# ADDENDUM TO THE AVIFAUNAL IMPACT ASSESSMENT CONDUCTED FOR THE PROPOSED POORTJIES WIND ENERGY FACILTY (WEF) NEAR POFADDER, NORTHERN CAPE PROVINCE

**APPLICATION FOR AMENDMENT OF ENVIRONMENTAL AUTHORISATION**


Addendum report compiled by:

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# EXECUTIVE SUMMARY

The purpose of this addendum report is to revisit the avifaunal impact assessment for the proposed Poortjies Wind Energy Facility (WEF) near Pofadder in the Northern Cape (Van Rooyen *et al*. 2014), based on a proposed amendment application to the environmental authorisation in June 2019.

The proposed changes are as follows:

| Aspect | Authorised | Proposed amendment |
|---|---|---|
| **Hub height** | 140m | 140m up to 200m |
| **Rotor diameter** | 140m | 140m up to 200m |
| **Rotor tip height** | 210m | Up to 300m |
| **Number of turbines** | 50 | Up to 24 |

In light of the proposed changes to the turbine specifications, a re-assessment of the potential collision impact was carried out for the proposed amendment, in order to establish if the original pre-mitigation assessment of by Van Rooyen *et al*. (2014) should be revised. The increase of 104% in rotor swept area per turbine is significant. However, the planned reduction in the number of turbines means that the total rotor swept area remains essentially unchanged. Furthermore, the planned reduction of 52% in the number of turbines is significant, given the fact that the number of turbines is a more important factor in determining the risk than the dimensions of the individual turbines. The collision rating therefore remains unchanged.

The proposed amendment would be advantageous from a bird impact perspective. No additional mitigation measures are required as a result of the proposed amendment.

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# 1 Background

The purpose of this addendum report is to revisit the avifaunal impact assessment for the proposed Poortjies Wind Energy Facility (WEF) near Pofadder in the Northern Cape (Van Rooyen *et al*. 2014), based on a proposed amendment application to the environmental authorisation which was issued on 28 May 2015. The proposed changes are provided in **Table 1** below.

***Table 1: Proposed turbine dimensions amendments***

| Aspect | Authorised | Proposed amendment |
|---|---|---|
| **Hub height** | 140m | 140m up to 200m |
| **Rotor diameter** | 140m | 140m up to 200m |
| **Rotor tip height** | 210m | Up to 300m |
| **Number of turbines** | 50 | Up to 24 |

# 2 Terms of reference

Due to the proposed changes in **Table 1**, and in accordance with the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), a re-assessment of potential impacts on the associated avifauna is required to be undertaken before an Amendment to Environmental Authorisation can be granted for the revised WEF development. **The principal impact which is specifically relevant in this instance is the risk of priority species mortality due to collisions with the turbines.**

The Terms of Reference (ToR) for this addendum report are as follows:

- Assess the impacts related to the proposed change from the authorised turbine specifications (if any);
- Assess advantages or disadvantages of the proposed change in turbine specifications (comparative assessment between the authorised hub height and rotor diameter, versus the proposed specifications); and
- Identify additional or changes to the mitigation measures required to avoid, manage or mitigate the impacts associated with the proposed turbine specifications (if any).

# 3 The findings of the original bird impact assessment reports

The original Bird Specialist Study (Van Rooyen *et al*. 2014) identified risks (**Table 2**) of bird collisions with the wind turbines.

***Table 2: Original bird collision risk***

| Environmental parameter | Impact | Rating prior to mitigation | Rating post mitigation |
|---|---|---|---|
| Avifauna | Priority species mortality due to collision with the turbines | -36 (medium negative) | -20 (low negative) |

# 4 The relevance of turbine numbers and dimensions in avifaunal mortality risk

Most of the studies to date found turbine dimensions to play a relatively unimportant role in the magnitude of the collision risk relative to other factors such as topography, turbine location, morphology, behaviour and a species' inherent ability to avoid the turbines, and may only be relevant in combination with other factors, particularly wind strength and topography (see Howell 1997, Barrios & Rodriguez 2004; Barclay *et al.* 2007, Krijgsveld *et al.* 2009, Smallwood 2013; Everaert 2014). Three (3) studies found a correlation between hub height and mortality (De Lucas *et al.* 2008; Loss *et al.* 2013 and Thaxter *et al*. 2017).

The Summary below provides a list of published findings on the topic:

- Howell *et al.* 1997 states on p.9: "*The evidence to date from the Altamont Pass does not support the hypothesis that the larger rotor swept area (RSA) of the KVS–33 turbines contributes proportionally to avian mortality, i.e. larger area results in more mortalities. On the contrary, the ratio of K-56 turbines to KVS-33 turbines rather than RSA was approximately 3.4:1 which as consistent with the 4.1:1 mortality ratio. It appears that the mortality occurred on a per-turbine basis, i.e. each turbine simply presented an obstacle."*
- Barrios & Rodriguez 2004 states on p. 80: "*Most deaths and risk situations occurred in two rows at PESUR with little space between consecutive turbines. This windwall configuration (Orloff & Flannery 1992) might force birds that cross at the blade level to take a risk greater than in less closely spaced settings. However, little or no risk was recorded for five turbine rows at PESUR having exactly the same windwall spatial arrangement of turbines. Therefore, we conclude that physical structures had little effect on bird mortality unless in combination with other factors*."
- Barclay *et al.* 2007 states on p. 384: "*Our analysis of the data available from North America indicates that this has had different consequences for the fatality rates of birds and bats at wind energy facilities. It might be expected that as rotor swept area increased, more animals would be killed per turbine, but our analyses indicate that this is not the case. Rotor-swept area was not a significant factor in our analyses. In addition, there is no evidence that taller turbines are associated with increased bird fatalities. The per turbine fatality rate for birds was constant with tower height*."
- De Lucas *et al.* 2008 states on p. 1702: "*All else being equal, more lift is required by a griffon vulture over a taller turbine at a higher elevation and we found that such turbines killed more vultures compared to shorter turbines at lower elevations.*"
- Krijgsveld *et al.* 2009 states on p. 365: "*The results reported in this paper indicate that collision risk of birds with larger multi-MW wind turbines is similar to that with smaller earlier-generation turbines, and much lower than expected based on the large rotor surface and high altitude-range of modern turbines. Clearly, more studies of collision victims are needed before we can confidently predict the relationship between size and configuration of wind turbines and the risk for birds to collide with a turbine.*"
- Smallwood *et al*. 2013 states on p.26 – 27 (see also Fig 9 on p.30): "*Red-tailed hawk (Buteo jamaicensis) and all raptor fatality rates correlated inversely with increasing wind-turbine size (Figs. 9A, B). Thousands of additional MW of capacity were planned or under construction in 2012, meaning that the annual toll on birds and bats will increase. However, the expected increase of*

*raptor fatalities could be offset by reductions of raptor fatalities as older wind projects are repowered to new, larger wind turbines, especially if the opportunity is taken to carefully site the new wind turbines (Smallwood and Karas 2009, Smallwood et al. 2009).*"

- Loss *et al.* 2014 states on p. 208: "*The projected trend for a continued increase in turbine size coupled with our finding of greater bird collision mortality at taller turbines suggests that precaution must be taken to reduce adverse impacts to wildlife populations when making decisions about the type of wind turbines to install*."
- Everaert, 2014 states on p. 228: "*Combined with the mortality rates of several wind farms in the Netherlands (in similar European lowland conditions near wetlands or other areas with water), no significant relationship could be found between the number of collision fatalities and the rotor swept area of the turbines (Fig. 4). In contrast to more common landscapes, Hötker (2006) also found no significant relationship between mortality rate and the size of wind turbines near wetlands and mountain ridges.*"
- In the most recent paper on the subject by Thaxter *et al*. (2017), the authors conducted a systematic literature review of recorded collisions between birds and wind turbines within developed countries. They related collision rate to species-level traits and turbine characteristics to quantify the potential vulnerability of 9 538 bird species globally. For birds, larger turbine capacity (megawatts) increased collision rates; however, deploying a smaller number of large turbines with greater energy output reduced total collision risk per unit energy output. In other words, although there was a positive relationship between wind turbine capacity and collision rate per turbine, the strength of this relationship was insufficient to offset the reduced number of turbines required per unit energy generation with larger turbines. *Therefore, to minimize bird collisions, wind farm electricity generation capacity should be met through deploying fewer, large turbines, rather than many, smaller ones*.

The authorised rotor diameter of 140m for the Poortjies WEF translates into a rotor swept area of approximately 15 393m² per turbine. An increase of the rotor diameter to 200m will result in a rotor swept area of approximately 31 415m² per turbine. This amounts to an increase of 104% in the rotor swept area per turbine. However, the applicant proposes to reduce the number of turbines from the approved 50 to a maximum of 24 turbines. That amounts to a 2% reduction in total rotor swept area, and a reduction of 52% in the number of turbines.

# 5 Re-assessment of collision mortality impact

In light of the proposed changes to the turbine specifications, a re-assessment of the potential collision impact was carried out for the proposed amendment, in order to establish if the original pre-mitigation assessment of by Van Rooyen et al. (2014) should be revised. The increase of 104% in rotor swept area per turbine is significant. However, the planned reduction in the number of turbines means that the total rotor swept area remains essentially unchanged. Furthermore, the planned reduction of 52% in the number of turbines is significant, given the fact that the number of turbines is a more important factor in determining the risk than the dimensions of the individual turbines. The collision rating therefore remains unchanged (see Table 3 below).

*Table 3: Impact and ratings table 3*

| | | | | |
|---|---|---|---|---|
| **Nature of impact:**<br><br>**Bird collisions of priority avifauna with the wind turbines.** | | | | |
| | **Authorised** | | **Proposed amendment** | |
| | **Without mitigation** | **With mitigation** | **Without mitigation** | **With mitigation** |
| **Extent** | Low (2) | Low (2) | Low (2) | Low (2) |
| **Duration** | Long-term (4) | Long-term (4) | Long-term (4) | Long-term (4) |
| **Magnitude** | Moderate (6) | Low (4) | High (6) | Low (4) |
| **Probability** | Probable (3) | Improbable (2) | Highly probable (3) | Improbable (2) |
| **Significance** | **36 (Medium)** | **20 (Low)** | **36 (Medium)** | **20 (Low)** |
| **Status (positive or negative)** | Negative | Negative | Negative | Negative |
| **Reversibility** | Low | High | Low | High |
| **Irreplaceable loss of resources?** | No | No | No | No |
| **Can impacts be mitigated?** | Yes | | Yes | |
| **Mitigation measures due to the proposed amendment:**<br><br>• No additional mitigation measures are required as a result of the proposed amendment.<br><br>**Mitigation measures as per the original EIA**<br><br>• A 200m no-go buffer is proposed around water points as they serve as focal points for raptor activity.<br>• Formal monitoring should be resumed once the turbines have been constructed, as per the most recent edition of the best practice guidelines (Jenkins *et al.* 2011). The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the results of the monitoring through a process of adaptive management. The purpose of this would be (a) to establish if and to what extent displacement of priority species has occurred through the altering of flight patterns post-construction, and (b) to search for carcasses at turbines.<br>• As an absolute minimum, post-construction monitoring should be undertaken for the first two (preferably three) years of operation, and then repeated again in year 5, and again every five years thereafter. The exact scope and nature of the post- | | | | |

construction monitoring will be informed on an ongoing basis by the results of the monitoring through a process of adaptive management.

- The environmental management plan should provide for the on-going inputs of a suitable experienced ornithological consultant to oversee the post-construction monitoring and assist with the on-going management of bird impacts that may emerge as the post-construction monitoring programme progresses.
- Depending on the results of the carcass searches, a range of mitigation measures will have to be considered if mortality levels turn out to be significant, including selective curtailment of problem turbines during high risk periods.
- If turbines are to be lit at night, lighting should be kept to a minimum and should preferably not be white light. Flashing strobe-like lights should be used where possible (provided this complies with Civil Aviation Authority regulations).
- Lighting of the wind farm (for example security lights) should be kept to a minimum. Lights should be directed downwards (provided this complies with Civil Aviation Authority regulations).

# 6 Revised mitigation measures

The "Best Practice Guidelines for Avian Monitoring and Impact Mitigation at Proposed Wind Energy Development Sites in Southern Africa", (Jenkins *et al*. 2011) revised in 2015, require that either all, or part of the pre-construction monitoring is repeated if there is a time period of three (3) years or more between the data collection and the construction of the wind farm. This re-assessment is necessary in order to take cognisance of any changes in the environment which may affect the risk to avifauna, and to incorporate the latest available knowledge into the assessment of the risks. In order to give effect to this requirement, nest searches on the Aggeneys – Aries 400kV were repeated in July 2019 and again in July 2020 to determine the presence of Martial Eagle nests.

The nest searches conducted in July 2019 and July 2020 confirmed the presence of a Martial Eagle nest on Tower 147 of the Aries – Aggeneys 400kV 1 transmission line, which runs north of the project area. The average territory size of a large eagle represents an important area which can contribute to conservation planning and should be considered the absolute minimum area for conservation (Ralston-Patton 2017). Global Positioning System (GPS) tracking of Martial Eagles in the Kruger National Park indicates average territory sizes of 110km² (Percy Fitzpatrick Institute 2015), which equates to a 6km circular zone around the nest. Given the proven vulnerability of the species to wind turbine collisions which is now firmly established, 5 - 6km should ideally be taken as the desired turbine-free buffer zone around a Martial Eagle nest[1]. The nest is approximately 7.5km from the nearest authorised turbine position, therefore the authorised lay-out will not be impacted by the required 5 – 6km buffer zone around the nest.

No additional mitigation measures are required as a result of the proposed amendment.

# 7 Conclusions

Given the potential changes to the turbine specifications, a re-assessment of the potential turbine collision impact was carried out in light of the proposed amendment, in order to establish if the original pre-mitigation assessment by Van Rooyen *et al*. (2014) should be revised and if the original mitigation measures need to be changed.

[1] It should be recognised that Martial Eagle territories in an arid environment like Bushmanland are likely to be much larger than in the mesic Lowveld of the Kruger National Park, therefore a 5-6km turbine free buffer should be seen as an absolute minimum.

In light of the proposed changes to the turbine specifications, a re-assessment of the potential collision impact was carried out for the proposed amendment, in order to establish if the original pre-mitigation assessment of by Van Rooyen *et al*. (2014) should be revised. The increase of 104% in rotor swept area per turbine is significant. However, the planned reduction in the number of turbines means that the total rotor swept area remains essentially unchanged. Furthermore, the planned reduction of 52% in the number of turbines is significant, given the fact that the number of turbines is a more important factor in determining the risk than the dimensions of the individual turbines. The collision rating therefore remains unchanged (see Table 3 below).

The proposed amendment would be advantageous from a bird impact perspective. No additional mitigation measures are required as a result of the proposed amendment.

# 8 References


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