes in terms of reducing bat fatalities.

The Evaluation Phase of the BBCS is intended to provide AWE, USFWS and NHFGD with a sufficient quantity and quality of data to identify specific treatment options that meet management objectives while minimizing cost of implementation. This evaluation will also insure the consideration that management actions to be implemented will be effective throughout the life of the Project without precluding the Project's financial viability.

8.3.2 Curtailment Implementation Phase

Should AWE, NHFGD and USFWS agree that an operational control measure is warranted based on the results of the Curtailment Evaluation Phase, the parties will determine the most appropriate curtailment parameter for implementation. Depending on patterns and species composition of bird and bat mortality documented during the Evaluation Phase, parameters of curtailment (such as cut-in wind speed, daily and nightly timing of curtailment, seasonal timing of curtailment, and numbers of turbines to curtail), may be adjusted to best manage potential risk to particular species or species groups while maintaining Project viability and maximizing the clean energy benefit realized by the Project. If any unforeseen, biologically significant events occur over the life of the Project, then manipulation of any curtailment strategy may be considered (among other potential solutions, as appropriate) during the phased consultation process. Again, any changes in the curtailment strategy must balance Project financial viability with positive outcomes for birds and/or bats, and must be agreed upon by all parties participating in the phased consultation process.

Throughout the implementation phase, AWE will record and retain turbine operation and weather data to document the amount of time that turbines are curtailed at various seasons. This information will provide a means of tracking the cost of the management actions implemented at the Project and will provide consistent data on the degree to which "high risk" conditions for each species group are being avoided.

Turbine curtailment and a significant conservation effort are the primary management actions provided under this BBCS. However, if implemented beyond the curtailment

implementation phase, AWE may propose to modify Project curtailment procedures should viable future technology, such as acoustic or visual deterrents or blade design innovations, be developed that will reasonably and cost effectively reduce impacts to birds and bats. Any such potential changes to Project operations will be proposed and/or initiated by AWE and will need to be vetted and agreed to by all parties participating in the phased consultation process. Any such proposed changes to operation and management strategy may be incorporated by AWE in the annual report under the Wildlife Mortality Monitoring Program (WMMP), and will initiate the phased consultation process.

In the event that bat mortality at the Project is found to be very low during the implementation period, and that operational controls are not making a significant contribution to lowering mortality, AWE reserves the right to propose alteration or suspension of the curtailment regime. Likewise, if conditions change over the life of the Project which cause operational controls to financially jeopardize continued operation, then AWE may propose financially viable alternatives to the current regime. Any such proposal would be subject to the phased consultation process.

8.4 Additional Mitigative Actions for Birds

AWE has worked cooperatively with the relevant agencies and implemented the most current available scientific knowledge, technology and survey methods into the development and definitive planning of the Project. Furthermore, AWE has committed to pursuing the most feasible risk avoidance and minimization techniques for bird species through: 1) the development and construction phase measures described in Section 6; 2) the post-construction studies and consultation described in Section 7; 3) the adaptive management strategy of this BBCS, which includes a Wildlife Mortality Monitoring Program, an Immediate Alert Procedure, and a phased consultation strategy (see Section 9); and 4) the permanent conservation of 908 acres of forested that provide valuable habitat for bird species as well as other wildlife. Specific avoidance and minimization measures that will be incorporated into Project plans that apply directly to eagles include: 1) minimizing practices that attract and

enhance prey species habitat in the project area; 2) requiring low speed limits for vehicles utilizing project roads (< 25 mph) in order to reduce vehicle collision risk to wildlife; and 3) removing carcasses (deer, moose, etc.) from the project.

9 ADAPTIVE MANAGEMENT STRATEGY

Studies and evaluations relevant to the Antrim Wind Energy Project to date have not indicated a need for Tier 5 study per the USFWS guidelines. However, given the dynamic nature of the environment and technology, unforeseen future circumstances could arise which may require further consideration. This adaptive management plan provides a framework for revisiting tiers of evaluation, or proceeding with Tier 5 consultation and study, if warranted.

The state of knowledge regarding bird and bat interactions at wind farms on the forested ridges of the northeast is still evolving. Likewise, the technology available to mitigate risks to birds and bats at wind farms is continuously developing as the science matures. Furthermore, the population status of a given species is dynamic, as exemplified by the population impacts to bats incurred by white-nose disease and the increase in bald eagle populations in the northeast in recent years. As such, the biological significance of individual losses can change over time.

In order to continuously address changing circumstances in the area of bird and bat interaction at wind farms, and potentially changing circumstances at the proposed Project, AWE will implement an adaptive management strategy for managing risk to birds and bats over the life of the Project. Adaptive management allows decisions and actions to be tailored to specific problems and circumstances (e.g., a specific species, location, weather pattern, wind speed, or season) at the specific point in time at which they occur.

The adaptive management process needs to take into account impacts to Project operations. Any additional controls will need to be supported not only by science, but by economic considerations that ultimately determine the Project's viability. Project adaptation should not only be geared toward additional controls, but also should take into account positive outcomes such as the documentation of minimal impacts to wildlife.

Adaptive management will be guided by: formal post construction study results documented during the year-one Curtailment Evaluation Phase and the longer three year formal mortality monitoring evaluation phase; a continuous Wildlife Mortality Monitoring Program (WMMP), equipped with an Immediate Alert Procedure (IAP) for reporting of unusual mortality events; and a phased consultation strategy. The WMMP, the IAP and the phased consultation strategy are described in detail in the following subsections.

9.1 Wildlife Mortality Monitoring Program

After formal monitoring is complete, AWE will implement a Wildlife Mortality Monitoring Program (WMMP) for all project site personnel. The WMMP will include training operations staff to continue to perform the nighthawk nesting surveys during each year of the Project's operational life, as described in Section 7.1.1 of this BBCS. This program will provide for the proper identification, handling and reporting of dead or injured birds and bats that are found during Project operation. AWE will keep a freezer onsite for the storage of any dead birds and bats found pending retrieval by appropriate agency personnel. The WMMP will be described in a stand-alone document that will be developed during the Evaluation Phase. The WMMP document will describe, in detail, the actions to be taken upon discovery of any dead or injured bird or bat at the Project. The WMMP will also incorporate the Immediate Alert Procedure described in this BBCS (see Section 9.2, below).

The WMMP will also include: provisions for cataloging and reporting annual findings; a list of key contacts; a training initiative for wind farm personnel; detailed handling and documentation forms and procedures; and provisions for permit compliance. The WMMP will be an evolving document, subject to updates as necessary.

9.1.1 Training

Under the WMMP, all appropriate personnel (including managers, supervisors, inspection and maintenance crews, etc.) will be trained in the identification, handling and reporting of dead or injured bird and bat species. This training will encompass the reasons, need, and method by which employees should report an injury or mortality, dispose of carcasses, and comply with applicable regulations, including the consequences of non-compliance.

All appropriate new-hires will be trained to execute the WMMP prior to working on-site. Appropriate staff will be subject to annual refresher training. Supplemental training also may be appropriate where there are material changes in regulations, permit conditions, or internal policies. Any updates to the WMMP will be distributed and discussed during annual training.

9.1.2 Key Resources

AWE will maintain a list of key resources to address bird and bat injury or mortality issues. This list will include a list of experts who may be called upon to aid in resolving various issues. Listed parties may include: Internal contacts, bird and bat study consultants, state and federal agency contacts, and local wildlife rehab facilities. The key resources list will be updated annually and presented during annual training.

9.1.3 Reporting

All injuries and mortalities discovered at the Project will be documented in an electronic database developed to serve the needs of the WMMP. Each year, these data will be compiled into an annual summary report. This annual report will assess the year's injury and mortality data, and will include a discussion, as appropriate, on other performance indicators relevant to this BBCS. If necessary, the report will also make recommendations for improvement. This BBCS summary report will be provided annually, by January 30, to the USFWS and NHFGD.

The WMMP will also include an Immediate Alert Program (IAP) which will inform regulating agencies of significant mortality events within 24 hours of discovery. Reports made under the IAP will trigger a phased process of consultation under the adaptive management process. The IAP and the phased consultation strategy it activates are described in detail, below.

9.1.4 Quality Control

Annual reporting under the WMMP will provide a mechanism for AWE and the agencies to review existing practices and ensure quality control.

9.1.5 Permit Compliance

Any Project staff that may be handling birds or bird carcasses will have appropriate federal and/or state wildlife handling permits. AWE will assure that wildlife rehabilitation centers and consulting staff also have appropriate permits if they will be responsible for transporting dead or injured birds protected by the MBTA and/or the BGEPA.

AWE operating personnel or designated contractors will be responsible for making sure that the Project maintains copies of all applicable permits and permit conditions. AWE operating personnel or designated contractors will also be responsible for maintaining all copies of annual permit reports to the USFWS and to any state agencies where required.

Copies of any necessary permits will be contained in the WMMP document, and will be kept current during annual updates.

9.2 Immediate Alert Procedure

An Immediate Alert Procedure (IAP), as defined and summarized in this BBCS, will be fully developed in consultation with USFWS and NHDFG, and will be incorporated as part of the WMMP. The IAP provides a mechanism for the reporting, assessment and resolution of biologically significant incidents.

For the purpose of this BBCS, biologically significant incidents are defined as those that involve the individual injury or death of a listed species or an eagle, or the large scale injury or death of any bird or bat species or groups. In the event that a bird or bat species that is federally or state listed as "threatened" or "endangered" is discovered, injured or dead, the IAP will be triggered. This includes any injury or mortality of a common nighthawk, which is state listed endangered. If a single bald or golden eagle is discovered, the IAP will be triggered. Likewise, in the event that a large-scale mortality event is discovered, the IAP will be triggered.

Listed species will be defined in the WMMP, and changes to that list will be incorporated in annual updates to the WMMP. Likewise, the definition of what constitutes a large-scale event will be developed in consultation with agencies and incorporated in the WMMP; this definition is also subject to re-assessment over time and may be adjusted, as appropriate over the life of the WMMP.

The MOU between AWE, NHFG, and ASNH outlines an adaptive management measure that shall be followed in the event a "displaying" nighthawk is observed on the Project site. In such an event, AWE shall:

a. Document the location that the displaying nighthawk was observed.
b. Notify NHFG within 48 hours.
c. Conduct three searches within 1 week of the initial observation to attempt to locate the nighthawk nest. Any located nest shall be cordoned off to prevent disturbance from vehicular or pedestrian traffic.
d. Curtail (shut down) the wind turbine closest to the discovered nest as follows:
    i. Daily between the hours of 8:00 PM and 9:30 PM and between the hours of 3:30 AM and 5:00 AM.

ii. Commencing form the date of the observation of the displaying nighthawk, or as soon as reasonably possible thereafter, and continuing until the earlier to occur of: a) the date upon which no nest is discovered after the initial observation despite habing conducted three searches in accordance with c). above; b) the following August 31st and c) the date on which AWE documents to NHFGD that the nesting nighthawks are no longer on the site.

Should a displaying nighthawk be present at the same site in a subsequent survey, these procedures shall be repeated.

In the event that no nesting nighthawk activity has been documented during the Project's operational life, all monitoring and survey work shall cease upon the final shutdown of the Project turbines. In the event that nesting nighthawk activity has been documented at any time during the 10-year period preceding the final shutdown of the Project turbines, then nighthawk surveys shall continue during the decommissioning period in the same manner as during Project operations until all decommissioning activities have been completed.

In general, as described within the USFWS Land-Based Wind Energy Guidelines (USFWS 2012), baseline risk assessments, definitions of biologically significant or large-scale events, and mitigation thresholds relevant to the Antrim Wind Energy Project will be regionally relative, and generally qualitative. These assessments and thresholds will be developed in consultation with USFWS and NHFGD and will be based on: site specific data collected during pre- and post-construction surveys at the Project; regional information regarding bird populations; and known comparative mortality rates at other wind projects in the region.

The IAP, when triggered, will require notification of a biologically significant event to NHFGD and USFWS within 48 hours of discovery. AWE will immediately implement a "root cause analysis" to determine the likely cause of the event. This analysis will be presented during a consultation with NHFGD and USFWS which will occur within a fourteen-day period following the reported incident.

This meeting will constitute Phase 1 of a phased consultation strategy (described in detail, below). At this meeting, the participants will determine an appropriate course of action to address the specific event at hand. Decisions may range from no-action to a course of further evaluation and potential mitigation. During consultation as a result of the IAP, AWE and consulting agencies will consider the most current, relevant knowledge, information and technology to determine an appropriate response.

9.3 Phased Consultation Process

Generally, the phased consultation process will be initiated by an alert from AWE as prescribed by the IAP. Under unforeseen circumstances, however, the phased consultation process may be initiated based on the results of annual reporting under the provisions of the WMMP. The phased consultation process is also the mechanism by which evaluation phase studies and recommendations will be assessed. This process must seek solutions which balance Project financial viability and ability to operate with positive outcomes for bird and bat species.

9.3.1 Phase 1 Consultation: Action/No Action Determination

During Phase 1 consultation, AWE, USFWS and NHFGD will meet to determine whether the reported event (or other matter of concern) is isolated, and if further action is feasible or required. If it is agreed that no further action is required, the consultation shall be closed. If further action is required, Phase 2 consultation shall proceed. The consultation shall proceed to Phase 2 or be closed within 60 days of the initial IAP event.

9.3.2 Phase 2 Consultation: Resolution/Research Initiative Determination

Phase 2 consultation will occur, as needed, at the initial consultation meeting. If appropriate action measures are readily defined and agreed upon by all parties at this meeting, then the agreed-upon strategy will be implemented and consultation will be closed.

If it is determined that further research is needed to address the matter at hand, then Phase 3 Consultation shall proceed within 45 days of initiating Phase 2.

9.3.3 Phase 3 Consultation: Desktop Research and Recommendations

Phase 3 consultation will consist of a desktop analysis of action alternatives. This analysis will determine potential action alternatives based on the most current scientific knowledge and available technology relevant to the subject at hand. This assessment will also take into account the financial viability of the Project and the financial and/or operational impact of any measures considered.

This effort will result in the production of a formal report to be submitted to the agencies by a date determined during Phase 2 consultation. The Phase 3 report will include descriptions of the action alternatives considered, and will present final action recommendations.

The results of Phase 3 consultation will dictate the course of research or mitigative actions, if any. If Phase 3 consultation results in a no-action decision, then consultation shall be closed. If Phase 3 consultation identifies and agrees upon mitigative measures to be taken, then those measures shall be implemented and consultation shall be closed.

If Phase 3 consultation agrees upon a strategy, but determines that a final plan of execution must be developed based on desktop research, then such a plan will be produced and assessed at the Phase 3 level.

If Phase 3 consultation determines that field research is necessary, then Phase 4 consultation shall proceed.

9.3.4 Phase 4 Consultation: Field Assessments

A final plan for research, as applicable, will be developed, approved and executed during Phase 4. The results of any field studies conducted during Phase 4 shall be submitted and treated as in Phase 3 consultation.

As in Phase 3, if consultation results in a no-action decision, then consultation shall be closed. If mitigative measures are identified and agreed upon by all parties, then those measures shall be implemented and consultation shall be closed.

If consultation agrees upon a strategy, but determines that a final plan of execution must be developed based on desktop research, then such a plan will be produced and assessed at the Phase 3 level. If it is determined that more field research is necessary, then Phase 4 consultation shall continue.

9.3.5 Closure of Consultation

Consultation shall continue until resolution is reached among all parties. Upon resolution, AWE will prepare a formal letter and submit it to the agencies. This letter will summarize the history of consultation regarding the specific matter at hand, explain the resolution, and declare that formal consultation has been closed. The agencies shall respond in a formal letter which indicates their acceptance of resolution and closure. The failure of agencies to provide such a letter within 60 days of AWE's letter of closure shall be construed as an acceptance of resolution and closure.

9.3.6 Dispute Resolution

If an occasion should arise where consulting parties do not agree on resolution and closure, a qualified mediator will be selected to assist in resolution. The parties shall select a mediator agreed upon by all parties. Mediation shall occur in Concord or Portsmouth, New Hampshire. If the parties cannot agree on the selection of a mediator, then each party shall select its own consultant and the consultants shall then select a mediator to assist in the resolution of the dispute. The decision of the

consultants on the mediator shall be final. Upon selection of an agreed upon mediator, mediation shall be completed within 120 days. If a resolution acceptable to all parties cannot be achieved within the 120 days period, the Site Evaluation Committee shall then arbitrate the dispute in accordance with its rules and applicable New Hampshire Statutes.

10 PERMIT COMPLIANCE

Permit compliance will occur in several stages of project development and operation. In general, any project staff that may be handling birds or bird carcasses will have appropriate federal and/or state wildlife handling permits. AWE will assure that wildlife rehabilitation centers and consulting staff also have the appropriate permits or permission to handle or transport dead or injured birds protected by the MBTA and/or the BGEPA.

Handling, possession, and/or scientific collection permits will likely be needed for the post-construction mortality study. All necessary permits will be obtained and maintained by the contractor performing the study.

AWE operating personnel or designated contractors will be responsible for ensuring that the Project maintains copies (electronic and hard copy) of applicable permits and permit conditions. AWE operating personnel or designated contractors will also be responsible for maintaining all copies of annual permit reports to the USFWS and to any state agencies where required.

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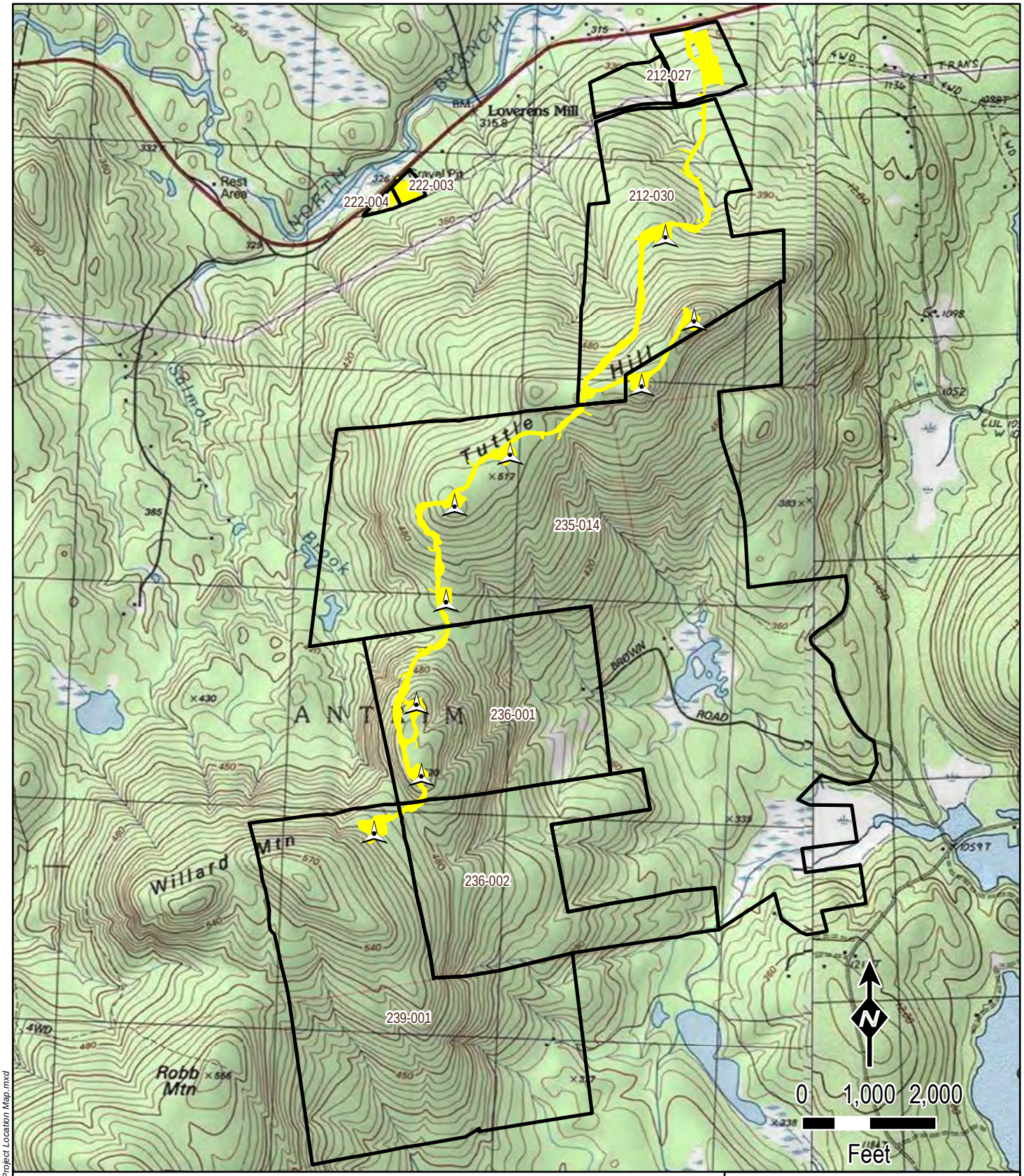
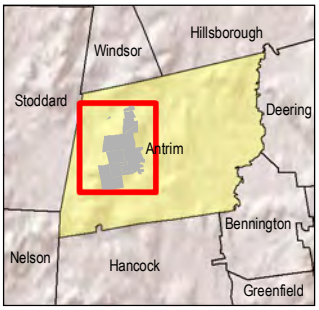
Attachment A

Site Map





Legend

- Proposed WTG
- Project Footprint
- Project Parcels

Antrim Wind Energy

ANTRIM WIND ENERGY PROJECT

354 KEENE ROAD, ANTRIM, NH

Attachment A

Project Location Map

Produced by: TRC | 1/29/2015

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Attachment B

Nocturnal Migrant Passage Rates

Appendix A Table 5. Summary of available avian spring radar survey results conducted at proposed (pre-construction) US wind power facilities in eastern US, using X-band mobile radar systems (2004-present)

Year	Project Site	Number of Survey Nights	Number of Survey Hours	Landscape	Average Passage Rate (t/km/hr)	Range in Nightly Passage Rates	Average Flight Direction	Average Flight Height (m)	(Turbine Ht) % Targets Below Turbine Height	Reference
Spring 2005										
2005	Sheffield, Caledonia Cty, VT	20	180	Forested ridge	166	12-440	40	552	(125 m) 6%	Woodlot Alternatives, Inc. 2006. Avian and Bat Information Summary and Risk Assessment for the Proposed Sheffield Wind Power Project in Sheffield, Vermont. Prepared for UPC Wind Management, LLC.
2005	Stamford, Delaware Cty, NY	35	301	Forested ridge	210	10-785	46	431	(110 m) 8%	Woodlot Alternatives, Inc. 2007. A Spring and Fall 2005 Radar and Acoustic Survey of Bird Migration at the Proposed Moresville Energy Center in Stamford and Roxbury, New York. Prepared for Invenergy, LLC. Rockville, MD.
2005	Deerfield, Bennington Cty, VT	20	183	Forested ridge	404	74-973	69	523	(100 m) 4%	Woodlot Alternatives, Inc. 2005. Spring 2005 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy, Inc.
2005	Franklin, Pendleton Cty, NY	21	204	Forested ridge	457	34-1240	53	492	(125 m) 11%	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar and Acoustic Survey of Bird and Bat Migration at the Proposed Liberty Gap Wind Project in Franklin, West Virginia. Prepared for US Wind Force, LLC.
2005	Dans Mountain, Allegany Cty, MD	23	189	Forested ridge	493	63-1388	38	541	(125 m) 15%	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Dan's Mountain Wind Project in Frostburg, Maryland. Prepared for US Wind Force.
Spring 2006										
2006	Kibby, Franklin Cty, ME (Range 1)	10	80	Forested ridge	197	6-471	50	412	(120 m) 22%	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
2006	Deerfield, Bennington Cty, VT	26	236	Forested ridge	263	5-934	58	435	(100 m) 11%	Woodlot Alternatives, Inc. 2006. Spring 2006 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy, Inc.
2006	Mars Hill, Aroostook Cty, ME	15	85	Forested ridge	338	76-674	58	384	(120 m) 14%	Woodlot Alternatives, Inc. 2006. A Spring 2006 Radar, Visual, and Acoustic Survey of Bird Migration at the Mars Hill Wind Farm in Mars Hill, Maine. Prepared for Evergreen Windpower, LLC.
2006	Kibby, Franklin Cty, ME (Valley)	2	14	Forested ridge	443	45-1242	61	334	(120 m) n/a	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
2006	Kibby, Franklin Cty, ME (Mountain)	6	33	Forested ridge	456	88-1500	67	368	(120 m) 14%	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
2006	Kibby, Franklin Cty, ME (Range 2)	7	57	Forested ridge	512	18-757	86	378	(120 m) 25%	Woodlot Alternatives, Inc. 2006. A Spring 2006 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Spring 2007										
2007	Stetson, Washington Cty, ME	21	138	Forested ridge	147	3-434	55	210	(120 m) 22%	Woodlot Alternatives, Inc. 2007. A Spring 2007 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
2007	Laurel Mountain, Barbour Cty, WV	20	197	Forested ridge	277	13-646	27	533	(130 m) 3%	Stantec Consulting Services Inc. 2007. A Spring 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Laurel Mountain Wind Energy Project near Elkins, West Virginia. Prepared for AES Laurel Mountain, LLC.
2007	Errol, Coos County, NH	30	212	Forested ridge	342	2 to 870	76	332	(125 m) 14%	Stantec Consulting Inc. 2007. Spring 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Power, LLC. Prepared for Granite Reliable Power, LLC.
2007	Roxbury, Oxford Cty, ME	20	n/a	Forested ridge	539	137-1256	52	312	(130 m) 18%	Woodlot Alternatives, Inc. 2007. A Spring 2007 Survey of Bird and Bat Migration at the Record Hill Wind Project, Roxbury, Maine. Prepared for Roxbury Hill Wind LLC.
2007	Lempster, Sullivan Cty, NH	30	277	Forested ridge	542	49-1094	49	358	(125 m) 18%	Woodlot Alternatives, Inc. 2007.A Spring 2007 Survey of Nocturnal Bird Migration, Breeding Birds, and Bicknell's Thrush at the Proposed Lempster Mountain Wind Power Project Lempster, New Hampshire. Prepared for Lempster Wind, LLC.
Spring 2008										
2008	Allegany, Cattaraugus Cty, NY	30	275	Forested ridge	268	53-755	18	316	(150 m) 19%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
2008	Oakfield, Penobscot Cty, ME	20	194	Forested ridge	498	132-899	33	276	(120 m) 21%	Stantec Consulting Services Inc. 2008.A Spring 2008 Survey of Bird and Bat Migration at the Oakfield Wind Project, Washington County, Maine. Prepared for Evergreen Wind, LLC.
2008	New Creek, Grant Cty, WV	20	n/a	Forested ridge	1020	289-2610	30	354	(130 m) 13%	Stantec Consulting Services Inc. 2008. A Spring 2008 Survey of Bird Migration at the New Creek Wind Project, West Virginia. Prepared for AES New Creek, LLC.
2008	Tenney, Grafton Cty, NH	40	373	Forested ridge	234	35-549	77	321	(125 m) 12%	Stantec Consulting Services Inc. 2008. Spring 2008 Radar Survey Report for the Groton Wind Project. Prepared for Groton Wind, LLC.
2008	Rollins, Penobscot Cty, ME	20	189	Forested ridge	247	40 - 766	75	316	(120 m) 13%	Stantec Consulting. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind, LLC.
Spring 2009										
2009	Sisk (Kibby Expansion), Franklin Cty, ME	21	193	Forested ridge	207	50-452	28	293	(125 m) 18%	Stantec Consulting Services Inc. 2009. Spring 2009 Nocturnal Migration Survey Report for the Kibby Expansion Wind Project. Prepared for TRC Engineers LLC.
2009	Vermont Community Wind Farm, Orleans Cty, VT	15	90	Forested ridge	435	49-771	48	320	(130 m) 22%	Stantec Consulting Services Inc. 2009. Spring and Summer 2009 Bird and Bat Survey Report. Prepared for Vermont Community Wind Farm, LLC.
2009	Moresville, Delaware Cty, NY	30	275	Forested ridge	230	30-575	53	314	(125 m)12%	Stantec Consulting Services Inc. 2009. 2009 Spring Nocturnal Radar Survey Report for the Moresville Energy Center. Prepared for Moresville Energy LLC.
2009	Highland, Somerset Cty, ME (location 1)	21	192	Forested ridge	496	10-1262	47	287	(130.5m) 26%	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys for the Highland Wind Project. Prepared for Highland Wind LLC
2009	Highland, Somerset Cty, ME (location 2)	19	161	Forested ridge	511	8-1735	53	314	(130.5m) 23%	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys for the Highland Wind Project. Prepared for Highland Wind LLC
Spring 2010										
2010	Bowers, Carroll Plantation, ME	20	188	Forested ridge	289	20-589	56	243	(131 m) 26%	Stantec Consulting Services Inc. 2010. Draft 2010 Spring Avian and Spring/Summer Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy LLC.
2010	Bull Hill, T16 MD, ME	20	184	Forested ridge	387	43-879	48	217	(145 m) 38%	Stantec Consulting Services Inc. 2010. Spring 2010 Avian and Bat Survey Report for the Bull Hill Wind Project. Prepared for Blue Sky East Wind LLC.
Spring 2011										
2011	Antrim, Antrim, NH	30	284	Forested ridge	223	6-1215	44	305	(150 m) 30%	Stantec Consulting Services Inc. 2011. Spring 2011 Radar and Acoustic Survey Report for the Antrim Wind Energy Project. Prepared for Eolian Renewable Energy.

Note:

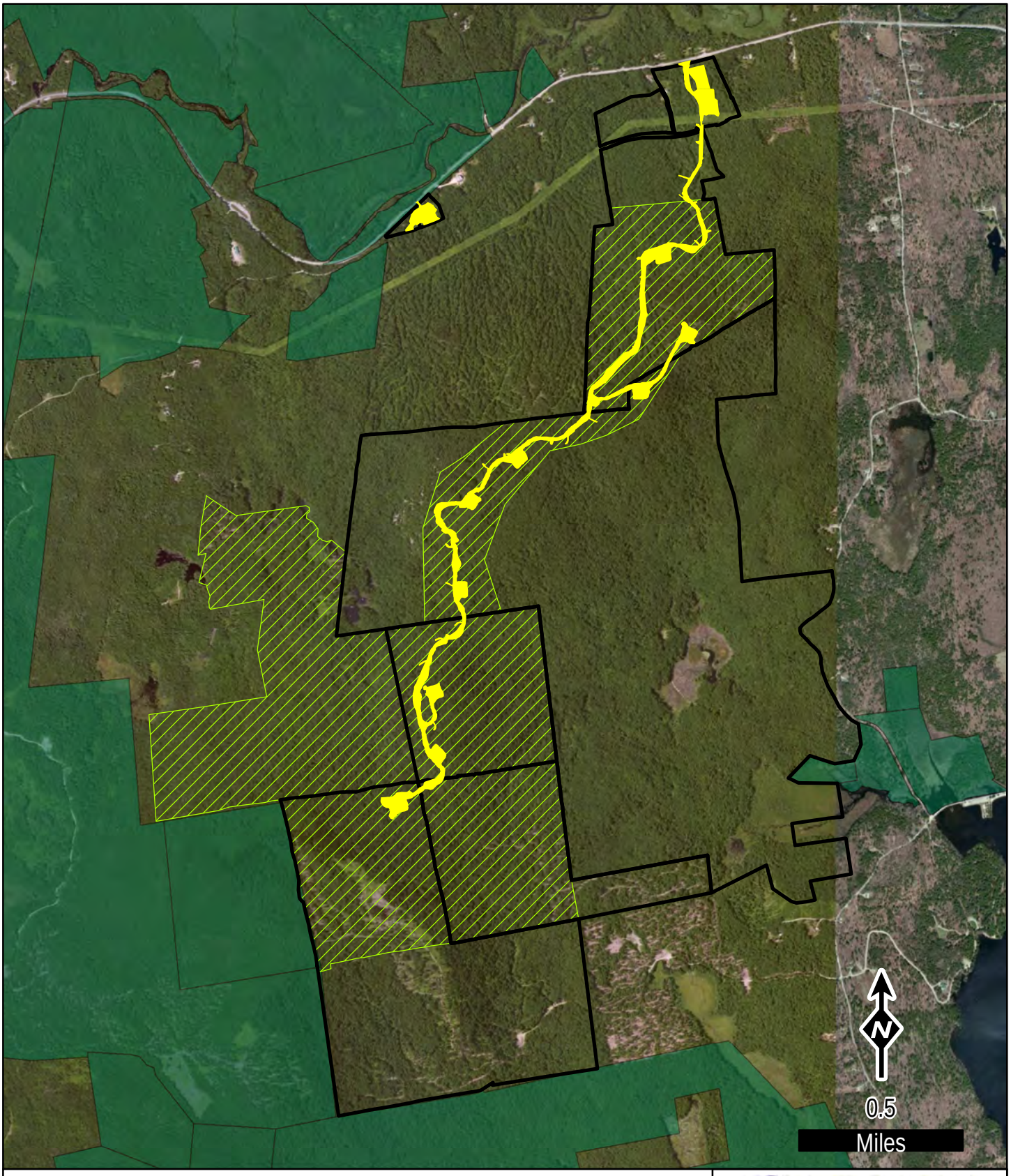
[1] The percent targets below turbine height can be found in the addendum to the report "Effect of Top Notch (now Hardscrabble) Wind Project revision to turbine layout and model changes on the spring and fall 2005 nocturnal radar survey reports." Prepared August 26, 2009, by Stantec Consulting Services Inc.

Appendix A Table 5. Summary of available avian fall radar survey results conducted at proposed (pre-construction) US wind power facilities on forested ridges in the eastern US, using X-band mobile radar systems (2004-present)

Project Site	Number of Survey Nights	Number of Survey Hours	Landscape	Average Passage Rate (t/km/hr)	Range in Nightly Passage Rates	Average Flight Direction	Average Flight Height (m)	(Turbine Ht) % Targets Below Turbine Height	Reference
Fall 2004									
Sheffield, Caledonia Cty, VT	18	176	Forested ridge	91	19-320	200	566	(125 m) 1%	Woodlot Alternatives, Inc. 2006. Avian and Bat Information Summary and Risk Assessment for the Proposed Sheffield Wind Power Project in Sheffield, Vermont. Prepared for UPC Wind Management, LLC.
Casselman, Somerset Cty, PA	30	n/a	Forested ridge	174	n/a	n/a	436	(125 m) 7%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
Dans Mountain, Allegany Cty, MD	34	318	Forested ridge	188	2-633	193	542	(125 m) 11%	Woodlot Alternatives, Inc. 2004. A Fall 2004 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Dan's Mountain Wind Project in Frostburg, Maryland. Prepared for US Wind Force.
Franklin, Pendleton Cty, WV	34	349	Forested ridge	229	7-926	175	583	(125 m) 8%	Woodlot Alternatives, Inc. 2005. A Fall 2005 Radar and Acoustic Survey of Bird and Bat Migration at the Proposed Liberty Gap Wind Project in Franklin, West Virginia. Prepared for US Wind Force, LLC.
Fall 2005									
Swallow Farm, PA	58	n/a	Forested ridge	166	n/a	n/a	402	(125 m) 5%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
Kibby, Franklin Cty, ME (Range 1)	12	101	Forested ridge	201	12-783	196	352	(125 m) 12%	Woodlot Alternatives, Inc. 2006. A Fall 2005 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Fayette Cty, PA	26	n/a	Forested ridge	297	n/a	n/a	426	(125 m) 5%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
Stamford, Delaware Cty, NY	48	418	Forested ridge	315	22-784	251	494	(110 m) 3%	Woodlot Alternatives, Inc. 2007. A Spring and Fall 2005 Radar and Acoustic Survey of Bird Migration at the Proposed Moresville Energy Center in Stamford and Roxbury, New York. Prepared for Invenergy, LLC. Rockville, MD.
Preston Cty, WV	26	n/a	Forested ridge	379	n/a	n/a	420	(125 m) 10%	Plissner, J.H., T.J. Mabee, and B.A. Cooper. 2006 A radar and visual study of nocturnal bird and bat migration at the proposed Preston Wind Development project, Virginia, Fall 2005. Report to Highland New Wind Development, LLC.
Highland, VA	58	n/a	Forested ridge	385	n/a	n/a	442	(125 m) 12%	Plissner, J.H., T.J. Mabee, and B.A. Cooper. 2006 A radar and visual study of nocturnal bird and bat migration at the proposed Highland New Wind Development project, Virginia, Fall 2005. Report to Highland New Wind Development, LLC.
Kibby, Franklin Cty, ME (Valley)	5	13	Forested ridge	452	52-995	193	391	(125 m) 16%	Woodlot Alternatives, Inc. 2006. A Fall 2005 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Mars Hill, Aroostook Cty, ME	18	117	Forested ridge	512	60-1092	228	424	(120 m) 8%	Woodlot Alternatives, Inc. 2006. A Fall 2005 Radar, Visual, and Acoustic Survey of Bird Migration at the Mars Hill Wind Farm in Mars Hill, Maine. Prepared for Evergreen Windpower, LLC.
Deerfield, Bennington Cty, VT	32	324	Forested ridge	559	3-1736	221	395	(100 m) 13%	Woodlot Alternatives, Inc. 2006. Fall 2005 Bird and Bat Migration Surveys at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy, Inc.
Kibby, Franklin Cty, ME (Mountain)	12	115	Forested ridge	565	109-1107	167	370	(125 m) 16%	Woodlot Alternatives, Inc. 2006. A Fall 2005 Survey of Bird and Bat Migration at the Proposed Kibby Wind Power Project in Kibby and Skinner Townships, Maine. Prepared for TransCanada Maine.
Fall 2006									
Somerset Cty, PA	29	n/a	Forested ridge	316	n/a	n/a	374	(125 m) 8%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
Bedford Cty, PA	29	n/a	Forested ridge	438	n/a	n/a	379	(125 m) 10%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
Stetson, Washington Cty, ME	12	77	Forested ridge	476	131-1192	227	378	(125 m) 13%	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
Lempster, Sullivan Cty, NH	32	290	Forested ridge	620	133-1609	206	387	(125 m) 8%	Woodlot Alternatives, Inc. 2007. A Fall 2007 Survey of Nocturnal Bird Migration, Breeding Birds, and Bicknell's Thrush at the Proposed Lempster Mountain Wind Power Project Lempster, New Hampshire. Prepared for Lempster Wind, LLC.
Fall 2007									
Laurel Mountain, Barbour Cty, WV	20	212	Forested ridge	321	76-513	209	533	(130 m) 6%	Stantec Consulting Services Inc. 2007. A Fall 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Laurel Mountain Wind Energy Project near Elkins, West Virginia. Prepared for AES Laurel Mountain, LLC.
Errol, Coos County, NH	29	232	Forested ridge	366	54 to 1234	223	343	(125 m) 15%	Stantec Consulting Inc. 2007. Fall 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Power, LLC. Prepared for Granite Reliable Power, LLC.
Rollins, Lincoln, Penobscot Cty, ME	22	231	Forested ridge	368	82-953	284	343	(120 m) 13%	Woodlot Alternatives, Inc. 2008. A Fall 2007 Survey of Bird and Bat Migration at the Rollins Wind Project, Washington County, Maine. Prepared for Evergreen Wind, LLC.
Roxbury, Oxford Cty, ME	20	220	Forested ridge	420	88-1006	227	365	(130 m) 14%	Woodlot Alternatives, Inc. 2007. A Fall 2007 Survey of Bird and Bat Migration at the Record Hill Wind Project, Roxbury, Maine. Prepared for Roxbury Hill Wind LLC.
Allegany, Cattaraugus Cty, NY	46	n/a	Forested ridge	451	n/a	230	382	(150 m) 14%	New York Department of Conservation [Internet]. c2008. Publicly Available Radar Results for Proposed Wind Sites in New York. Albany, NY: NYDEC; [updated May 2008; cited June 2009]. Available at http://www.dec.ny.gov/docs/wildlife_pdf/radarwindsum.pdf
New Creek, Grant Cty, WV	20	n/a	Forested ridge	811	263-1683	231	360	(130 m) 17%	Stantec Consulting Services Inc. 2008. A Fall 2007 Survey of Bird and Bat Migration at the New Creek Wind Project, West Virginia. Prepared for AES New Creek, LLC.
Fall 2008									
Georgia Mountain, VT	21	n/a	Forested ridge	326	56-700	230	371	(120 m) 7%	Stantec Consulting Services Inc. 2008. A Fall 2008 Survey of Bird Migration at the Georgia Mountain Wind Project, Vermont. Prepared for Georgia Mountain Community Wind.
Oakfield, Penobscot Cty, ME	20	n/a	Forested ridge	501	116-945	200	309	(125 m) 18%	Woodlot Alternatives, Inc. 2008. A Fall 2008 Survey of Bird and Bat Migration at the Oakfield Wind Project, Washington County, Maine. Prepared for Evergreen Wind, LLC.
Tenney, Grafton Cty, NH	45	509	Forested ridge	470	94-1174	260	342	(125m) 13%	Stantec Consulting Services Inc. 2008. Fall 2008 Radar Survey Report for the Groton Wind Project. Prepared for Groton Wind, LLC.
Highland, Somerset Cty, ME	20	216	Forested ridge	549	68-1201	227	348	(130.5m) 17%	Stantec Consulting. 2009. Fall 2008 Bird and Bat Migration Survey Report: Radar and Acoustic Avian and Bat Surveys for the Highland Wind Project Highland Plantation, Maine. Prepared for Highland Wind LLC
Fall 2009									
Sisk (Kibby Expansion) Franklin Cty, ME	20	210	Forested ridge	458	44-1067	206	287	(125m) 23%	Stantec Consulting Services. 2009. Fall 2009 Nocturnal Migration Survey Report. Prepared for TRC Engineers LLC.
Vermont Community Wind Farm, Orleans Cty, VT	20	227	Forested ridge	443	110-1029	215	330	(130m) 15%	Stantec Consulting Services. 2009. Fall 2009 Bird and Bat Survey Report. Nocturnal Radar, Acoustic, and Diurnal Raptor Surveys performed for the Vermont Community Wind Farm Project in Rutland County, Vermont. Prepared for Vermont Community Wind Farm, LLC.
Stetson, Washington Cty, ME	18	201	Forested ridge	457	106-1746	227	420	(119m) 2%	Stantec Consulting Services. 2010. Stetson I Mountain Wind Project Year 1 Post-Construction Monitoring Report, 2009. Prepared for First Wind Management, LLC.
Bull Hill, Hancock Cty, ME	20	232	Forested ridge	614	188-1500	260	357	(145m) 20%	Stantec Consulting Services. 2010. Summer and Fall 2009 Avian and Bat Survey Report for the Bull Hill Project. Prepared for Blue Sky East Wind, LLC.
Bowers, Washington Cty, ME	22	249	Forested ridge	344	95-844	231	453	(119m) 14%	Stantec Consulting Services Inc. 2010. 2010 Spring Avian and Spring/Summer Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy, LLC.
Fall 2010									
Bingham, Somerset Cty, ME	20	232	Forested ridge	803	194-2463	234	377	(150m) 20%	Stantec Consulting Services Inc. 2010. 2010 Spring Avian and Spring/Summer Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy, LLC.
Fall 2011									
Antrim, Hillsborough Cty, NH	30	327	Forested ridge	138	4-538	217	203	(150m) 40%	*this report*

Attachment C

Conservation Easements



Legend

- Project Parcels
- Proposed Project Area
- Proposed Conservation Easements
- Existing Conserved Lands

Conserved Lands layer courtesy of NH GRANIT and Town of Antrim

EOLIAN
RENEWABLE ENERGY

ANTRIM WIND ENERGY PROJECT

ANTRIM, NH

Attachment C

Proposed Conservation Easement Areas

Produced by: TRC | 7/2/2015

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