

**POST-CONSTRUCTION BIRD AND BAT MONITORING PLAN  
STONY CREEK WIND FARM  
WYOMING COUNTY, NEW YORK**

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## 1 BACKGROUND

Stony Creek Energy LLC (“Stony Creek”) is developing a wind energy project of up to 59 wind turbines in the Town of Orangeville, in Wyoming County, New York State. This facility will be operated by Stony Creek. The Stony Creek Wind Farm (the “Project”) will consist of:

- Up to 59 wind turbines located in a Project Area of approximately 14,500 acres of high elevation farm land and wooded areas;
- Approximately 15 miles of access roads that will connect to each wind turbine to allow vehicles access for construction and maintenance of the facilities; and
- An electrical collection system consisting of underground installations that will allow delivery of electricity to a new substation.

Stony Creek plans to install GE 1.6-100 wind turbines or similar machines. The turbines are three-bladed, upwind, horizontal-axis wind turbines with towers that are 80 m tall and with rotors of that are 100 m in diameter. The nacelle will be located at the top of each tower and will contain the electricity-generating equipment. The maximum height of these turbines with one blade in the vertical and upward direction (the "tip height") is 130 m (426 feet). Once installed, each wind turbine will occupy a round pad approximately 16 feet in diameter at the ground surface.

Stony Creek prepared this plan for post-construction avian and bat studies to respond to concerns raised in the SEQRA process being led by the Town Board of the Town of Orangeville.

This plan is designed to be consistent with the guidelines of the New York State Department of Environmental Conservation (“NYSDEC” or “DEC”) for *standard* post-construction studies as described in the DEC’s “Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects,” dated August 2009.

## 2 OBJECTIVES OF THE MONITORING PLAN

The post-construction studies described in this plan are designed to quantify the avian and bat collision impacts that may result from operation of the Project. The post-construction studies will complement the pre-construction studies conducted by Stony Creek as part of the Project’s environmental reviews.

The post-construction studies have four objectives:

- To estimate the Project’s direct collision or barotrauma impacts to birds and bats expressed as annual per turbine mortality rates,
- To document indirect impacts of construction and operation to resident birds,
- To determine how daily weather events and conditions may correlate with the number and species composition of animals found beneath turbines, and
- To assess the potential for and cost of adaptive management techniques to mitigate significant adverse impacts of the Project to birds and bats, if any.

### **3 MONITORING PLAN METHODOLOGY**

This plan includes the following three types of surveys:

- ground searches,
- bird habituation and avoidance studies, and
- bat acoustic sampling.

Protocols for each of these surveys are described in the following sections.

Stony Creek will provide NYS DEC access to study areas while studies are in progress, and Stony Creek will provide annual study reports as described in Section 4

#### **3.1 Ground Searches**

Stony Creek will conduct field surveys and statistical evaluations to estimate the magnitude of avian collisions associated with the Project, i.e., “ground searches”. Stony Creek will conduct the ground searches for up to three years.

##### **3.1.1 Ground Search Years**

Stony Creek will conduct ground searches in two consecutive calendar years, starting with the first year where project construction and restoration activities are completed before April 15. As an example, if restoration activities are completed in June 2011, no ground searches would be done during 2011; ground searches would be done in 2012 and 2013.

The need for, and timing of, a third year of ground searches will be determined by Stony Creek after reviewing the results of the first two years of ground searches in consultation with the NYSDEC.

##### **3.1.2 Selection of Turbines to be Searched**

Daily or weekly ground searches will be conducted at 33% of the installed Project turbines. Stony Creek will select the wind turbines to be searched using a variety factors, including accessibility and surrounding land cover, but also to ensure that, to the extent practicable, the searched turbines are representative of the different habitats, geographical areas, physical conditions, and turbine features (e.g., lighting) that exist in the Project.

##### **3.1.3 Ground Search Season**

Stony Creek will conduct ground searches from April 15 to November 15 (the “Search Season”) of every year in which such searches are conducted.

##### **3.1.4 Search Frequency**

For one third of the turbines being searched, Stony Creek will perform ground searches every day of the Search Season. For the other two thirds of the turbines being searched, Stony Creek will perform ground searches once every seven (7) days. Stony Creek will establish a search schedule where the same turbines are searched daily and the same turbines are searched weekly. Adjustments and exceptions to these search frequencies may be necessary due to severe weather.

As an example, if 59 turbines are installed, Stony Creek will conduct searches at 20 turbines. At 7 of these turbines, Stony Creek will conduct daily searches, and at the other 13 turbines it will conduct searches every seven (7) days.

### **3.1.5 Search Areas**

At each turbine searched, ground searches will be performed within an approximately square area with each side equal to 1.5 x the turbine rotor diameter and centered around the turbine tower. If turbines with 100 m rotor diameter are used, this will mean the nominal search area will be 492 ft x 492 ft (150 m x 150 m), which would be a nominal search area of 5.5 acres per turbine. Notably, this area is 50% greater than the 120m x 120m area that is suggested in the 2009 DEC guidelines as likely to be adequate for most modern turbines operating in New York.

Searches will not be conducted in forested areas and trees will not be removed to facilitate the ground searches. Thus, if the areas cleared for turbine construction are less than the search area above, then search areas extend to the limit of what was cleared for turbine construction and will be less than the search area above.

The search area will be separated into survey transect lines evenly spaced at 16 ft (5 m) intervals.

### **3.1.6 Vegetation Management**

At turbines where mortality surveys are being conducted Stony Creek will maintain vegetation to be 12 inches or less during the Search Season, unless such practices would cause an unacceptable risk of ground erosion.

### **3.1.7 Recording of Weather Data**

For day in which daily surveys are done, Stony Creek will document weather conditions and will maintain this information as part of the ground survey records. Weather conditions to be documented for daily surveys include:

- Weather from the night prior to the survey day, collected from local sources and supplemented by National Weather Service (NWS) data. Night visibility characterized by estimating the percent of cloud cover and the presence or absence of fog. Precipitation from the night prior to the survey day will be documented using NWS data sources.
- Weather for the morning of the survey day, including: cloud cover, temperature, wind direction and wind speed.

### **3.1.8 Field Search Methodology**

Ground searches will commence near sunrise and will proceed until all turbines to be searched that day have been surveyed. Searches will be temporarily delayed if severe weather or safety conditions occur.

The transect lines within each search area will be slowly walked to locate any bird or bat carcasses, including feathers or portions thereof. Search times will likely exceed 1 hour per turbine; actual times will vary based terrain, habitat, and weather conditions. Field modification of transect lines may be necessary to avoid unwalkable areas (e.g., pits, steep slopes).

For every turbine ground search, Stony Creek will record data on the time of the search and the ground cover conditions at the turbine site.

Any carcass observed during the survey effort will be collected and labeled for possible use the scavenging loss or searcher efficiency tests. For every carcass observation, field surveyors will complete a data sheet with the following information:

- Date, time, and turbine number.
- Location on a plot marked with GPS coordinates.
- Distance and cardinal direction from the turbine.
- Distance and bearing from the transect from which the carcass was first spotted.
- Condition of the carcass (whole or partial, extent of injury and some measure of decomposition to estimate time of death).
- Position of the carcass (face-up, face-down, sprawled, balled up, etc.)
- Species, age and sex, if determinable.
- Substrate conditions when found (gravel, short grass, long grass, crops, brush, etc.)
- Name of the searcher that found the carcass.
- Digital photographs of the observation, showing (i) the position in which it was found; (ii) the dorsal and ventral sides; (iii) for bats the gender and reproductive condition; (iv) any identifying characteristics such as bill, foot, wing, or tail shape and plumage coloration for birds. At least one of the photographs shall include a ruler or other standard item to show the scale of the carcass.

### **3.1.9 Incidental Finds**

Incidental finds will be defined as any bird or bat carcass found in the vicinity of a Project turbine but not as part of the standardized carcass searches. This includes carcasses found by Project personnel, at turbines that are not part of the standardized carcass searches, at times outside of the Search Season, or during a day when ground searches are not being conducted.

For incidental finds, the personnel making the find shall record as much of the information listed in Section 3.1.7 as is practicable and shall label and store the carcass in the same manner as if it were found in a ground search, except that it shall have a marker identifying it as an incidental find.

### **3.1.10 Searcher Training**

Each field surveyor will be trained in the search protocol in advance of his or her first ground search.

### **3.1.11 Field Tests for Searcher Efficiency and Scavenging Losses**

Stony Creek will conduct field tests on scavenging losses and searcher efficiency as described below.

The scavenging loss field tests will be performed to estimate the proportion of bird and bat carcasses that are removed from search areas by wildlife before they can be found by ground searchers. The searcher

efficiency tests will be performed to quantify ground search errors that may exist due to detection biases and ability of searchers to successfully locate carcasses in the search area.

### Carcass Removal Trials

Stony Creek will conduct carcass removal trials at least once every 30 days during the Search Season. To the extent practicable, the carcass removal trials performed over the course of a calendar year shall use a variety of carcasses represent the various sizes and species of birds and bats that breed and migrate through the project area. Carcasses used in the scavenging tests will be as fresh as possible, since NYSDEC expects long-frozen carcasses will be more difficult to find and less attractive to scavengers.

In the morning that a carcass removal trial is to begin, someone will place carcasses around one or more turbines in a variety of habitats. The number of carcasses will not be too large as to cause an excessive attraction to scavengers. Location of the trial carcasses will be noted when placed, and then revisited as follows to check whether the carcass has been removed or decomposed. Checks will be made daily in the first week after placement and then every two days thereafter until the carcass is removed or decomposed. On each check, the location and condition of the carcass will be recorded to determine if any scavenging has occurred. Notes on tracks, scat, marks, or other signs of scavenger activity, if any, will be noted on every check.

Stony Creek will use data from the carcass removal trials to estimate the scavenging rate. Scavenging rates will be determined as a function of season and habitat type.

### Searcher Efficiency Tests

Stony Creek shall perform a searcher efficiency tests at least once every 30 days during the Ground Search Season. The searcher efficiency tests performed over the course of a calendar year shall, to the extent practicable, use a variety of carcasses that represent the various sizes and species of birds and bats that breed and migrate through the project area. Searcher efficiency tests will be conducted unbeknownst to the searchers.

In the evening before or the morning of the day for a searcher efficiency test, a project manager will place carcasses in the search areas under one or more turbines and in a variety of habitats. Each carcass placed for a searcher efficiency trial will be discreetly marked with a non-reflective marker so it can be readily identified as a test carcass when found, but so as not make it any more noticeable than a non-test carcass. For searcher efficiency trials, if enough bat carcasses are not available, brown mice may be used as a surrogate. The project manager will document the date, time, and location of each searcher efficiency test carcass placed.

After ground searches are completed, searcher efficiency carcasses will be visited and records will be made on which test carcasses are found and not found. Stony Creek will use data from searcher efficiency tests to determine a searcher efficiency for every individual ground searcher.

### **3.1.12 Mortality Estimate Calculations**

Stony Creek will calculate an estimated mortality rate 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. Mortality rates will be estimated using an industry standard formula. An example of one that could be used is (Koford and Jane 2005):

$$M = uM / ((1-SC)*(1-E)*P)$$

M = Mortality Rate (adjusted) for entire project.

uM = Mortality Rate (observed); the number of carcasses found in search area.

SC = Scavenging Rate (percentage birds/bats removed by scavengers within 2 days).

E = Searcher Efficiency Rate (percentage of test carcasses missed).

P = Proportion of turbines included in the search area.

### **3.2 Bird Habituation and Avoidance Study**

Stony Creek will conduct bird habituation and avoidance studies in two consecutive calendar years, starting with the first year where project construction and restoration activities are completed by April 15. The need for, and timing of, a third year of habituation and avoidance studies will be determined by Stony Creek after reviewing the results of the first two years of such studies in consultation with the NYSDEC.

The bird habituation and avoidance study shall be performed using a protocol similar to the pre-construction “breeding bird” study performed by Stony Creek. Stony Creek will consult with NYSDEC to review study the protocol for the bird habituation and avoidance study prior to commencing work. Specific protocols to be used shall include:

- Surveys shall be conducted once per week during May, June, and September.
- For each survey day, observers will start at first light and continue until no later than 10 am. During this time, observer(s) will visit predetermined observation points to look and listen for songbirds, raptors, and waterfowl. For each point, the observers shall record the species and number of birds observed.
- Observation points shall be the same points included in pre-construction surveys, to the extent practicable. For observation points that have become turbine sites, the surveys will, to the extent practicable, take place when turbine noise does not interfere with the ability of the observer to identify birds.
- Stony Creek will not conduct bird habituation and avoidance surveys on days that are excessively windy, rainy, or cold. Ideal survey days will be days where weather conditions are conducive to hearing and seeing birds in flight and moving about in vegetation.
- Upon consultation with NYSDEC, Stony Creek may replace some of the point counts noted above with sets of transects at turbine and control sites to evaluate bird habituation and avoidance behavior and habitat use within the Project Area. Transects would be surveyed during the same time frame and under the same conditions as point count surveys. Consideration will be given to the pre-construction surveys so as to develop useful results that can be compared to pre-construction surveys.

### **3.3 Bat Acoustic Sampling**

Concurrently with the Ground Search Seasons and for every year in which ground searches are conducted, Stony Creek will deploy, maintain, and monitor bat acoustic monitors using the Project's permanent met tower. One detector shall be located at a height that is within the height of the turbine rotor zone and a second detector shall be located two to three meters above ground level. Recording at both detectors will occur daily from one half hour prior to sunset until one half hour after sunrise between April 15 and October 15.

During the summer of any season in which ground searches are conducted, Stony Creek will also perform active acoustical sampling to assess bat activity levels on the site. This will entail a field investigator with a detector walking across the study area in a variety of habitats that are likely to contain bats, and recording what is present. To the extent practicable, active sampling will be conducted on at least nine warm (>55 deg F), dry, and calm evenings between June 1 and July 10, starting at dusk and ending no earlier than 2:00 AM.

Analysis of calls from the stationary and active bat monitoring will be based on a criteria verified by a reputable, independent authority on bat vocalization.

## **4 REPORTS**

For each year in which ground searches are conducted, Stony Creek shall generate and submit to the DEC reports:

- An interim ground search progress report summarizing results of ground searches conducted from the beginning of the ground search season through mid-June. The interim progress report will be submitted to the DEC no later than July 31 of the year in which it is summarizing results.
- A final ground search report summarizing results of mortality surveys conducted for the full ground search season, including all data collected as part of the ground surveys (see Section 3.1.8 of this plan), estimates of overall mortality for the search period on a per turbine, per MW, and per rotor swept area basis. The final report will be submitted no later than January 31<sup>st</sup> of the year following the year in which the searches were performed.
- A final report or reports summarizing the results of the bird displacement study and the bat acoustic study for the full study period. These reports will be submitted no later than January 31<sup>st</sup> of the year following the year in which the studies were performed.

## **5 MONITORING PLAN ADJUSTMENTS AND ADAPTIVE MANAGEMENT**

### **5.1 Assessment of Impacts**

Stony Creek will, in consultation with the NYSDEC and USFWS, evaluate monitoring results to deem the estimated levels of mortality as either acceptable or unacceptable based on what is known about mortality at other wind farms and the affected species.

## **5.2 Monitoring Plan Adjustments**

Stony Creek will conduct up to three years of ground searches at the Project. After the first year and second years of monitoring are completed, Stony Creek will, in consultation with the NYSDEC and USFWS, review the monitoring results to assess changes to the monitoring that may be appropriate for the second or third year of monitoring. Appropriate changes to be considered will include changes to the timing, search frequency, and duration of the ground searches.

The results of the first year of monitoring will be used to evaluate levels of bird and bat mortality at the Project. If the actual impacts are deemed by Stony Creek, in consultation with the NYDEC and USFWS, as acceptable, monitoring will continue for a second year to confirm the first year results. If results of both the first and second years find that impacts are deemed acceptable by Stony Creek, then Stony Creek, in consultation with the NYSDEC and USFWS, will consider reducing the effort level and overall cost of the monitoring plan for the third year.

Once the observed levels of bird and bat fatalities have been deemed acceptable, and after three years of post-construction monitoring, monitoring will be discontinued and the Project will be operated as determined based on the monitoring results.

## **5.3 Adaptive Management Plans**

Pre-construction data suggest that the Stony Creek project will not cause unacceptable levels of bird and bat fatalities; however, the adaptive management plans in this section allow for Stony Creek, NYSDEC, and the USFWS to determine if additional avoidance and minimization measures are appropriate in successive years.

### **5.3.1 Adaptive Management for Unacceptable Bat Impacts**

If mortality levels for bats are deemed unacceptable, Stony Creek will implement changed turbine operation regimes or other minimization strategies to reduce fatalities. If changed turbine operation regimes are determined to be an appropriate measure to minimize bat collisions, Stony Creek will develop a curtailment regime designed to further reduce potential bat mortality and to be implemented in year two of monitoring. Examples of different regimes could include, but are not limited to, changes in the turbine cut-in speed; change in timing of turbine operating regimes if timing of bat fatalities suggests a specific period when they are at greatest risk; selected turbine curtailment if some turbines appear to cause greater bat mortality. Other minimization strategies could include use of bat deterrent devices should they become a proven and cost-effective tool for reducing fatalities.

### **5.3.2 Adaptive Management for Unacceptable Bird Impacts**

For birds, there are no specific operational changes that are known to reduce impacts, so if impacts to birds are deemed to be unacceptable, Stony Creek would develop mitigation on a case-by-case basis in consultation with NYDEC and USFWS.

### **5.3.3 Take of State-Listed Species**

Any adjustments or mitigation to be done for take of birds or bats that are listed as either New York threatened or New York endangered will be done in accordance with an incidental take permit or license. Limits on Adaptive Management

In the event that the estimated levels of fatality for birds or bats are deemed unacceptable (in overall numbers of birds and bats and/or affected species), the operational adjustments and/or mitigations designed to limit these impacts shall not result in the Project being curtailed from operating for more than 120 hours per calendar year. This limit does not apply to adjustments or mitigations designed for State-listed species.

## **6 REFERENCES**

Erickson, W. and J. Kerns. 2005. Bat Mortality at wind energy facilities during fall migration: a proposal for intensive mortality searches. Appendix V in E.B. Arnett, technical editor, Relationships between bats and wind turbines in Pennsylvania and West Virginia: an assessment of bat fatality search protocols, patterns of fatality, and behavioral interactions with wind turbines. A final report submitted to the Bats and Wind Energy Cooperative. Bat Conservation International. Austin, TX, USA.

Koford, R. and A. Jain. 2005. Avian Mortality Associated with the Top of Iowa Wind Farm. Progress Report, Calendar Year 2004. Iowa Coop. Fish and Wild. Res. Unit and Iowa State University.

New York State Department of Environmental Conservation, January 2009. New York State Department of Environmental Conservation (NYSDEC) Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects.