Savannah Environmental (Pty) Ltd
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Johannesburg, Gauteng 2191
South Africa

18 February 2021

To whom it may concern,

RE: Avifaunal Peer Review of the Wind Garden Wind Farm: Avifaunal Impact Assessment

Arcus Consultancy Services South Africa (Pty) Ltd ('Arcus') was appointed by Savannah Environmental (Pty) Ltd ('Savannah') to conduct a peer review of the study entitled: "Wind Garden Wind Farm: Avifaunal Impact Assessment, Makana Local Municipality, Eastern Cape" Dated December 2020.

The report aims and scope are clearly defined to assess the avifaunal impact of the proposed development of a commercial wind farm and associated infrastructure on a site located approximately 17km north-west of Grahamstown, within the Makana Local Municipality and the Sarah Baartman District Municipality in the Eastern Cape Province. A preferred project site with an extent of ~4336 ha has been identified by Wind Garden (Pty) Ltd as a technically suitable area for the development of the Wind Garden Wind Farm with a contracted capacity of up to 264 MW that can accommodate up to 47 turbines. The proposed development includes a grid connection to the national grid on site to an existing 132 kV Eskom power line. The Wind Garden Wind Farm forms part of a larger cluster of proposed renewable energy facilities, geographically separated into the East and West blocks, consisting of six wind farms, East block - two wind farms (including the Wind Garden Wind Farm) and West block – four wind farms, two solar farms and a 400 kV Main Transmission Substation (MTS) in the Makana and Blue Crane Route Local Municipalities.

The project site is located within the Cookhouse Renewable Energy Development Zone (REDZ). Due to the location of the project site within the REDZ, a Basic Assessment (BA) process is being pursued.

The report was prepared by Adri Barkhuysen (East Cape Diverse Consultants) and Steve Percival (Ecology Consulting). Having read the report I see no reason to question the relevant experience or independence of the avifaunal specialist who compiled the report. In my opinion the following points should be considered to add clarity to the report.

Overall the contents of the report appear to comply largely with the requirements of Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6 and to a reasonable degree with the requirements prescribed by Government Gazette 43110 (Published in Government Notice No. 320) of 20 March 2020 "Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Avifaunal Species by Onshore Wind Energy Generation Facilities where the electricity output is 20 Megawatts or more". It is presumed in instances where the protocol prescribed by the March 2020 legislation was not followed that this was due to the commissioning of this study predating the publication of the Government Gazette, but I think a statement to this effect should be included in the report given the date of the report.

The report states that the pre-construction bird monitoring has been designed using the BirdLife South Africa (BLSA) guidance, referencing Jenkins et al. (2015) and international best practice, referencing the Scottish Natural Heritage (2017) "Recommended bird survey methods to inform impact assessment of onshore wind farms" as well as the information in the Strategic

Environmental Assessment (SEA) (Department of Environmental Affairs 2015) for the Cookhouse REDZ Focus Area.

The presentation of the survey effort in the report could be made more clearly, as it is currently difficult to easily determine how well the survey effort corresponds to the requirements of the guidelines particularly in terms of the dates, times and hours spent on each vantage point (VP). A way to more readily appreciate these data (e.g. a table) would be useful to assess how the timing and duration of monitoring may influence the data collected and interpretations of bird activity. The survey effort is also not clear from the descriptions in the text as it appears to be contradictory. For example the report states:

"*Current BLSA guidance recommends at least 48 hours per VP, with 12 hours minimum over each of the four seasons, so for the surveys a minimum of four hours surveys have been carried out per VP per month. BLSA also recommends a higher survey effort in higher sensitivity areas (such as within eagle ranges), so additional survey effort was carried out in areas closer to eagle nesting areas and vulture roosts (up to 72 hours per VP). A total of 48 hours of surveys were obtained from each of the six VPs covering the Wind Garden Wind Farm site.*"

From this it is unclear if any VPs were surveyed for 72 hours or not. It is assumed that this statement applies to the other developments where nests were positioned on the development site and was not considered applicable to the Wind Garden Wind Farm, however this needs to be clearly stated and motivated as to how higher sensitivity areas were determined to not be present despite the report calculating eagle ranges overlapping with the proposed development.

It appears as if 14 months of monitoring was conducted and if 4 hours of surveys were carried out per VP per month then a total of 56 hours of surveys would have been obtained. A table detailing the survey effort would improve the evaluation of the methods.

The guidelines state that *"Monitoring should also be undertaken at a minimum of one nearby reference (control) site, matched as closely as possible to the proposed development site, to validate before-after comparisons of bird populations"* and that *"Reference sites should match as closely as possible to the impact site in all respects [… and] be at least half the size of the WEF"*. The report does not detail monitoring conducted at a control site and therefore compliance with these recommendations is not possible to evaluate. It is suggested that details of the control site are included in the report even if the results of the control site monitoring are not presented (they should however be archived and made available for comparison with post-construction monitoring).

It should be made more clear how avifaunal sensitivities have been determined (i.e. buffers) with specific reference to how the data collected during pre-construction monitoring has informed their ratings and how the ratings follow the precautionary approach adopted given the uncertainties and limitations of the data collection. For example an 'important note' on pg. 42 *states "At the current time the entire Karoo region has received very little rain therefore the region and this study area is in a very dry period.".* Therefore the potential impact that the drought conditions may have on the activity data should be explicitly evaluated and included in the limitations section.

It is noted that that the nest buffers proposed in the report are smaller than those currently recommended by most bird specialists in South Africa. Justification for these reductions should be more clearly motivated in the report referencing applicable baseline recommendations and applicable site-specific pre-construction monitoring data that demonstrates why 'standard' buffers are likely not required to reduce the probability of impacts associated with the proposed project. The justification should give appropriate consideration to the limitations of the study in terms of the duration and timing of the data collection (e.g. how drought conditions may influence the confidence in the reduction of buffer sizes).

While known Verreaux's Eagle and Martial Eagle nests are not specifically referred to in the Strategic Environmental Assessment (SEA) Cookhouse Focus Area 3 REDZ Focus Area, the National

Web-based Screening Tool[1] and other focus areas list areas within 3 km and 5 km of Verreaux's Eagle nests are considered to be of Very High Sensitivity and High Sensitivity respectively. Similarly the other focus areas consider a buffer of 5 km from active Martial Eagle nests to be of Very High Sensitivity. These zones correspond to the buffers regularly recommended by bird specialists in South Africa and I think it would be worthwhile to outline the reasoning behind not considering these buffers to represent the precautionary approach for the project area, particularly in light of the recent global up-listing of Martial Eagle to Endangered status by the International Union for Conservation of Nature (IUCN).

It is not clear how the survey effort corresponds to The Verreaux's Eagle Guidelines, which recommends a buffer of 3 km is around all nests. These guidelines recommend that "Areas associated with increased flight activity and/or risky behaviour should also be avoided" and in the decision tree the guidelines define an area within 3 km nest buffers as an area associated with high flight activity. If these areas are avoided then one year of monitoring may be sufficient. The guidelines do make provision for a reduction of the 3 km buffer provided that it is based on rigorous avifaunal surveys including 72 hours of VP monitoring per year and potentially two years of monitoring. As only a single turbine is placed within this buffer I would suggest that it is relocated or its position be more clearly motivated taking the potential effects of the drought conditions on flight activity into consideration. I consider this motivation to be a useful addition to the report as at least one of the fatalities of Verreaux's Eagle that have occurred were a at a facility where low flight activity of Verreaux's Eagle was recorded and the assessment did not predict that the species was particularly at risk at the site and the fatality occurred a considerable distance (at least 3.5 km) from suitable Verreaux's Eagle breeding habitat on relatively flat ground. This is referenced in the report as well as another fatality that occurred 3.8 km from a nest, therefore the reasons behind reducing the buffer should be further motivated and elaborated upon. Particularly as an analysis[2] of circular buffers of 5.2 km radius showed that they only captured 50% of Verreaux's Eagle collisions.

The map representing the nest positions of various birds should more clearly differentiate between active/inactive nests as well as confirmed nest locations and territories, the accompanying text should elaborate on how territories were determined. As Secretarybird have recently been up-listed to Endangered globally by the IUCN, this information is of particular use to determine the potential effect of the development on this species, as on the map there appears to be a Secretarybird nest located on the facility. If this is a nest it should be elaborated on and motivation given as to the recommended and appropriate nest buffers. The executive summary however states that no Secretarybird nests were located. It is therefore recommended that clarification regarding the blue dot on the nest map and the determination of 'territories' therefore needs to be made.

The report makes reference to the use of a 'spatial modelling' and states that:

"The spatial model was used to predict Martial Eagle flight activity across the whole of the study area, enabling estimates to be made of flight density in areas that fell outside the VP survey area, and hence enhance coverage of the wind farm site and its surrounds […]. This could then be used to more fully quantify the benefits of applying buffer zones around nest sites […]. This illustrates clearly the higher levels of use predicted around the nest sites, with the large majority of the higher use zones within the proposed turbine exclusion zone."

The details of this 'spatial modelling' should be detailed in the report with any assumptions or limitations associated with the model added to the appropriate section on limitations. Without the details of this model I am unable to evaluate its applicability or how appropriate the outputs may

[1]https://screening.environment.gov.za/server/rest/services/screening/Wind_SensitivityLayers_NoLandscape/MapServer/legend

[2] Murgatroyd, M, Bouten, W, Amar, A. A predictive model for improving placement of wind turbines to minimise collision risk potential for a large soaring raptor. J Appl Ecol. 2020; 00: 1– 12. https://doi.org/10.1111/1365-2664.13799

be as a motivation to inform buffer sizes. The literature cited did not clarify how the model was employed so I suggest that a brief description of the model be included in the methods section.

The evaluation of this model is made particularly difficult as the output does not appear to match the report's presentation of flight path data collected during pre-construction monitoring.

There are generally considered to be several potential limitations in the use of Collision Risk Modelling (CRM) in a local context as the model is sensitive to the input values, particularly those of flight speed (which changes with behaviour being exhibited at the time and time of day for soaring species such as Verreaux's Eagle), avoidance rates and potentially sample size. Reliable data for many of the input variables do not exist for South African species and therefore proxies are used from species assumed to have similar biology found in other parts of the world. There are issues with this as even closely related species may have significantly different foraging strategies, for example Golden Eagles are considered to be generalist predators when compared to the closely related Verreaux's Eagle, which has different wing shape morphology and can exhibit highly specialised foraging behaviour in parts of its range. The flight speed of Verreaux's Eagle used in the model is listed on pg. 54 as 11.9 m/s, while the flight speed of these eagles will vary depending on the behaviour being exhibited at the time.

The report states that *"flight speeds were taken from Alerstam et al. (2007) for ecologically similar species, as none were available for any of the six key species."* However no reference to this paper is included in the references. The derivation of these flight speeds or relevant proxies used would be useful to include in the methods section.

Murgatroyd *et al.* (2016)[3] reported an average trip speed of less than half that value (4.69 m/s) for pre-breeding Verreaux's eagle (n = 4) over 22 days of tracking via GPS-loggers. As the model is sensitive to flight speed, this would likely have a significant effect on the results of the CRM. While the limitations of CRM are outlined in the text, I suggest that these be added to Section 10 that outlines limitations of the study.

As CRM is also highly sensitive to potential avoidance rates it is useful that the author has included multiple levels of avoidance in the table on pg. 57. The table does however demonstrate the sensitivity of the model by showing that an order of magnitude difference exists in the variation between the lowest avoidance rate (95 %) and highest avoidance rates (99.5 %) calculated. This translates to the difference between a Verreaux's Eagle fatality rate of one fatality approximately every 15 years at 99.5 % avoidance rate to one fatality every 1.5 years at 95 % avoidance rate. Or 1.6 Verreaux's Eagle fatalities over the lifespan of the project compared to 16 respectively (assuming the flight speed of Verreaux's Eagle used in the CRM of 11.9 m/s is appropriate). The collision rate and fatalities effectively double in the difference between 98 % and 99 % avoidance rates.

My confidence in these estimates is low, but the exercise can be worthwhile nonetheless as potential (and actual) mortalities could be contextualised in terms of the percentage of the population that may be lost, if a reasonable motivation and justification can be provided as to why each input variable was selected.

The utility of CRM in context of the species population dynamics has been stated in the report, which states that "*In the UK a 1% increase over the baseline mortality is now frequently being used as an initial filter threshold above which there may be a concern with the predicted collision mortality (and hence requiring further investigation). Collision risks below this level are usually considered not to be significant."* However the report does not appear to present the baseline mortality for the species considered nor how those figures were derived. This makes it impossible to evaluate the suitability of any assumptions or assess the percentage increase that the proposed

[3] Murgatroyd M, Underhill LG, Bouten W, Amar A (2016) Ranging Behaviour of Verreaux's Eagles during the Pre-Breeding Period Determined through the Use of High Temporal Resolution Tracking. PLoS ONE 11(10): e0163378. doi:10.1371/journal.pone.0163378

development may impose over the baseline mortality data. Nor is it clear if national, regional or local populations are the intended receptors against which this target is measured.

Bearing in mind the limitations of CRM care should be taken to not to over-interpret the results. BLSA recommends a more precautionary approach when assessing the significance of potential impacts on Verreauxs' Eagles as even apparently low collision rates have the potential to cause significant population declines for raptors. BLSA suggests in its Verreaux's Eagle Guidelines that wind farms should aim for a target of zero Verreaux's Eagle mortality. BLSA 'strongly encourages' the inclusion of thresholds in the Environmental Management Programmes for wind farms; if annual mortality rates exceed a pre-defined limit, operational-phase mitigation should be non-negotiable. While this position refers to Verreaux's Eagle, it is recommended that it is considered appropriate for other species Red-List species such as Martial Eagle.

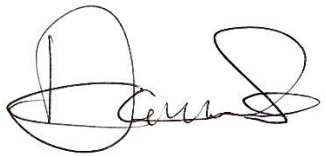
The report notes that there are currently no established thresholds for acceptable impacts on bird species in South Africa and that areas of increased collisions that may require additional mitigation if unacceptable impacts are observed (in the opinion of the bird specialist after consultation with BLSA, relevant stakeholders and an independent review). I therefore recommend that the requirements for operational phase mitigation be strengthened for inclusion in the EMPr detailing a more definitive and unambiguous threshold limit of fatalities above which operational mitigation (such as shut-down-on-demand) ***must*** be implemented, to avoid confusion or debate about when such actions need to be undertaken.

The report states that "Sites where higher numbers of raptor collisions have occurred generally have supported a high density of flight activity that has been maintained post-construction, often associated with attractive ecological resources within the wind farm site, resulting in attraction into the wind farm rather than avoidance." However there is no reference offered to support this claim and it would be useful to include one from a South African context. The total number of flight paths recorded across the WEF site should be considered for inclusion despite their height, as the table provided for flight activity only reports flights at rotor-swept-height. In my opinion this makes the table harder to interpret as for example only four flights of Martial Eagle were recorded on four occasions yet the recorded passage rates are not equal. I assume this is due to flights considered to be 'not at risk' being recorded but I think this could be clarified by displaying both risky flights and total flights recorded per month.

I am largely in agreement with the impact tables presented and assessed, however my primary concern is regarding the collision impact table, and based on the points raised above I am unable to evaluate if the impact rating and conclusion are justified and appropriate or not. I suggest that the structure of the report should be altered to facilitate the logical flow between the results and conclusion.

The recommended mitigation measures are appropriate but I suggest that fatality threshold limits for the implementation of operational mitigation measures be more clearly defined and unambiguously prescribed.

Regards,



Dr Owen Rhys Davies (Pr. Sci. Nat)
Avifaunal Specialist

CURRICULUM VITAE

Dr Owen Davies Pr. Sci. Nat. (Ecology)

Ecologist

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Specialisms

- Avifaunal surveys
- Ecological surveys
- Field research
- Data analysis and assessment of ecological data

Summary of Experience

Owen is a Professional Natural Scientist registered with the South African Council for Natural Scientific Professions (SACNASP) and obtained his doctoral degree from the Percy FitzPatrick Institute of African Ornithology, a DST-NRF Centre of Excellence at the University of Cape Town. Owen has been involved in avifaunal monitoring activities for renewable energy projects since 2013. Extensive field research has given Owen experience in the techniques required for conducting biological surveys on a variety of taxa including observations, physical trapping and identification of small terrestrial birds, raptors, bats, small mammals, rodents, snakes, reptiles, scorpions and fish. He is also qualified to conduct observations and acoustic monitoring of marine mammals in the offshore environment. Data collection in a diversity of habitats and ecosystems, combined with formal training in field skills such as off-road driving, enables Owen to conduct ecological surveys across southern Africa. In addition, his skills in data analysis and scientific writing at the PhD level enable him to produce high quality assessments and reports.

Qualifications and Professional Interests

- **University of Cape Town, Percy FitzPatrick Institute of African Ornithology, 2010 to 2015**
  PhD Zoology
- **University of Cape Town, Percy FitzPatrick Institute of African Ornithology, 2008 to 2010**
  MSc Zoology (upgraded to PhD)
- **University of Cape Town, 2007**
  BSc Zoology (Hons)
- **University of Cape Town, 2003 to 2006**
  BSc Zoology
  BSc Botany

Professional History

2015 (July) to present - Avifaunal Specialist, Ecologist, field team leader, Arcus Consultancy Services, Cape Town
2014 to 2015 - Bat monitoring field assistant, Arcus Consultancy Services, Cape Town
2013 to 2015 - Avifaunal observer, Arcus Consultancy Services, Cape Town
2009 to 2013 - Research Assistant (birds) to Dr J. Fuchs (Curator of Birds at the Muséum national d'Histoire naturelle, Paris), throughout South Africa
2007 to 2013 - Research Assistant (birds) to Prof T. M. Crowe (Percy FitzPatrick Institute of African Ornithology, Department of Zoology, University of Cape Town), throughout South Africa
2011 - Research Assistant (birds) to Dr I. Little, Endangered Wildlife Trust, Uganda
2010 - Research Assistant (bats) to Asst. Prof Hassan Salata, Department of Wildlife (South Sudan), Northern Cape
2010 to 2011 - Research Assistant (small mammals) to Dr B. Smit, University of Pretoria, Northern Cape
2010 - Research Assistant to Dr H. Smit-Robinson, Birdlife SA, Western and Northern Cape

CURRICULUM VITAE

Project Experience

- Umsinde Emoyeni WEF (Avifaunal assessment, data analysis and reporting)
- Confidential WEF near Molteno, Northern Cape Province (bird monitoring data analysis and reporting)
- Confidential Grid Connection near De Aar, Northern Cape Province (Avifaunal assessment, Ecological assessment, site-walkthrough, data analysis and reporting)
- Confidential WEF near Yzerfontein, Western Cape Province (Avifaunal assessment, Ecological assessment, site-walkthrough, data analysis and reporting)
- Metsimatala Solar (Field team leader, bird observations, data analysis and reporting in collaboration with specialists)
- Kolkies WEF (Field team leader, bird observations, bat mast commission, data analysis and reporting in collaboration with specialists)
- Karee WEF (Field team leader, bird observations, bat mast commission, data analysis and reporting in collaboration with specialists)
- Gouda WEF (Field team leader, bird observations – post construction)
- Hopefield WEF (Field team leader, bird observations, data analysis and reporting in collaboration with specialists – post construction)
- Spitzkop West WEF (Bird observations, bat mast commission)
- Pofadder WEF (Bat mast commission)
- Cookhouse WEF (Bat mast commission and decommission)
- Komsberg WEF (Field team leader, bird observations, bat mast commission, data analysis and reporting in collaboration with specialists)
- Bokpoort Solar (Avifaunal assessment, bird observations, data analysis and reporting)

Conferences and Seminars

- Biodiversity Southern Africa Conference, Biological Sciences Department, University of Cape Town, 2 to 6 December 2013
- Southern African Society for Systematic Biology (SASSB) Conference 2012: Systematics in the Era of Integrative Biology, Arniston, Western Cape, 16 to 20 July 2012
- The Willi Hennig Society Annual Meeting XXX Conference for Cladistic Research 2011, Sao Jose do Rio Preto, State of Sao Paulo, Brazil, 29 July to 2 August 2011
- Southern African Society for Systematic Biology (SASSB) Conference 2011: Biodiversity Matters!, Rhodes University, Grahamstown, Eastern Cape, 19 to 21 January 2011
- Zoological Society of Southern Africa (ZSSA) 50th Anniversary conference 2009, Natalia Resort, Illovo Beach, Kwa-Zulu Natal South Coast, 21 to 25 July 2009
- Southern African Society for Systematic Biology (SASSB) 10th Anniversary Conference 2009, Natalia Resort, Illovo Beach, Kwa-Zulu Natal South Coast, 25 to 27 July 2009
- Pan-African Ornithological Congress (PAOC 12) South African Conference 2008: Birds and People – Interaction, Utilisation and Conservation, Goudini Spa, Western Cape, 7 to 12 September 2008

Publications

DAVIES, O.R, JUNKER, K, JANSEN, R, CROWE, T.M. & BOOMKER, J. 2008. Age- and sex-based variation in helminth infection of Helmeted Guineafowl (*Numida meleagris*) with comments on Swainson's Spurfowl (*Pternistis swainsonii*) and Orange River Francolin (*Scleroptila levaillantoides*). South African Journal of Wildlife Research 38 (2): 163-170.

JUNKER, K., DAVIES, O.R., JANSEN, R., CROWE, T.M. & BOOMKER, J. 2008. Nematodes of Swainson's Spurfowl *Pternistis swainsonii* and Orange River Francolin *Scleroptila levaillantoides* from the Free State province, South Africa, with a description of *Tetrameres swainsonii*, sp. nov. (Nematoda: Tetrameridae). Journal of Helminthology 82: 365-371.