



Work Plan for Post-Construction Bird and Bat Mortality Monitoring

**Work Plan for Bird and Bat
Post-construction Studies
at the Ball Hill Windpark
Towns of Villenova and Hanover,
Chautauqua County, New York**

July 2008

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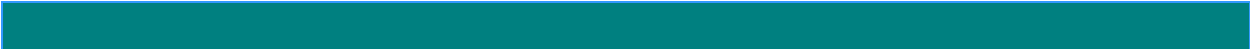
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List of Abbreviations and Acronyms

amsl	above mean sea level
DEIS	Draft Environmental Impact Statement
E & E	Ecology and Environment, Inc.
GE	General Electric
GPS	global positioning system
kV	kilovolt
MTS	modular tower system
MW	megawatt
Noble	Noble Environmental Power, LLC
NWS	National Weather Service
NYSDEC	New York State Department of Environmental Conservation
ROW	right-of-way
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey

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Project Background and Study Area

1.1 Project Description

Noble Ball Hill Windpark, LLC (Noble) is proposing to construct and operate a wind energy facility (the Project) in the Towns of Villenova and Hanover, Chautauqua County, located in western New York State (see Figure 1-1). The project consists of generation and transmission components.

1.1.1 Ball Hill Project Area

Currently, the Project will include the following:

- Installation and operation of 60 wind turbines (49 in the Town of Villenova and 11 in the Town of Hanover) with a capacity of 90 megawatts (MW) within an approximately 13,658 acre Project Area in the Towns of Villenova and Hanover;
- Construction and use of approximately 16 miles of access roads (13 miles in the Town of Villenova and three miles in the Town of Hanover) that will connect each wind turbine to a Town or County roadway to allow equipment and vehicle access for construction and subsequent maintenance of the facilities;
- Construction and use of an electrical collection system (23.8 miles) that will allow delivery of electricity to a new substation to be constructed in the Town of Hanover. Nearly the entire collection system will be installed underground. One hundred seventy four feet of overhead collection line will be installed in the Town of Villenova;
- Construction and use of a new substation (Hanover substation) within the Project Area in the Town of Hanover that will tie into a new 115-kilovolt (kV) transmission line. The substation footprint will be approximately 200 by 300 feet. The substation will be located on and have direct access to Hurlbert Road;
- Construction and use of a switchyard within the Project Area in the Town of Hanover. The switchyard footprint will be approximately 300 by 500 feet.

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The switchyard will be located on and have direct access to Bennett State Road (County Route 85); and

- Construction and use of a 5.95-mile overhead 115-kV transmission line, sited within the Town of Hanover to transfer the energy from the new substation to the new switchyard. The proposed switchyard will provide connection to existing 230-kV National Grid transmission line which provides access to the grid.

1.1.2 Turbine Description

The wind turbines that will be installed at the Windpark will be General Electric (GE) 1.5-MW, Model sle, 80-meter, modular tower system (MTS), T-Flange wind turbine generators¹. The turbine is a three-bladed, upwind, horizontal-axis wind turbine with a rotor diameter of 253 feet (77 meters) (see Figure 1-2). The nacelle is located at the top of each tower and contains the electrical generating equipment. The turbine rotor and nacelle are mounted on top of a tubular tower, giving a rotor hub height of 263 feet (80 meters) (see Figure 1-2). The maximum height for the turbine is 389 feet (118.5 meters) when a rotor blade is at the top of its rotation. Once installed, each wind turbine will occupy a round, slightly exposed base approximately 18 feet (5.5 meters) in diameter.

1.2 Permitting Requirements

This work plan for bird and bat post-construction mortality studies was prepared by Ecology and Environment, Inc. (E & E) as part of the draft Environmental Impact Statement (DEIS) (E & E 2008) to address anticipated requirements that will be incorporated into the New York State Department of Environmental Conservation (NYSDEC), Article 15 and Article 24 permitting and U.S. Army Corps of Engineers, Section 404 and Section 10 permitting for the Project. It should be noted that NYSDEC is likely to require an overarching adaptive management strategy for evaluating actual impacts associated with the operation of the Project. As such, the methodology as outlined here is a pilot study of methods to be used in subsequent years of the post-construction studies. In consultation with NYSDEC, the scope may be revised to either increase or reduce the scope of the study, based on the number of carcasses retrieved in relation to the actual number of hours/days searched, weather conditions, carcass removal rates, searcher efficiencies, or other parameters viewed as relevant following yearly review of the data. Any changes to the work plan will be made in writing and agreed to by both NYSDEC and Noble.

¹ 1.5MW refers to the production capacity of the turbine, which is 1.5 megawatts. The nomenclature “sle” is used to designate that the diameter size of the turbine rotor is 253 feet. 80-meter refers to the height of the tower. MTS (Modular Tower System) designates the type of tower configuration, and T-Flange designates the type of flange used to connect the tower directly to the foundation.

1. Project Background and Study Area

NYSDEC issued draft Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects (“Draft Guidelines”) for public comment in January 2008 (NYSDEC 2008). Noble recognizes that issuance of a final NYSDEC guidance document regarding post- construction monitoring should be forthcoming in the future. Noble will coordinate with NYSDEC, as appropriate, if modifications are needed to reflect final NYSDEC guidelines in future revisions of this work plan.

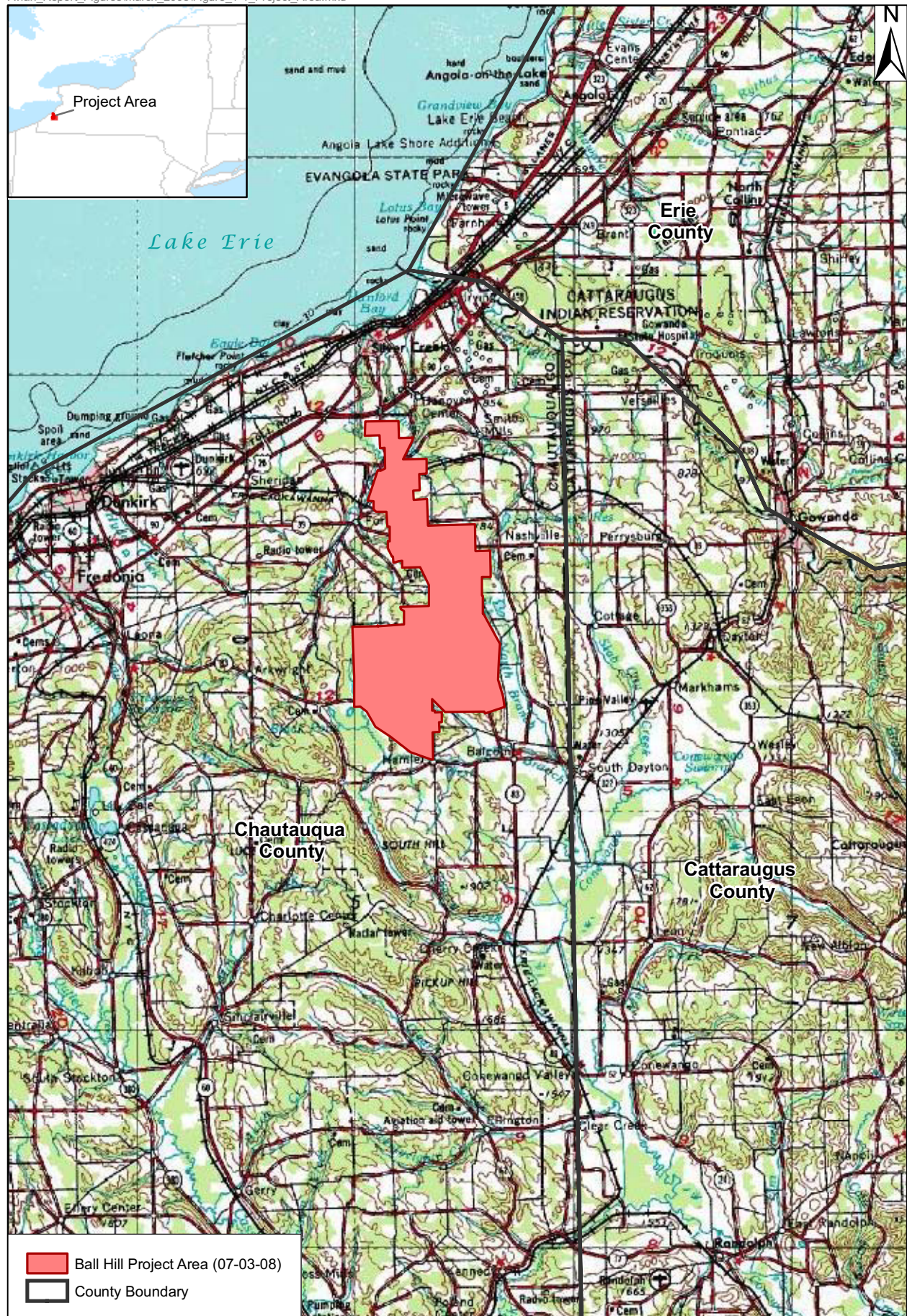


Figure 1-1 General Project Location
Noble Ball Hill Windpark
Towns of Villenova and Hanover,
Chautauqua County, New York

Source: USGS 1:250,000 Topographic Map
 Quadangles: Buffalo, 1967.

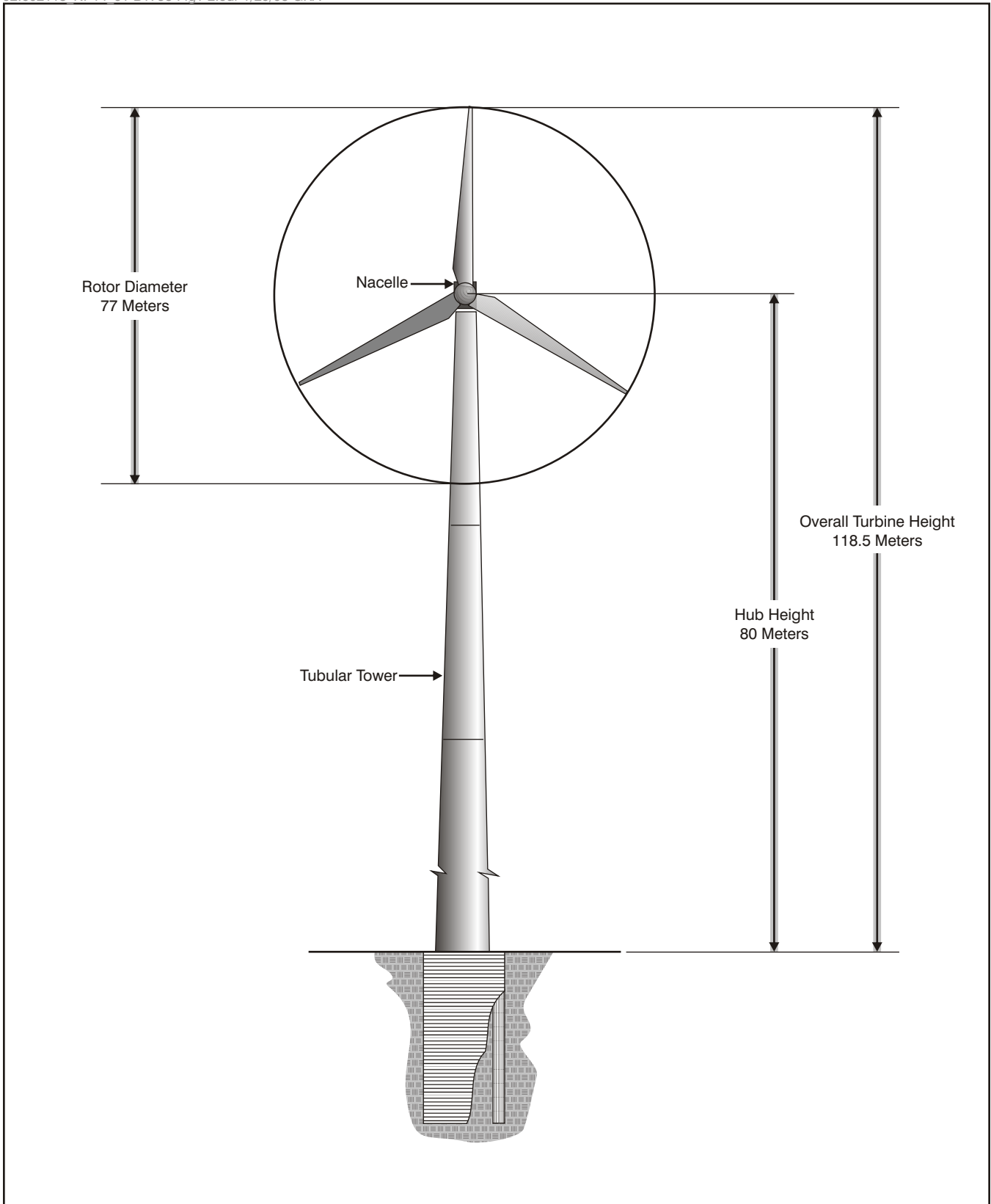


Figure 1-2 Generalized Wind Turbine Layout

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Study Objectives

Given the concern for bird and bat resources associated with wind energy facilities, quantifying the direct collisions with turbines is the key component of the studies. The studies are a complement to pre-construction field surveys that were conducted in the fall of 2006, spring and fall of 2007, and spring of 2008 and are designed to quantify the bird and bat collision impacts from the Noble Ball Hill Windpark.

The proposed plan of study has the following objectives:

1. Collect quantitative collision data on birds and bats from the Ball Hill Windpark during migratory seasons and the summer. Estimates of numbers of fatalities will be determined for both birds and bats, both collectively, and on a species-by-species basis.
2. Collect information on the occurrence and distribution of bird species in the Project Area during the breeding season.
3. Collect information on the occurrence of bat species in the Project Area.
4. Evaluate the data and identify potential adaptive management strategies if the collision impacts are significantly adverse.
5. Evaluate the study methodology after each year and revise if necessary.

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Methodology

The methodologies proposed by Noble follow procedures that have been included in previous work plans for Noble windparks in New York State (e.g. Clinton, Ellenburg, Altona, Bliss, Chateaugay, Wethersfield, and Allegany). Those work plans were developed through ongoing discussions with NYSDEC bird and bat biologists and permits staff, including meetings on October 25, 2006; March 21, 2007; and April 4, 2008. The methodologies proposed closely match those included in the NYSDEC Draft Guidelines. Noble anticipates that NYSDEC will issue finalized guidance for post-construction monitoring requirements to standardize sampling between the various projects that are under construction or being proposed within the state. While the Draft Guidelines have been published, it is the understanding of Noble that final guidance may be made available in 2008 or 2009, and as such, will be able to modify approaches, as appropriate, prior to Ball Hill Windpark becoming operational and the first year of the study. Any modifications to the work plan that are based on future NYSDEC guidance will be made in writing and will need agreement by both NYSDEC and Noble.

Task 1: Post-Construction Bird and Bat Mortality Study

This post-construction study will estimate the magnitude of bird and bat collisions associated with the Ball Hill Windpark based on field surveys and statistical extrapolation. The study will be conducted over three years and focus on the migration periods for birds and bats in addition to the summer months. The results of this study will be useful to determine the collision impacts to migratory birds and bats and identify if the results are comparable with the range of estimated mortality rates included in the DEIS for this project.

Study Area. When constructed, the Ball Hill Windpark will consist of 60 1.5-MW turbines within an approximate 13,658-acre area in the Towns of Villenova and Hanover, Chautauqua County (see Figure 1-1). The turbines will be distributed in loose clusters throughout the Project Area. Within the Project Area, elevations range from 787 feet to 1,740 feet above mean sea level (amsl). With a total turbine height, from ground surface to full rotor blade extension, of approximately 389 feet, the elevations will range between 1,176 to 2,129 feet amsl). The Windpark will be lighted in accordance with Federal Aviation Administration guidelines. No guy wires will be associated with the turbines and there are also no locations suitable for perching or nesting by birds on the turbines. Access roads will connect to each turbine, allowing for vehicular access to conduct this study.

Turbine Search Area. There is not a current standard for turbine search area. Many current studies include searching plots based on half the maximum distance from the tip height to the ground from the turbine tower. The National Research Council indicated the minimum plot radius should be approximately equal to the diameter of the rotor (National Research Council 2007). The Draft Guidelines indicated that a search area should be no less than 1.5 times the rotor diameter. Studies conducted at wind energy facilities in Oregon, Minnesota, Wyoming, and Washington prior to 2003 found that most fatalities (more than 80%) were found within half of the maximum distance from the tip height to the ground from the turbine tower (National Research Council 2007). More recent studies conducted at the Mountaineer (West Virginia) and Meyersdale (Pennsylvania) wind-energy facilities with more rigorous methods had different results. Fewer than 3% of fatalities were found more than 50 meters from the nearest turbine at those sites, with 93% of all fatalities at Mountaineer and 84% of all fatalities at Meyersdale found less than 40 meters from the nearest turbine (Arnett et al. 2005; National Research Council 2007). In a 2003 study at Mountaineer with a search out to 60 meters from each turbine tower, the majority of carcasses were between 16 and 30 meters of the base of the turbine tower (Kerns and Kerlinger 2004; National Research Council 2007).

For at least the first year of the study, direct visual observations will be conducted within a 120-meter (394-foot) by 120-meter (394-foot) plot centered on the turbine tower. This turbine search area is approximately half the maximum distance from the tip height (118.5 meters [389 feet]) to the ground from the turbine tower and also at least 1.5 times the rotor diameter (115.5 meters [379 feet]) as per the Draft Guidelines. After the first year of the study, the turbine search area will be re-evaluated and 80-meter (263 foot) by 80-meter (263 foot) and 100-meter (328 foot) by 100-meter (328 foot) plots may be considered. Any proposed modifications to the turbine search area, will be based on specific data collected during the first year of the study, with NYSDEC and United States Fish and Wildlife Service (USFWS) approval sought in advance of implementation.

The search area will be further separated into survey transect lines at 5-meter (16.4-foot) intervals, with 24 transects sited for each turbine surveyed (see Figure 3-1). A visual scan out to approximately 2.5 meters (8.2 feet) on either side of the transect will be covered by the searcher. This method will allow tight coverage of the turbines searched to reduce the impact of unsearched ground on the estimated mortality under a turbine. Data reporting for each transect will include the perpendicular distance of each target found from the centerline to facilitate assessment of searcher efficiency and define the functional range of observation off transect centerline.

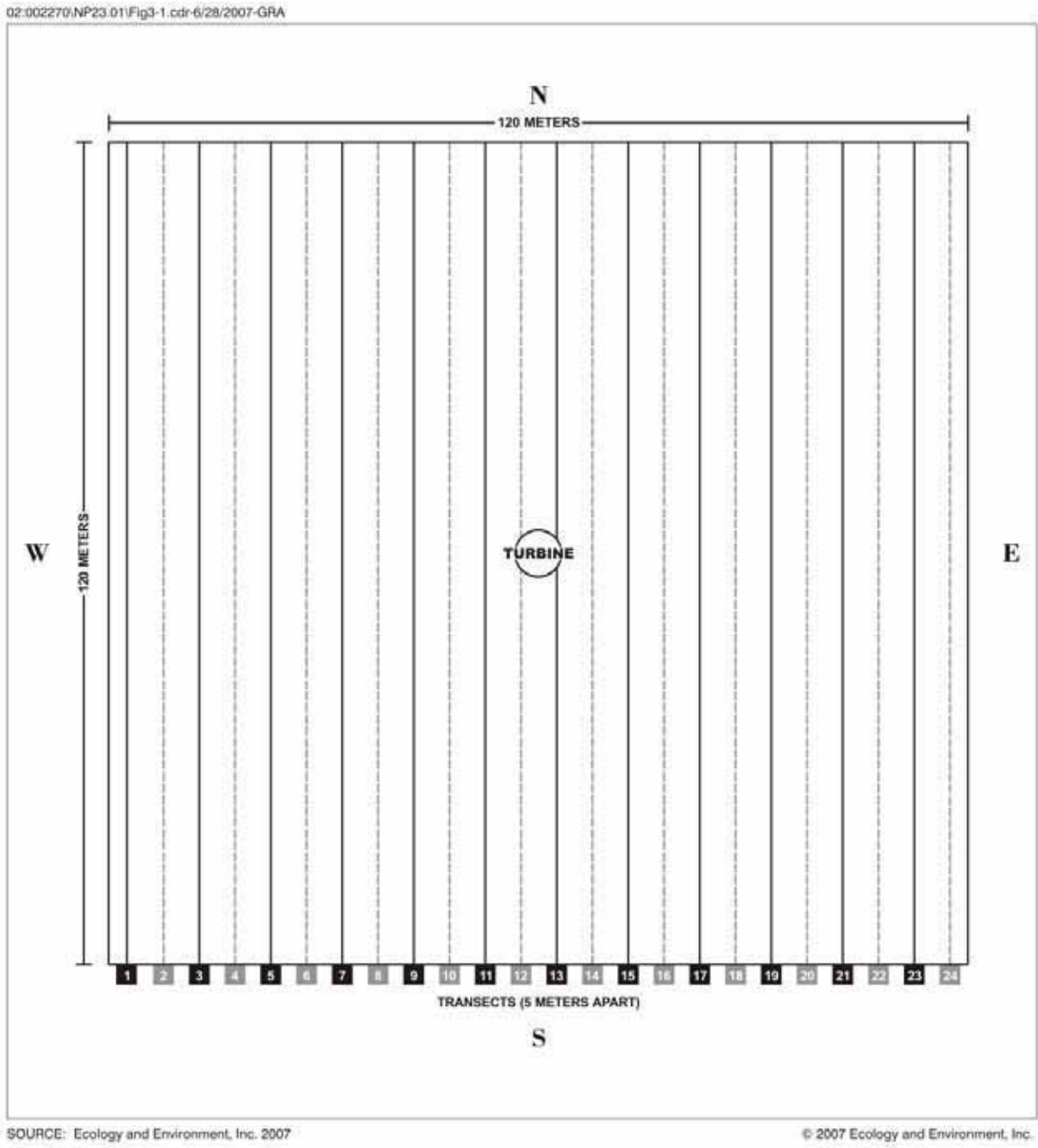


Figure 3-1 Turbine Search Area for Daily Surveys

Some other methodology procedures related to turbine search area include:

- Each transect will be located using a global positioning system (GPS) and/or in field flagging to assure consistency between searchers and turbine sites. Wood field stakes, rather than metal field flagging, will be used in areas where livestock may graze or where the area is utilized for crop production. Each transect line will be flagged at the beginning, mid-point, and end of each line to help assure that the searcher will remain on course.
- Prior to initiating the annual survey effort, each turbine site that is selected to be included within the scope of the survey will be searched to locate residual carcasses that may have accumulated since the Project began operating.
- Field modification of transect lines may be necessary to avoid unwalkable areas (e.g. dense forest, pit, steep slope). If necessary, correction calculations will be performed to account for the unsearchable ground.
- Prior to the commencement of sampling, the search areas beneath turbines (except forested areas) will be cleared of vegetation as necessary to facilitate the searchers' efforts. Noble will develop a regular mowing schedule after conferring with the participating landowners. Mowing/clearing of land beneath turbines involved in ground surveys will occur on a frequent, regular basis to maintain a short vegetation height suitable for ground searches.
- Heavily forested areas will only be cleared and searched out to the tree line.

Total Turbines Surveyed. Searches will be conducted at approximately 30% of the total turbines as per the Draft Guidelines. Therefore, 18 turbines will be searched for this study at the Ball Hill Windpark. It is anticipated that the same 18 turbines will be searched throughout the first year of the study, although it is possible that changes might be necessary during the year due to unforeseen issues with a site, access, or property owners. It is also anticipated that the same 18 turbines, or at least a majority of them, will be searched in the second and third years of study; however, the value of doing so will be evaluated following the first year of study.

Although the turbines to be searched will be selected randomly, the selection process will involve stratification by habitat prior to random selection. All turbines will be classified by one or more habitats present: agricultural (crop), grassland (hayfield or pasture), reverting field (brush), or forest, so that an appropriate mix of survey points can be selected and differences in fatality, scavenging, and searcher efficiency rates among habitats could be evaluated following data collection. Proximity to wetland complexes, forested areas, and outlying turbines will also be considered during turbine search selection and data analysis. For the Ball Hill Windpark, it is anticipated that the majority of turbines will be classified as agricultural fields or pasture, followed by forest, and reverting field (brush), in

descending order. Permission of the land owner for surveys and vegetation maintenance will also be necessary for all turbines selected for searches. Noble will use its best efforts to obtain these agreements.

Search Interval. Based on discussions with NYSDEC, as well as on information generally available for other wind projects, Noble proposes to further divide the 18 turbines into two subsets. Daily searches will be conducted at nine turbines and the remaining nine turbines would be searched weekly. Adjustments may be necessary due to severe weather, as searches will not be conducted during times of heavy rain, lightning, heavy snow, or other conditions considered unsafe. If possible, the weekly surveys will be made up within 1 to 3 days.

Seasonal Duration. Although largely dependent on weather, search efforts will extend from April 15 through November 15, as per the Draft Guidelines. Winter bird use of the Project Area is comparatively low and risk is considered minimal during this season. Although bird migration begins in March, and can extend into late November, the proposed time frame encompasses the peak of spring and fall passerine migration and the entire breeding season. Based on preliminary data being collected at other constructed wind projects, much of the mortality that is being noted is bat mortality, and is occurring as specific events in the late summer. Therefore, while bird fatalities are anticipated primarily with spring and fall migration, bat fatalities, specifically tree roosting species, are anticipated in the late summer and early fall. The search interval of April 15 through November 15 will be re-evaluated after the first year of the study. If the Project Area experiences heavy snowfall in late October or early November, it is conceivable that the surveys will be cancelled for the rest of the season.

Field Search Methodology. Each field surveyor will be trained in the search protocol in advance of his or her first fatality search. Daily searches will commence near sunrise and proceed until all searches for the day are completed. Searches will be temporarily delayed if severe weather or unsafe conditions exist. The transect lines within each search area will be slowly walked by one individual or a two person team. A search time of approximately 45 minutes per turbine is anticipated, although the time will vary based on habitat and terrain. The field team leader will collect the data for all carcasses found by the searchers, as available.

All carcass observations, which may include feathers or portions thereof, will be mapped on a data sheet as to its location relative to specific transect lines. Additional information to be collected for each carcass observation will include:

- Date, time, and turbine number;
- Observer;
- GPS coordinates;

- Distance and cardinal direction from the turbine;
- Distance and direction from the transect from which it was spotted;
- Condition of the carcass (e.g., whole or partial; extent of injury; and some measure of decomposition to estimate time of death);
- Position of the carcass (e.g., face-up/down, sprawled, balled up, etc.);
- Identification of bird or bat species (if possible) including age and sex, if determinable;
- Substrate conditions when found (e.g., gravel, short/long grass, crops, brush, etc.); and
- Photographic documentation of the carcass and its location;
 - In the position in which it was found,
 - Dorsal side of carcass,
 - Ventral side of carcass, and
 - Others as necessary to indicate gender and reproductive condition (bats) and any identifying plumage, bill shape, or other characteristics (birds). At least one photo of each carcass will include a ruler or other standard items used for scale.

Identification of Carcasses. Each carcass will be mapped on a data sheet in reference to its distance and bearing from the specific turbine. Photographic documentation will be collected of each observation. The field surveyor will attempt to identify each carcass to species. The photographic documentation will be reviewed to confirm the proper identification. All photos will be sent to NYSDEC for identification confirmation.

Any bird carcasses observed during the survey effort will be left in place (except to collect photographs) for use in the scavenging loss analysis. In order to avoid recounting, bird carcasses left in place will be marked on the leg using dark thread to indicate that they are part of the scavenging loss analysis. There will be minimal handling of bird carcasses and gloves will be worn by the field searchers. In the case of bat carcasses, final (confirmatory) identification will be by an expert (e.g. Al Hicks, NYSDEC). Based on discussions with NYSDEC, some, but not all, bat carcasses are to be collected and forwarded to NYSDEC for identification and storage. Noble will continue to coordinate with NYSDEC regarding possible on-site storage of certain bat carcasses and use for scavenging and efficiency trials. In addition to the bat carcasses provided to NYSDEC, some specific carcasses will be submitted for laboratory testing (see paragraph below).

NYSDEC has requested that specific bat carcasses be submitted for stable radioisotope analysis to determine genetic diversity within local bat populations and possibly the origin of individual bats. This study will be used by NYSDEC as a

means of assessing cumulative impacts to bat species from wind energy development. To support this effort, Noble will commit to submitting approximately 10 specimens of the following species per year toward this effort: Hoary bat (*Lasiurus cinereus*), Eastern red bat (*L. borealis*) and Silver-haired bat (*Lasionycteris noctivagans*), with a preference for females. Final details of this portion of the carcass analysis, specifically collection protocols and cost, will be coordinated with NYSDEC. It is anticipated that a hair sample and a wing will need to be collected from each individual to be tested and the remainder of the carcass can still be used for the scavenging loss analysis.

If any carcasses are initially identified as a state-threatened or endangered species, the NYSDEC will be contacted (USFWS will also be contacted for any federally threatened or endangered species found).

Noble will apply to obtain permits for the searchers to handle bird and bat carcasses. It is anticipated that permits will be received prior to implementing the studies.

Weather. Weather conditions, including the moon phase and time of moon rise and set, from the night prior to each survey day will be collected from local sources and supplemented by National Weather Service (NWS) data. During each morning's carcass search, weather observations will be documented on all data sheets and will include, at a minimum, cloud cover, temperature, and wind direction and speed at both ground level and turbine height. Night visibility will be characterized by estimating the percent of cloud cover to the nearest quarter percent and by recording the presence or absence of fog. Additionally, precipitation records will also be gathered from NWS data sources.

Scavenging Loss Estimations. The proportion of bird and bat carcasses removed from the search area by other wildlife (scavengers) will be estimated based on the information collected and several scavenger removal trials.

The number of days until scavenging removal occurs will be tracked for each bird carcass found in the search area. The degree of scavenging prior to carcass removal will be documented during each search. It will not be possible to track the number of days until scavenging removal for bat carcasses found in the search area as bat carcasses will be collected and will not be left undisturbed.

Several scavenging removal trials will also be conducted in differing seasons (spring, summer, fall) and weather conditions (dry, wet) in a variety of habitats and ground cover. Additional carcasses of varying sizes and colors that represent the expected species of birds and bats will be used based on bird and bat carcass availability. During these trials, carcasses will be placed or tossed at random locations within the search area. Placement of these "test carcasses" will be used primarily to determine searcher efficiency (see section below), but they will also be tracked for scavenging loss. Scavenging loss will be estimated for each habitat

type, carcass size, season, and searcher. Test carcasses will be those found from other locations, such as roadways, buildings, or turbines not included in the searches; or obtained from other sources. Bats, and various sizes of birds (small [warbler and sparrow size], medium [dove sized], and large [crow sized]) will be used for the trials, if possible. However, the number and sizes of carcasses used in the trials will depend on the available supply. It is Noble's assumption that NYSDEC will assist with supply of dead birds and bats in order to meet the requirements imposed for this study.

The estimates for scavenging loss will be factored in to the estimates for the total number of bird and bat fatalities during the study period.

Searcher Efficiency. To correct for detection bias, searcher efficiency will be estimated. As indicated in the Scavenging Loss Estimations section above, "test carcasses" will occasionally be placed at random locations within the search area during differing seasons and weather conditions in a variety of habitats and ground cover. Bats, and various sizes of birds (small [warbler and sparrow size], medium [dove sized], and large [crow sized]) will be used for the trials, if possible. However, the number and sizes of carcasses used in the trials will depend on the available supply. It is Noble's assumption that NYSDEC will assist with supply of dead birds and bats in order to meet the requirements imposed for this study. The test carcasses will be placed either one day before or on the day of the survey to reduce the potential for predation. Carcasses used for searcher efficiency trials will be marked on the leg using dark thread, in case the carcass is moved by scavengers, weather events, or by other means. The date, time, and location of the test carcass placement will be documented. Someone besides the searchers will place the test carcasses and the presence of test carcasses will not be known by the searchers. The percentage of test carcasses found will be determined based on review of the data collected by the searchers. Searcher efficiency will be estimated for each habitat type, carcass size, season, and searcher.

Mortality Estimation. The mortality estimate for the Ball Hill Windpark will be calculated separately for birds and bats. Scavenging loss estimations, searcher efficiency, and the proportion of turbines searched will be used to adjust the total number of carcasses found during the searches.

To calculate the total number of fatalities for the period of time in which searches would be conducted (April 15 to November 15), the estimator indicated in The National Research Council (2007) based on Erickson et al. (2004) would be used. For most of the species concerned, this time period would be an annual measurement of mortality. The rationale for this conclusion is that most species of birds and bats are not active or present during the period November through March, so there is no risk of fatalities for those species during this time period. The point estimates for the fatality rates would be calculated for each season by the formula (or an appropriate variation of the formula):

$$m = \left(\frac{N * C}{k * t * p} \right) \left(\frac{e^{I/t} - 1 + p}{e^{I/t} - 1} \right)$$

where:

N is equal to the total number of turbines,

C is the total number of carcasses detected for the period of study,

k is the number of turbines searched,

I is the interval between searches (in days),

t is the mean carcass removal time (in days),

p is the detection probability, and *k* is the number of turbines sampled.

This formula assumes correctness of the estimates for *t* and *p*, i.e., sampling error in those estimates is not considered. Fatality estimates for the entire period of study (April 15 through November 15) would be calculated by summing the seasonal estimates. Fatality estimates will be further broken down, as appropriate to standalone estimates for birds, bats, seasons, and habitat.

Utilization – Mortality Estimation. The post-construction mortality estimation will be compared to the range of estimated collisions presented in the DEIS and to pre-construction radar study passage rates. The estimates will also be compared to results from similar studies at other windparks.

Task 2: Acoustical Monitoring for Bats

Acoustical monitoring via AnaBat equipment will be conducted for the duration of the ground searches (approximately April 15 to November 15) of the first year of the study only. AnaBat monitoring equipment will be installed on one meteorological tower located in the Project Area. However, the location of the meteorological tower and thus the AnaBat detectors is uncertain as it is unknown at this time whether the temporary meteorological towers will remain in place following construction. One monitoring unit will be installed as high on the tower as possible, while the other unit will be installed midway between that unit and the ground. It is anticipated that the monitoring units will be deployed within a guy wire system and pointed in the direction of anticipated migration (facing south in spring and facing north in summer/fall) at a 45 degree angle facing the rotor swept zone, if possible. Bat echolocation data will be recorded digitally and analyzed for species or species-group identification.

It is anticipated that AnaBat II detectors will be used for this study. AnaBat detectors are frequency-division detectors, dividing the frequency of ultrasonic calls made by bats so that they are audible to humans. Frequency division detectors will be used 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 range of frequency, which allows detection of all species of bats that could occur in New York. Data from the AnaBat detectors will be logged onto compact flash media and downloaded to a computer for analysis. Detectors will be programmed to re-

cord data from 7:00 p.m. to 7:00 a.m. every night. Typical for remote sensing equipment, periods of downtime are often encountered due to weather damage and equipment failure. Periods of downtime will be minimized to the extent practicable.

Call files will be extracted from data files using appropriate software, with default settings in place. Call files will be visually screened to remove files caused by wind, insect noise, and other static so that only bat calls remain. Nightly tallies of detected calls will be compiled for each detector and each night. Detection rates indicate only the number of calls detected and do not necessarily reflect the number of individual bats in an area.

Call files will be examined visually and assigned to species categories, based on comparison to libraries of known bat reference calls. This is possible only when clear calls are recorded and only with certain species. The tree-roosting bats are typically easy to identify to species while those of the genus *Myotis* are not. Call rates by species, as well as total detections and trends in species' presence in the data set will be reported. Comparisons between call rates and species composition will also be compared between the detectors.

The results of the acoustical monitoring study will be compared to the mortality study results and weather data to identify if any temporal similarities occurred between abundance and mortality.

Task 3: Breeding Bird Surveys

Breeding bird surveys will be conducted in the Project Area during the primary breeding season (June) in the first, third, and fifth year of Project operation. One survey per each of the first, third, and fifth years will be performed using USGS Breeding Bird Survey techniques with an observer recording all birds identified by sight or sound in 5-minute periods at each survey point (USGS 2006). Survey points will be selected near turbine locations, based on accessibility and a variety of habitats and with a preference for pre-construction survey point locations and post-construction mortality study locations. Surveys will be conducted at approximately 30% (18) or more of the total turbines. The number of points surveyed per day will be limited to a reasonable number that can be conducted between sunrise and 11 a.m. It is anticipated that it will take two mornings to conduct surveys at a minimum of 18 turbines. This methodology is the same as during the 2008 pre-construction breeding bird surveys.

Task 4: Post-construction Study Reporting and Adaptive Management Review

Interim progress reports will be provided to NYSDEC on a monthly basis throughout the study period. These reports will include the number of carcasses found under each turbine, the date of each recovery, and photographs of the carcasses found in the time period since the previous report.

A report will be prepared evaluating the results from the post-construction bird and bat mortality study, acoustical monitoring study, and breeding bird survey based on the first year of data. Potential adaptive management measures will be identified if significant adverse impacts occur. The mortality study methodology will also be evaluated in this report and, if necessary, changes identified for implementing the second year of the mortality study. A similar report will be prepared after the second year of the study and a final report evaluating all of the data collected during the study will be prepared after the third year of the study.

Noble will continue to coordinate with NYSDEC regarding the adequacy of survey methodologies following review of annual reports. The need for adaptive management strategies will be assessed based on the results of the previous year's surveys.

4

Schedule

The field studies will be initiated in April of the first year following construction of the Ball Hill Windpark. It is currently assumed that the field studies will start in April 2010.

Task Number	Activity	Date
1	Bird and Bat Mortality Study	~April 15 through ~November 15 (first three years of windpark operation; seasonal duration and/or dates subject to change after each year of study)
2	Acoustical Monitoring (Bats)	April 15 through November 15 (first year of study only)
3	Breeding Bird Survey	June (first, third, and fifth years of windpark operation)
4	Interim Progress Reports	Monthly during Bird and Bat Mortality Study field effort
4	Post-construction Study Report	By January 31 following completion of each year of mortality study in November

5

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