

OPERATIONAL BAT MONITORING PROGRAMME FOR THE HOPEFIELD SMALL WIND ENERGY FACILITY, HOPEFIELD, WESTERN CAPE

13 May 2016

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1. Purpose

The purpose of this document is to outline a programme for bat monitoring during the operational phase of the Hopefield Small Wind Energy Facility. This document serves as a framework and should be read in conjunction with the draft South African Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (2014). If an update of this report is available before the operational monitoring commences, the bat monitoring programme should be updated as such.

2. Aim of Monitoring

The aim of post-construction bat monitoring is to analyse changes in bat activity patterns and to assess the effectiveness of the suggested mitigations as per the operational monitoring guideline.

If the negative impact of the turbines is significant enough to have impacted upon the ability of the bat population to survive and reproduce, or if the bat population is significantly altered in their local distribution or abundance, it renders the population of bats at risk although only possible to conclude through significant and directly observed bat mortality as a result of the wind farm. This in turn, then runs the risk of infringing the National Environmental Management: Biodiversity Act 10 of 2004, unless mitigation is implemented.

The first two years of wind farm operation is a vital period in which to collect post-construction data. During this period changes in bat activity and mortality are most likely to occur.

The South African Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (2014) recommends that a minimum of two years intensive post-construction monitoring be undertaken, but that auditing for impacts should continue throughout the lifespan of the facility (Aronson, et al, 2014). "Where more severe impacts have been identified or predicted, an extended period of data collection might be needed to assess the effectiveness of any mitigation proposal (Aronson, et al, 20014)"; therefore, the bat protocol of the Hopefield Small Wind Energy Facility should be revised as soon as results are available, so that the specialist can establish if an extended monitoring period is necessary, which must draw on peer review.

Post construction fatality monitoring should be designed to answer the following questions as indicated in the guidelines (2014):

1. What are the bat fatality rates for the facility?
2. What are the fatality rates for species of concern (e.g. species with high conservation status, rare species and species at high risk of fatality)?
3. Do bat fatalities vary within a facility in relation to site characteristics?
4. How do the fatality rates compare with those from facilities in similar landscapes with similar species composition?
5. What is the composition of fatalities with respect to migrating and resident bat species?
6. What is the relationship between bat activity and bat fatality?
7. What is the relationship between bat fatality and environmental variables (e.g. wind speed)?
8. What is the relationship between bat fatality and season?
9. Do fatality rates suggest the need for measures to reduce impacts?
10. Which mitigation methods are the most effective?

3. Monitoring Protocol

The bat monitoring should be carried out throughout all seasons of the year, for two years, and special attention should be given to periods with increased rainfall and temperatures when insect numbers may be elevated. Beyond the minimum two-year period, auditing for impacts should continue throughout the lifespan of the facility if necessary. This auditing must be informed by the findings of the initial two-year operational monitoring and based on a peer review thereof if required (Aronson, et al, 2014).

3.1 Acoustic monitoring

To compare data and keep consistency, operational acoustic monitoring should use the same sampling regimes, methods, sites (including the meteorological masts), duration, comparable equipment and techniques used during pre-construction, unless more stringent monitoring is needed.

Supplementary to the data collected from the mast and to monitor bat activity in the area of the greatest risk (the rotor-swept zone), the guidelines mention that acoustic detectors might also be installed on a sub-sample of turbine nacelles. For a small wind farm like the proposed development, this might not be necessary, but will be decided upon when monitoring data is available.

If required, the monitoring systems must record bat activity continuously every night for the entire night, in order to estimate a proportionate mortality rate of local

bat populations. Acoustic data collection from the passive systems would typically be every 3 months, by the specialist visiting the site.

3.2 Carcass Searches

Sampling effort for carcass searches should be weekly/ (7) days preferably and can be done by local independent staff. During each site visit by the bat specialist, stored carcasses should be identified and carcass searches conducted as described in the guidelines.

Mortality surveys should be carried out, according to the guidelines relevant at the time of the study, to identify the number of bats killed per turbine over a known period of time (expressed as bats/turbine/time). This value represents a minimum estimate of bat mortality as adjusted for bat carcass removal rates and searcher efficiency.

Mortality surveys typically include the following procedures:

- **Standardized Search:** Counting the number of carcasses found around the turbines identified to potentially cause mortality. The search interval should be one week during the first year of monitoring unless carcass removal indicates that an alternate interval is required. The interval must be adjusted after the first year depending on carcass removal rates.
- **Carcass Removal Trials:** Monitoring of bat carcasses removed by scavengers to estimate the length of time that carcasses remain in the field. Carcass Removal trials should be undertaken for the first year, to inform the search interval during the second year.
- **Searcher Efficiency Trials:** Percentage of carcasses found by searchers in the varying habitats throughout the wind farm.
- **Quantify and if possible standardise the searchable plot area around each turbine, also ideally rate searchable areas according to a likely risk of not finding a carcass.**

Methods to deal with live, injured and dead bats are provided in Appendix 3 of the guidelines (Aronson, et al, 2014) or will be provided by the relevant guidelines at the time of the monitoring.

The following, as it appears in the 2014 guidelines, should be kept in mind when doing the monitoring:

- All maintenance personnel and other people working on site should be instructed not to remove carcasses (bats or birds) they discover. They could alert a responsible person to it, but should not touch the carcass.
- All survey staff should ensure that they have the appropriate rabies pre-exposure vaccinations.
- Once all necessary data have been collected from the carcasses, it is recommended, and encouraged, that unless used for field bias trials, the carcasses are deposited with a local museum as discussed with the bat specialist.

The use of trained dogs for carcass searches can be significantly more successful than humans (Arnett, 2006, Mathews, et al, 2013).

When found, carcasses should be photographed in the position found, GPS position noted, and collected. Carcasses should be collected in plastic bags, labelled, and frozen for species identification and/or autopsy. This proposal relies on the assumption that local staff will be available on a weekly basis for carcass searches.

Where possible, bird and bat carcass searches should be combined to minimize cost.

3.2.1 Number of turbines to monitor

The number of turbines to be searched for carcasses are depended on the size of the site and its relative sensitivity determined by the levels of bat activity recorded during the pre-construction monitoring.

For sites with up to 20 turbines, all should be searched according to the search interval regardless of the level of risk.

Separate risk levels have been created for each biome, as depicted in the guidelines, and risk levels should not be compared between different biomes. See Section 2.2.2 of the current draft guidelines (Aronson, et al, 2014, p22).

It should be noted that if no pre-construction monitoring was performed, or if the methods used were insufficient to adequately predict risk, it is impossible to determine the predicted level of risk to bats at a site. Therefore, for the purpose of

the operational monitoring at these sites, the predicted level of risk will be assumed to be high for the first year of monitoring.

3.2.2 Transects and carcass plots

Surveys should be concentrated under the turbines and should ideally be symmetrical around the turbine using linear/circular transects equally spaced if possible.

The search plot size will be determined by the wind turbine technology. If the highest point of the turbine's blades are 120 m from the ground, thus the top of the rotor swept zone, the search plot should extend 60 m in all directions. Searches should be symmetrically centred on each turbine using either a square or circular search plot. Methods for using square and circular plots are described in the guidelines.

3.2.3 Habitat mapping and visibility classes

The habitat in each search plot should be mapped and visibility classes established according to the habitat type and the percentage and height of ground cover. The actual area of each plot searched should then be used as a basis to adjust fatality estimates. This mapping should take place once per season, as indicated in the guidelines (2014).

4. Adaptive management approach

A precautionary and adaptive mitigation management approach must be adopted based on the results and certainty of results of the post-construction bat monitoring programme. Mitigation management and mortality surveys may possibly be altered significantly as technological advancements can cause other methodologies to be more favourable.

5. Landowner Consultation

Before the carcass search commences and before a carcass search team is appointed, the landowner(s)/farmer(s) must be consulted. The consultation should outline the methods of the carcass searches. Details, e.g. frequency of searches, responsible persons, access control, etc. must be discussed and agreed with the landowner/ farmer. To ensure the safety of landowner/farmer it is also recommended that a background check is done on all employees/members of the carcass search team before they are appointed and that proof of this is kept. The

carcass search team should be introduced to the landowner/farmer, if the landowner/farmer prefer to meet them. Landowner/farmer should at all times be kept informed of the whereabouts of the carcass search team. All relevant EMP conditions, e.g. no hunting/ killing of animals, no fires on site, no camping on site, etc. will apply to the carcass search team. They must therefore be inducted to the wind farm and made aware of all rules, regulations and code of conduct. Landowner requirements agreed upon will be signed and form part of this Report.

This document may be updated as and when required.

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