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AMENDMENT TO THE AVIFAUNAL IMPACT ASSESSMENT CONDUCTED FOR THE AUTHORISED UMSINDE EMOYENI PHASE 1 WIND ENERGY FACILITY NEAR MURRAYSBURG, WESTERN CAPE PROVINCE

On behalf of

Emoyeni Wind Farm Project (Pty) Ltd

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1 INTRODUCTION

1.1 Background

The Umsinde Emoyeni Phase 1 Wind Energy Facility (WEF) received Environmental Authorisation (EA) for a maximum generation capacity of 147 MW, with a total of up to 35 wind turbine generators (WTGs) with a hub height of up to 135 m, blade length of 75 m, rotor diameter of up to 150 m and an individual generating capacity of 1.5-4.5 MW each.

Emoyeni Wind Farm Project (Pty) Ltd is proposing to amend the EA to allow for the utilisation of improved WTG technology (increased hub height, rotor diameter and rated power of the WTGs) and the optimization of the layout to accommodate revised WTG specifications.

The amendment includes the following specification changes:

- Number of WTGs reduced from up to 35 to up to 33;
- Individual WTG generation capacity increased from up to 4.5 MW to up to 10 MW;
- Hub height increased from up to 135 m to up to 160 m;
- Blade length increased from 75 m to up to 90 m;
- Rotor diameter increased from up to 150 m to up to 190 m;
- Maximum hardstanding increased from 45 m x 25 m to 55 m x 35 m; and
- Internal roads increased from 9 m to 12 m width in places during construction (reduced to 4 - 6 m width during operation).

The specification changes with particular relevance to potential impacts on avifauna are summarised in Table 1 below.

Table 1: Summary of specification changes in the proposed amendment compared to those originally authorised

	Authorised	Proposed Amendment
Hub Height	Up to 135 m	Up to 160 m
Blade Length	75 m	Up to 90 m
Rotor Diameter	Up to 150 m	Up to 180 m
Number of WTGs	Up to 35	Up to 33

1.2 Purpose and Aims

The purpose of this report is to assess whether the conclusions and recommendations of the original Avifaunal Impact Assessment Report compiled for the Umsinde Emoyeni Phase 1 WEF in January 2018 will be affected by the proposed changes.

1.3 Terms of Reference

The Terms of Reference for this assessment are as follows:

- Review original reports and data;
- Review any updated data on the baseline avifaunal community (where available);
- Review existing literature relevant to the effects of WTG dimensions on the risks to avifauna;
- Update the avifaunal sensitivity map(s) where relevant to the proposed changes;
- Assess the impacts related to the proposed changes from the authorised specifications (if any);
- Assess advantages or disadvantages of the proposed change in WTG specifications including a comparative assessment between the authorised specifications and the proposed specifications);

- Identify additional changes to the mitigation measures required to avoid, manage or mitigate the impacts associated with the proposed changes (if any).

1.4 Assumptions and Limitations

A significant amount of pre-construction monitoring data was collected during two, 12 month monitoring programmes on the WEF site (conducted in 2013/14 and 2016/17). Based on the dimensions proposed at the time of the surveys flight activity was recorded through five height bands: 1: 0-20 m; 2: 20-40 m; 3: 40-120 m; 4: 120-160 m and 5: >160 m and it was assumed that flights between 20 m above ground and 160 m would fall within the Rotor Swept Height (RSH) of a WTG. These flight data were used in the original assessment to determine flight sensitivity by creating a Grid Cell Sensitivity Score (GCSS) which is calculated through the use of an equation that includes the proportion of a flight line at RSH. The accurate estimation of flight heights is difficult in the field, especially during pre-construction monitoring when there are few reference points of known height in the area. This limitation is addressed by the observers adopting a conservative approach when recording flight height estimation in the field by assigning a flight to the nearest RSH height band when they are uncertain unless flights are obviously significantly higher or lower such as birds using thermals at high altitude or foraging close to ground level. In previous experience the accurate estimation of flight height becomes more difficult as height increases.

The height bands used during pre-construction monitoring do not lend themselves to re-analysis based on the WTG specification changes in the proposed amendment. The specification changes would result in the RSH being between 70 m and 250 m and therefore some flights previously classified as being within the RSH could fall below the RSH of the WTGs considered for the amendment and similarly some flights previously classified as being above RSH could now be within it, although the latter is less likely following the conservative approach outlined above.

One approach often used in similar circumstances would be to include all flight bands relevant to the new specifications (i.e. height bands 3: 40-120 m; 4: 120-160 m and 5: >160 m). This approach was not considered to be appropriate at the project site. The topography of the area often resulted in birds soaring at considerable height, e.g. Verreaux's Eagle commuting to and from nests located high in the surrounding mountains. It was determined by the avifaunal specialist that due to the large number high altitude flights and the difficulty of accurately estimating flight heights in the field, the incorporation of height bands 3, 4 and 5 into a re-analysis of the flight sensitivity data would not result in a flight sensitivity map that describes the site utilisation by birds in a way that would be more informative to ensure that WTGs are placed away from areas of particular sensitivity than the map which currently exists.

To further address this limitation the latest available risk modelling was undertaken for Verreaux's Eagles (Appendix I) using the WTG specification changes in the proposed amendment to identify High Risk areas. These data were combined with revised avifaunal buffers and flight activity data to produce an updated avifaunal sensitivity map based on modelled, predicted and observational field data (Figure 1).

The rotor swept area, WTG number and layout associated with the proposed amendment were the factors considered to be more appropriate to assess any changes to the potential impacts from the proposed amendment in this instance.

2 METHODOLOGY

2.1 Document Review

To determine how the proposed changes may compare to the previous layout the following documents and/or data were reviewed:

- Arcus, 2015. Avifaunal Specialist Report for Umsinde Emoyeni Wind Energy Facility Phase 1 & 2 and Associated Electrical Grid Connection Phase 1 & 2, September 2015;
- Arcus, 2018. Updated Avifaunal Impact Report for Umsinde Emoyeni Wind Energy Facility Phase 1 & 2 and Associated Electrical Grid Connection Phase 1 & 2, January 2018; and
- Various research publications (citations provided in the text).

2.2 Updated Avifaunal Baseline

The most recent data available online from the South African Bird Atlas Project 2 (SABAP2) of the Animal Demography Unit (ADU), University of Cape Town (UCT) were obtained for pentads on and around the project site.

2.3 Updated Avifaunal Sensitivity

The Verreaux's Eagle Risk Assessment Tool (VERA) was utilised to model areas of particular sensitivity to Verreaux's Eagle, the methods are outlined in the attached report (Appendix: Verreaux's Eagle Risk Assessment). Areas identified by the model to be of High collision risk were added to the 'no-go' buffers. Buffer areas around rocky ridges were revised and increased and existing buffers were increased in relation to the increased dimensions of the proposed WTGs. The avifaunal sensitivity map was updated with these additional buffers accordingly.

2.4 Site Visit

The Best Practice Guidelines for assessing and monitoring the impact of wind energy facilities on birds in southern Africa[1] state that: "*If there is a significant gap (i.e. more than three years) between the completion of the initial preconstruction monitoring and impact assessment, and the anticipated commencement of construction, it may be advisable to repeat the pre-construction monitoring (or parts thereof) to assess whether there have been any changes in species abundance, movements and/or habitat use in the interim*". This is necessary to determine if any changes in the receiving environment have occurred that may influence the potential impacts and risk to avifauna or the suitability of a "Before (pre-construction)- After (post-construction)- Control (reference site)- Impact (development) (BACI) analysis. A BACI analysis is used to determine the effects of a wind energy facility by comparing data collected before and after the construction of the facility on the development site and a suitable control site. This enables a distinction to be made between effects likely attributable to a wind energy facility and those stemming from other factors. Any significant aspect of the avifaunal community in the area that has changed since the conclusion of the pre-construction monitoring and prior to the construction of the development therefore needs to be suitably recorded. The site visit was conducted over five days between 22 June 2020 and 26 June 2020. This included a confirmation of the status of nests of Priority Species, a search for additional nests and time spent on and around the project site to determine if any significant changes in land use relevant to avifauna had occurred.

[1] Jenkins, A.R. van Rooyen C.S., Smallie, J.J., Harrison J.A., Diamond M., Smit-Robinson H.A., and Ralston-Paton S. 2015. Best Practice Guidelines for assessing and monitoring the impact of wind energy facilities on birds in southern Africa (Third Edition, 2015). BirdLife South Africa, Johannesburg, South Africa.

3 ORIGINALLY AUTHORISED IMPACT ASSESSMENT FINDINGS

The originally authorised avifaunal impact assessment study (Arcus 2018) made the following relevant findings with respect to impact significance for each phase:

Table 2: Summary of relevant impact assessments and indication of changes due to the proposed amendment

Phase	Impact	Significance Without Mitigation	Significance with Mitigation	Significance with mitigation will change due to proposed Amendment (Y/N)
Construction	Habitat Destruction	Medium	Low	N
	Disturbance and Displacement	Low	Very Low	N
Operational	Disturbance and Displacement	Medium	Low	N
	Electrocution	Medium	Low	N
	Collisions with Power Lines	High	Medium	N
	Collisions with WTGs	Very High	Medium	N
Decommission	Disturbance and Displacement	Low	Very Low	N
Cumulative Impacts (of the Umsinde Emoyeni Phase 1 and 2 WEF and proposed developments within 50 km)	Electrocution	Very High	Medium	N
	Collisions with Power Lines	Very High	High	N
	Collisions with WTGs	Very High	Very High	Y

The key species which Arcus (2018) identified in the original avifaunal impact assessment as being most at risk are Blue Crane *(Near-Threatened[2])* and Verreaux's Eagle *(Vulnerable[2])*.

4 EFFECTS OF WTG NUMBERS, DIMENSIONS AND LAYOUT ON RISKS TO AVIFAUNA

Collision of birds with turbines is the largest potential impact on avifauna associated with wind energy facilities. The main factors of the proposed amendment that could influence the potential risks to avifauna therefore relate to the number of WTGs, their dimensions and layout.

Conflicting results on the effect that WTG specifications have on avifaunal fatalities exist in the published literature. Howell *et al.* (1997)[3] concluded that the evidence from the Altamont Pass in California (United States of America) did not support the hypothesis that the larger rotor swept area (RSA) of turbines contributes proportionally to avian mortality,

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[2] Taylor, M.R., Peacock, F., and Wanless, R.M. 2015. Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland.

[3] Howell, J.A. 1997. Avian Mortality at rotor swept area equivalents Altamont Pass and Montezuma Hills, California. Report for Kenetech Wind Power.

i.e. that larger RSA resulted in more mortalities. Barclay *et al.* (2007)[4] compiled wind turbine and fatality data from 33 sites in North America to test the hypothesis that wind turbine size and height influenced fatality rates of birds. They concluded that while it may be expected that as rotor-swept area increased, more animals would be killed per turbine their analyses indicated that this was not the case and rotor-swept area was not a significant factor. In addition they found no evidence that taller turbine towers are associated with increased bird fatalities and that the per-turbine fatality rate for birds was constant with tower height. Krijgsveld *et al.* (2009)[5] conducted a study in the Netherlands which "*indicated 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*". Smallwood (2013)[6] estimated fatalities at wind energy facilities across North America to "*test whether the trend toward installing larger wind turbines might reduce fatality rates, or whether variation in fatality rates could be explained by other methodological, environmental, or turbine design factors*" and concluded that "*adjusted fatality rates correlated inversely with wind-turbine size for all raptors as a group*", i.e. lower fatality rates were estimated at wind energy facilities with larger turbines. Everaert (2014)[7] studied the impact of bird collisions at eight land-based wind energy facilities in Belgium (with a total of 66 wind turbines) and concluded that "*no significant relationship could be found between the number of collision fatalities and the rotor swept area of the turbines*".

De Lucas *et al.* (2008)[8] showed a correlation between hub height and mortality for Griffon Vulture, indicating that differential impacts and risks may be experienced depending on the flight characteristics of the species present in the area.

It must be noted that even though older studies may refer to 'modern turbines' the technology has advanced at such a rapid pace that even WTGs considered to be at the larger end of the scale in these studies are significantly smaller than those that are currently available on the market. Similarly, Loss *et al.* (2014)[9] argued that Smallwood (2013) failed to distinguish between lattice and monopole turbines, stating that as monopole turbines comprise the vast majority of all wind turbines installed in North America, it is important to separately estimate mortality and assess correlates of mortality for this turbine type. Loss *et al.* (2014) sought to provide the first mortality estimates specific to monopole turbines and included data from 68 studies, their findings supported a positive relationship between bird collision mortality and turbine hub height. Part of their explanation for why their studied showed different results was the fact that lattice turbines were excluded from their analysis. Lattice turbines are relatively small and have relatively high per-turbine mortality rates as the lattice structure may attract perching birds and raptors which may skew the results and conclusions of previous studies. Loss *et al.* (2014) conclude that "*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*".

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[4] Barclay R.M.R, Baerwald E.F and Gruver J.C. 2007. Variation in bat and bird fatalities at wind energy facilities: assessing the effects of rotor size and tower height. Canadian Journal of Zoology. 85: 381 – 387.

[5] Krijgsveld, K.L., Akershoek, K., Schenk, F., Dijk, F. and Dirksen, S. 2009. Collision risk of birds with modern large wind turbines. Ardea 97(3): 357–366.

[6] Smallwood, K.S. 2013. Comparing bird and bat fatality rate estimates among North American Wind-Energy projects. Wildlife Society Bulletin 37(1):19–33.

[7] Everaert, J. 2014. Collision risk and micro-avoidance rates of birds with wind turbines in Flanders, Bird Study, 61:2, 220-230

[8] De Lucas, M., Janss, G.F.E., Whitfield, D.P., Ferrer, M., 2008. Collision fatality of raptors in wind farms does not depend on raptor abundance. J. Appl. Ecol. 45, 1695–1703.

[9] Loss S.R., Will, T., Marra, P.P. 2013. Estimates of bird collision mortality at wind facilities in the contiguous United States. Biological Conservation 168 201–209.

A more recent study by Thaxter *et al.* (2017)[10] conducted meta-analyses that included 88 bird studies containing information from 93 onshore wind energy facilities and related collision rate to species-level traits and turbine characteristics to quantify the potential vulnerability of 9 538 bird species globally. They found a strong positive relationship between wind turbine capacity and collision rate per turbine. The strength of this relationship, however, was insufficient to offset the reduced number of larger turbines required per unit energy generation. They concluded that to minimize bird collisions, wind farm electricity generation capacity should be met through deploying fewer, large turbines, rather than many smaller ones.

5 POTENTIAL EFFECTS OF THE PROPOSED AMENDMENT ON RISKS TO AVIFAUNA

The authorised rotor diameter of up to 150 m translates into a rotor swept area (RSA) of up to approximately 17 671 m² per turbine. The proposed increase of the rotor diameter to 180 m translates into an RSA of up to approximately 25 447 m² per turbine. This is an increase of 44 % in the RSA per turbine. The maximum number of WTGs will be reduced from the authorised number of up to 35 WTGs to 33 WTGs proposed by the amendment. The total RSA of the 35 authorised WTGs is approximately 618 485 m² and the total RSA of the maximum number of 33 WTGs proposed by the amendment is approximately 839 751 m² when using maximum blade lengths at the same time. This translates into an increase of 35.8 % increase in the collision risk window. It should be noted that the project has a maximum generation size capped at 147MW which results in an inverse relation between number of turbines and the size of individual turbines. For the Environmental Authorisation maximum limits on all specifications need to be considered, in practice however the maximum on only one specification will likely be reached.

When using the upper limits on all specifications, it results in a moderate increase in the overall size of the collision risk window, however as the collision risk to avifauna was identified by the original avifaunal impact assessment as being of Medium significance for Phase 1 and of High significance in the cumulative assessment, this increase is undesirable and the formal impact rating will increase from Medium significance to High significance pre-mitigation. Post-mitigation the significance will remain at Medium.

Based on this, the recommendations of Thaxter *et al.* (2017) should be followed in that the maximum generation capacity should be met through the deployment of fewer, larger WTGs to minimize bird collisions. For example, a reduction in the total number of WTGs from 33 to 23 would result in a lower total RSA (575 493 m²) than the 35 authorised WTGs (618 503 m²) and reduce the impact significance to acceptable levels. This would be preferred as the total RSA of the proposed amendment would be lower than the total RSA already authorised and would also result in significantly fewer obstacles on the landscape. It is highly unlikely that the proposed amendment would meet its maximum generation capacity through the development of WTGs that translates into a significantly increased RSA.

6 ADVANTAGES AND DISADVANTAGES OF THE PROPOSED AMENDMENT

The advantages of the proposed amendment relate to the significantly improved layout and increase in the individual generating capacity of the WTGs considered allowing for a reduction in the total number of WTGs required to achieve the maximum generation capacity of the facility. The layout associated with the proposed amendment has been informed through the use of the latest available information such as the Verreaux's Eagle

[10] Thaxter, C.B., Buchanan, G.M., Carr, J., Butchart, S.H.M., Newbold, T., Green, R.E., Tobias, J. A., Foden, W. B., O'Brien, S. and Pearce-Higgins, J.W. 2017. Bird and bat species' global vulnerability to collision mortality at wind farms revealed through a trait-based assessment. Proc. R. Soc. B.28420170829.

Risk Assessment Tool (VERA, which was not previously available), resulting in updated and expanded buffers, revised WTG positions and an expected reduction in the risks of negative impacts of the facility on avifauna compared to the original authorisation.

The disadvantages of the proposed amendment relate to the increase in the RSA should the maximum number of WTGs (33) be constructed. This scenario is unlikely however as the maximum generation capacity of the facility would be exceeded if the maximum number of WTGs with the maximum rotor diameter were to be constructed.

7 AVIFAUNAL BASELINE STATUS-QUO

The latest SABAP2 data only recorded two additional priority species since the original assessment, namely Pallid Harrier and Rufous-breasted Sparrowhawk, both with only a single record each. The weather conditions for the site visit were excellent and allowed for an extensive amount of time to be spent on and around the project site. The land use and available habitats in the area remain largely unchanged from previous site visits to the area. No additional nests were located. There was, however, a significant and surprising reduction in the number of Blue Crane encountered. Blue Crane were widespread and abundant on the WEF site during the 2016/17 monitoring surveys and accounted for the most incidental recordings during that period. The reasons for this are unclear and the birds may just not have been utilising the area at the time of the site visit, however a local farmer in the area was asked about his experience in this regard and he suggested that he had also noticed a lower number of Blue Crane in the area in recent years (Mr G. Kingwill, pers. comm.). If there is a reduction in the number of Blue Crane utilising the area, this could be a result of the recent drought conditions experienced in the Central Karoo either reducing the number of birds in the area or causing them to forage elsewhere. A mass poisoning event of Blue Crane by a farmer near Richmond around 2015 cannot be discounted as a contributing factor as the effects of such an event on the population are not well understood.

A medium sized flock (62 individuals) of Blue Crane was nevertheless observed on the project site during the 2020 site visit. The location of this flock was determined to be important for the persistence of the species on the landscape regardless of the ultimate cause of the otherwise notable absence of this species on and around the WEF site.

8 NEW RELEVANT INFORMATION

8.1 Updates to Best Practice Guidelines for Wind Energy & Avifauna

Since the original monitoring was completed, BirdLife South Africa (BLSA) have released species-specific guidelines for the pre-construction monitoring of Verreaux's Eagle[11]. These guidelines recommend additional monitoring over-and-above those outlined by the 'standard' best practice guidelines. The main considerations of the Verreaux's Eagle guidelines include the following:

- Wind turbines should be placed outside of the core territory of eagles to reduce the risk of collisions;
- Areas associated with increased flight activity and/or risky behaviour should also be avoided, for example the edge the escarpment, ridge tops, cliffs, steep slopes and particularly slopes that are perpendicular to the prevailing wind direction;
- Dedicated surveys must be conducted to identify potential nest sites. Cliff-lines should be surveyed for evidence of nesting. These surveys should extend beyond the development footprint to include the likely territory of any pair that may regularly use the site;

[11] Ralston-Paton, S. 2017 Verreauxs' Eagle and Wind Farms Guidelines for impact assessment, monitoring, and mitigation. BirdLife South Africa, Johannesburg, South Africa.

- A buffer of 3 km is recommended around all nests (including alternate nests);
- Vantage point surveys should be conducted for a minimum of 72 hours per vantage point per year;
- Fieldwork must include surveys during the breeding season;
- Surveys (including vantage point monitoring) should extend beyond the developable area;
- The relative extent and type of use of the site by eagles must be assessed;
- Steps should be taken to avoid increasing the prey population (and thereby attracting eagles to the wind farm). For example, excavated rocks and animal carcasses should be removed;
- If it is suspected that a proposed wind farm may pose a significant risk to Verreauxs' Eagles, the duration of pre-construction monitoring should be extended to two years, particularly where alternate nests are some distance apart and/or turbines are proposed in areas that may be associated with increased flight activity and/or risky behaviour;
- No construction activities (e.g. new roads) should be allowed within 1 km of nests during the breeding season; and
- Nests should be monitored for breeding activity throughout the lifespan of the wind farm (including during construction), but care must be taken to ensure that monitoring activities do not disturb breeding birds.

The guidelines state that in order to reduce the risk of collisions and displacement WTGs should be placed outside of the core territory of eagles and suggest that core territories can be identified through the use of modelling. Other areas associated with increased flight activity and/or risky behaviour should also be avoided including ridge tops, cliffs, steep slopes, escarpment edges and particularly slopes that are perpendicular to the prevailing wind direction. These areas should be assumed to represent areas of high flight activity, unless monitoring data demonstrates otherwise. Despite not being released at the time of the original avifaunal monitoring, the original programme was in line with most of the recommendations of the Verreaux's Eagle guidelines.

Since the original impact assessment, the Verreaux's Eagle Risk Assessment Tool (VERA) has been developed which uses predictive modelling to obtain a relative collision risk map of the area to ensure that WTGs can be placed in locations that will minimise risk to flying eagles. The tool was developed by Dr Murgatroyd through the Percy FitzPatrick Institute of African Ornithology, DST-NRF Centre of Excellence, at the University of Cape Town, and utilises nest location data and models incorporating topographical and meteorological information of the area to predict site-specific collision risk with WTGs.

A significant amount of survey effort has already been conducted on the project site, including 2 x 12 month monitoring programmes and several nest surveys. To minimize the potential impacts of the proposed development on Verreaux's Eagle, the developer employed the latest available VERA model to predict the territory use of breeding Verreaux's Eagles on and around the project site to inform the proposed layout.

8.2 VERA modelling

8.2.1 Vera Modelling Results

The VERA modelling report (Appendix I) considers two scenarios, one where collision risk is modelled using all nests regardless of their current activity status (i.e. including currently unoccupied nests) and one where collision risk is modelled after the exclusion of currently unoccupied nests. Following the precautionary principle the more restrictive model that included all nest sites including those unoccupied nests was adopted to inform the layout (Scenario 1). The model output resulted in the identification of areas classified as having High, Medium and Low collision risk potential. The High collision risk potential area is the area predicted to be most intensively used by eagles where the development of WTGs should not occur. The Medium collision risk potential area is predicted to likely be used by eagles where the development of WTGs should be avoided where possible and only proceed with additional specialist input. The Low collision risk potential area poses the lowest risk to eagles. The model (Scenario 1) considered an initial revised WTG layout and identified 6 WTGs in High collision risk areas, 17 in Medium collision risk areas and 10 in Low collision risk areas for Umsinde Phase 1.

8.2.2 Implications of the VERA model results on WTG layout

The results of the VERA model were interpreted together with the significant amount of pre-construction monitoring data that has already been collected on the site, including the recording of flight paths. Overall, the areas predicted by the VERA model to be of High collision risk largely corresponded with the flight path data collected during pre-construction monitoring. The good correlation between the actual flight path data collected on site and the predictions of the VERA model suggests that the areas identified to be of High collision risk by the VERA model should be considered to be additional avifaunal no-go areas for the construction of WTGs.

However, the actual flight path data collected on site during pre-construction monitoring did not match the areas predicted by the VERA model to be of Medium collision risk as strongly. The VERA modelling report states that the development of WTGs should be avoided in these areas where possible and only proceed with additional specialist input. While the latest version of the VERA model was employed it has not yet been published and is currently being compiled for scientific publication and therefore may be subject to further refinements. The actual flight path data collected on site is considered by the avifaunal specialist to be a significant amount of relevant additional input and therefore more suitable to inform the layout of WTGs given the discrepancy between the data and the model in these areas in this instance.

The development of WTGs in areas identified by the VERA model to be of Medium collision risk should therefore be allowed to proceed provided that none of the WTGs are in areas identified from actual flight path data to be avifaunal no-go areas for the construction of WTGs. The developer nevertheless removed WTGs from the Medium collision risk areas identified by the VERA model where practically possible.

As the recommendations of the VERA model are intended to minimise collision risk to resident adult eagles but are not relevant to non-breeding eagles using the area, rocky ridge buffers have been reconsidered in the revised mitigation measures to reduce the potential risk to non-breeding eagles.

The layout was further revised based on the above to reduce the potential risk to Verreaux's Eagle. The revised layout removed all WTGs from High collision risk areas predicted by the VERA model as well as from additional or updated avifaunal no-go areas and removed WTGs from Medium collision risk areas where practically possible.

The revised layout has resulted in zero WTGs placed in High collision risk areas identified by VERA, 16 WTGs placed in Medium collision risk areas identified by VERA (but zero WTGs placed in high sensitivity areas identified by actual flight path data) and 17 WTGs placed in Low collision risk areas. Assuming the maximum number of turbines are utilised.

It is the specialist's opinion that the implementation of these steps will result in the proposed amendment layout posing a ***<u>significantly lower risk</u>*** to Verreaux's Eagle compared to the layout that was originally authorised.

8.3 Results from Operational Wind Energy Facilities in South Africa

Ralston-Paton *et. al.* (2017)[12] reviewed the results from one year of post-construction (operational-phase) monitoring of birds at seven wind farms constructed under the first phase of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). No conclusive evidence of displacement of bird species once turbines were constructed was found. While some species observed during preconstruction were not observed during the operational phase, and vice versa, there was little conclusive evidence for displacement of priority species from any sites. In the first year of operation, 271 bird fatalities were recorded at the seven wind farms (285 turbines) that were regularly surveyed in accordance with the BirdLife South Africa/EWT Best Practice Guidelines. This represents an average of 0.95 birds per turbine per year (range 0.2 – 2.0) birds per turbine per year. When adjusted for searcher efficiency and carcass persistence the estimated fatality rates ranged from 2.1 to 8.6 birds per turbine per year, with a mean of 4.1 birds per turbine per year. They noted that raptors and passerines are two groups most affected.

The authors stated that "*Verreaux's Eagle is ranked third on the South African Birds and Renewable Energy Specialist Group's priority list and concerns that this species is vulnerable to collisions appear to have been confirmed. One wind farm recorded four Verreaux's Eagle fatalities in the first year of operation. Three of these were adults and one was a juvenile. Two of the fatalities (one adult and one juvenile) occurred at the same turbine*".

Blue Cranes do not appear to be displaced by wind farms and have been recorded breeding near to wind turbines (Ralston-Paton *et. al.* 2017). The latest figure for Blue Crane mortality at twenty operational wind farms in South Africa is eight confirmed turbine related fatalities (BLSA 2018). While fatalities of Blue Crane have been recorded, preliminary results suggest that Blue Cranes may avoid flying near turbines (Ralston-Paton *et. al.* 2017).

From these data there does not appear to be grounds for additional concern with respect to Blue Crane at the project site and the initial information on Verreaux's Eagle mortalities reinforces the importance of WTG placement in reducing the risks to birds as a single incorrectly placed WTG can contribute disproportionally to fatalities.

Ralston-Paton *et. al.* (2017) recommend that wind energy facilities should also facilitate further academic research at their sites to investigate specific questions that standard monitoring protocols cannot address. It is recommended that a tracking study focussing particularly on the movement of sub-adults and non-territorial adults (floaters) be considered in consultation with BLSA and relevant academic institutions to better understand their movements. The timing and suitability of such a study should be advised by the input of BLSA. The completion of this research should not be a requirement for the amendment authorisation however the data collected would be valuable to the scientific community and also be used to inform any post-construction mitigation that may be required.

8.4 Recent findings on the efficacy of passive markings to reduce WTG collision mortality of birds

It has been suggested that as birds approach the rotating blades of a WTG, the retinal image of the blade increases in velocity until it is moving so fast that the retina cannot keep up with it and the image becomes a transparent blur (known as 'motion blur' or 'motion smear') that the bird may interpret as a safe area to fly through[13]. Hodos (2003)

[12] Ralston-Paton, S., Smallie, J., Pearson, A., & Ramalho, R. 2017. Wind energy's impacts on birds in South Africa: a preliminary review of the results of operational monitoring at the first wind farms of the Renewable Energy Independent Power Producer Procurement Programme Wind Farms in South Africa. BirdLife South Africa Occasional Report Series No. 2. BirdLife South Africa, Johannesburg, South Africa.

[13] Hodos, W. 2003. Minimization of motion smear: Reducing avian collisions with wind turbines. Period of performance: July 12, 1999-August 31, 2002. (NREL/SR-500-33249). Retrieved from Golden, Colorado, USA.

tested the potential of painting several different patterns on WTG blades to reduce the effect of motion smear to increase their visibility to birds in a laboratory setting. The results were encouraging however the author noted that only the visibility of anti-motion-smear blade patterns was evaluated and not their ability to deter a flying raptor from approaching them. Based on the results Hodos (2003) recommended further field tests with a single-blade, solid black pattern to determine its efficacy in reducing fatalities as that pattern resulted in the largest effect in reducing motion smear in the laboratory tests.

A recent study by May *et al.* (2020)[14] tested the hypothesis that painting a single WTG blade black would reduce bird fatalities at the Smøla wind-power plant in Norway using a Before–After–Control–Impact (BACI) approach based on long-term fatality searches. The Smøla wind-power plant provided a suitable study system because of its relative large number of WTGs and the existence of long-term data on turbine fatalities before treatment. The Smøla archipelago is a coastal area rich in birdlife and it has been designated an Important Bird Area (IBA) by Birdlife International and so finding (cost-) effective mitigation measures is of particular appeal. The study found that the annual fatality rate was significantly reduced at WTGs with a painted blade by over 70%, relative to the neighboring control (i.e., unpainted) turbines. Applying contrast painting to the rotor blades significantly reduced the collision risk for a range of birds, and the treatment had the largest effect on reduction of raptor fatalities, with no white-tailed eagle carcasses recorded after painting.

While the results of this study are very promising the implementation of such a mitigation measure in South Africa would be subject to approval by the South African Civil Aviation Authority (SACAA).

9 REVISED IMPACT ASSESSMENTS

The baseline avifauna environment of the WEF site was described in Section 3 of Arcus (2015). The impact assessment therein was updated based on additional monitoring data collected and an updated layout and presented in Arcus (2018). These results were carefully considered, along with the results of the initial monitoring and all the findings from a thorough desk-based study (presented in Pearson, 2015), and an updated Impact Assessment is presented below. The land use, vegetation types and bird micro-habits did not change significantly between 2013/2014, 2016/2017 and 2020. This updated assessment is based on the revised layout proposed by the amendment and considers the latest available information outlined above. The significance of these impacts during the construction, operation and decommissioning phases were then rated using a set criteria (as used in Arcus 2015 and 2018). Where there was no change to the impact rating from the rating given by Arcus (2018), this is stated as such, and the impact rating tables are not shown.

9.1 Construction Phase

9.1.1 Habitat Destruction

No change.

The overall significance of this impact is considered medium if no mitigation takes place. With properly implemented mitigation measures detailed for the original authorisation the intensity of habitat destruction can be decreased to low, resulting in a **low significance**.

9.1.2 Disturbance & Displacement

No change.

[14] May, R, Nygård, T, Falkdalen, U, Åström, J, Hamre, Ø, Stokke, BG. 2020. Paint it black: Efficacy of increased wind-turbine rotor blade visibility to reduce avian fatalities. Ecol Evol. 2020; 10: 8927– 8935. https://doi.org/10.1002/ece3.6592

Prior to mitigation the significance of this impact is rated as low. With the implementation of mitigation measures detailed for the original authorisation the intensity of the impact can be reduced to low, resulting in a **very low significance**.

9.2 Operational Phase

9.2.1 Disturbance and Displacement

No change.

The intensity of this impact is considered potentially medium and probable to occur, resulting in a medium significance. With the implementation of mitigation measures detailed for the original authorisation the intensity can be lowered to low resulting in a **low significance.**

9.2.2 Electrocution

No change.

The extent of the impact is local and restricted to the WEF. As the result of the impact is likely mortality of a number of birds the intensity is considered high and the duration longterm. Since electrocution is known to affect many species in South Africa the impact is possible to occur without mitigation, resulting in a medium significance. If the majority of all new powerlines on the WEF site (i.e. those connecting the turbine strings to the on-site substation) are buried, and any new overhead power line sections are of a bird-friendly design as detailed for the original authorisation, the probability of electrocution occurring can be reduced to improbable, resulting in an impact of **low significance**.

9.2.3 Power Line Collisions

No change.

Prior to mitigation the significance of this impact is high, but the mitigation measures detailed for the original authorisation can lower the probability of the impact occurring, resulting in an impact of **medium significance.**

9.2.4 WTG Collisions

No change.

The most effective mitigation for collision impacts currently available is wind farm placement, as well as specific WTG placement within a WEF to avoid high use areas. Such recommendations have been made and WTG layouts have been revised based on the latest available risk modelling and information. Prior to mitigation the significance of this impact is very high. While the updated layout informed by the revised avifaunal sensitivity map based on these data (Figure 1) is likely to reduce the probability of WTG collisions occurring, the probability of WTG collisions occurring nevertheless remains possible and the intensity remains medium, resulting in an unchanged impact rating of **medium significance** as evaluated by Arcus (2018). Confidence in this assessment remains medium due to uncertainties with regarding the effectiveness of mitigation measures (including WTG placement outside of high risk areas), particularly for Verreaux's Eagle. However, confidence is somewhat improved over the assessment for original authorisation through the incorporation of the VERA risk model into the avifaunal sensitivity map and the good correlation between the model and actual observed flight path data collected on site.

While not yet tested in South Africa deterrent devices, shut-down on demand systems and the painting of one blade per WTG black have the potential to further reduce the risk of WTG collisions (the latter mitigation measure is subject to prior approval by SACAA).

9.3 Decommission Phase

9.3.1 Disturbance and Displacement

No Change.

Prior to mitigation this impact significance is low, and following implementation of mitigation measures detailed for the original authorisation would result in an impact of **very low significance.**

9.4 Cumulative Impacts

Arcus (2018) assessed the cumulative impacts based on the assumption that the Umsinde Emoyeni Phase 1, Phase 2 (Khangela), Modderfontein Wind Energy Facility on a site near Victoria West, Mainstream wind and solar energy facility at Victoria West and the Ishwati Emoyeni Wind Farm Project would be constructed in the broader area. The assessment (Arcus 2018) noted that the extent of these impacts will depend largely on the final turbine numbers and layouts of each facility which can be reduced if turbine placement is informed by pre-construction monitoring and nest surveys, and the minimum number of turbines is constructed.

9.4.1 Cumulative Impact of Electrocution (Operation phase)

No change.

Prior to mitigation the significance of this impact is very high, but the mitigation measures outlined for the original authorisation can lower the intensity and probability of the impact occurring, resulting in an impact of **medium significance.**

9.4.2 Cumulative Impact of Power Line Collisions (Operation Phase)

No change.

Prior to mitigation the significance of this impact is very high, but the mitigation measures outlined for the original authorisation can lower the probability of the impact occurring, resulting in an impact of **high significance.**

9.4.3 Cumulative Impact of Collisions from WTGs (Operation Phase)

This impact was assessed by Arcus (2018), as being of very high significance prior to mitigation, while the mitigation measures outlined for the original authorisation could potentially lower the probability of the impact occurring from definite to probable, the impact was assessed to remain of very high significance, albeit with low confidence.

The improvements of technology that allow for increased individual generation capacity of WTGs and potential for the reduction in the number of WTGs required to meet the maximum generation capacity of a facility has the potential to reduce the risks of WTG collisions and the associated impacts imposed on avifauna through the reduction in the number of obstacles in the airspace within an area. The ongoing research into mitigation measures such as painting a blade on a WTG black has also shown encouraging results. These factors, combined with the availability and implementation of tools such as the VERA model used to predict areas of high risk to resident Verreaux's Eagle and to inform and improve layouts of wind energy facilities is predicted to significantly reduce the cumulative risk of collisions, particularly if employed at nearby developments to further inform their layouts.

Therefore the updated assessment of this impact is that prior to mitigation the significance is very high, but if the appropriate mitigation measures and oversight occurs at the surrounding developments in the area this could potentially lower the intensity of the impact from high to medium, resulting in an impact reduced from very high significance to **high significance**. This could potentially be reduced should mitigation such as the painting of blades be permitted by SACAA and prove to be as effective at reducing the probability of collisions in South Africa as it has been elsewhere. The confidence in this assessment is somewhat improved over the assessment for the original authorisation through the incorporation of the VERA risk model into the avifaunal sensitivity map for both Umsinde Emoyeni Phase 1 and Phase 2 (Khangela) and currently under consideration for the nearby Ishwati Emoyeni Wind Farm Project. However, some uncertainties regarding the effectiveness of mitigation measures (including WTG placement outside of high risk areas) remain due to the lack of long-term data available from the area.

Table 3: Summary of relevant impact assessments and indication of changes due to the proposed amendment

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without Mitigation	Regional 2	High 3	Long-term 3	Very High 8	Definite	Very High	Negative	High
With Mitigation	Regional 2	Medium 2	Long-term 3	High 7	Probable	High	Negative	Medium

10 REVISED MITIGATION MEASURES

The mitigation hierarchy dictates that impacts should first be avoided, then minimised, and only then mitigated, and the Verreaux's Eagle guidelines state "*Emphasis should be placed on avoiding impacts though the careful location of wind farms and wind turbines, before considering curtailment and habitat management*". The primary mitigation measures include the avoidance of any WTG placements within areas classified as high avifaunal sensitivity. Therefore to further reduce the potential risks imposed on Verreaux's Eagle by the proposed development the developer has employed the VERA model to inform the revised layout.

The mitigation measures in the original avifaunal impact assessment and EMPr remain relevant and necessary, but the additional considerations outlined below are applicable.

The buffers for the avifaunal sensitivity map have been revised based on the amendment WTG specifications to ensure that the larger rotor swept area does not encroach on sensitive areas. Additional buffers based on the results of the VERA model and additional rocky ridge buffers based on the Verreaux's Eagle guidelines have been included in an updated avifaunal sensitivity map (Figure 1). An additional buffer has been included around the area identified by the most recent site visit (June 2020) as being of potential local importance to Blue Crane. These represent no-go areas for WTGs and overhead power lines. No WTGs in Umsinde Emoyeni WEF (Phase 1) fall inside these revised buffers.

The following revised mitigation measures are applicable:

- The EMPr must be updated to include the revised avifaunal sensitivity map;
- Areas identified by the updated sensitivity map as 'no-go' areas for the placement of WTGs and overhead powerlines should be explicitly stated as such in the EMPr;
- The final layout must be informed by the updated avifaunal sensitivity map and WTGs that fall inside the revised 'no-go' areas must be moved to lower sensitivity areas or removed completely from the layout (this has been done);
- The maximum generation capacity of the development should be met through the deployment of fewer, larger WTGs as far as practically possible;

- Should fewer WTGs be required to meet the maximum generation capacity of the development than the number authorised, WTGs closest to 'no-go' areas and those in areas identified as being of Medium collision risk by the VERA model must be the first up for consideration to forgo where practically possible;
- Construction-phase monitoring as recommended by the Verreaux's Eagle guidelines must be conducted throughout construction and include vantage point surveys, as uncertainty exists regarding the extent to which displacement may occur as this intense period of disturbance may trigger changes in eagle presence and behaviour;
- Excavated rock piles must be removed after the construction phase to avoid increasing the prey population (e.g. of rock hyrax) on the facility to reduce the chances of attracting Verreaux's Eagles into the project site during the operation phase;
- Animal carcasses encountered on the facility (e.g. roadkill, WTG collisions) must be recorded and reported to the Environmental Control Officer (ECO) for removal during the operation phase to reduce the chances of attracting avifauna into the project site;
- The EMPr must include additional requirements for post-construction monitoring. Manual searching of the site for carcasses is recommended as a strategy and these data are essential in identifying potentially problematic WTGs and critical to inform an effective curtailment plan;
- Post-construction/operational monitoring must be done in line with the latest Best Practice Guidelines and must be conducted as soon as the turbines become operational, any mortalities must be reported to BirdLife SA. As a minimum this monitoring programme must:
  - Continue for the first two years of operations, longer if a need is identified;
  - Record the numbers/densities of birds regularly present or resident within and around the operational WEF;
  - Document patterns of bird movements in the vicinity of the operational WEF.
  - Compare these data with baseline figures and hence quantify the impacts of displacement and/or collision mortality; and
  - Carcass surveying at the WEF for fatalities should also be done for a minimum of two years after construction and should be repeated again at year five and every five years thereafter.
- Results of post-construction bird monitoring must be used to design mitigation measures where necessary;
- Mitigation measures (e.g. curtailment or shut-down-on-demand) must be implemented on any WTGs responsible for the fatalities of two or more Verreaux's Eagle;
- Consultation with the South African Civil Aviation Authority (SACAA) should be undertaken to determine the potential mitigation measure of painting one WTG blade per turbine black to further reduce the risk of bird collisions, this mitigation measure is recommended at the facility should SACAA agree to its implementation;
- No construction activities (e.g. of new roads) is allowed within 1 km of nests during the breeding season (May, June, July and August) as per the Verreaux's Eagle guidelines;
- Nests of Verreaux's Eagle must be monitored for breeding activity throughout the lifespan of the facility as per the Verreaux's Eagle guidelines, including during construction;
- Additional vehicle based transects of the project site and control site must be conducted once per season over four seasons prior to the commencement of construction activities with the aim of recording the status of Blue Crane to allow for more reliable BACI analyses to be conducted; and
- It is recommended that tracking of sub-adult and non-territorial adult Verreaux's Eagles be considered in close consultation with BLSA and an academic institution to gain a better understanding of the movement of these birds across the landscape, should the timing and utility of such a study be considered to be of value by those institutions.

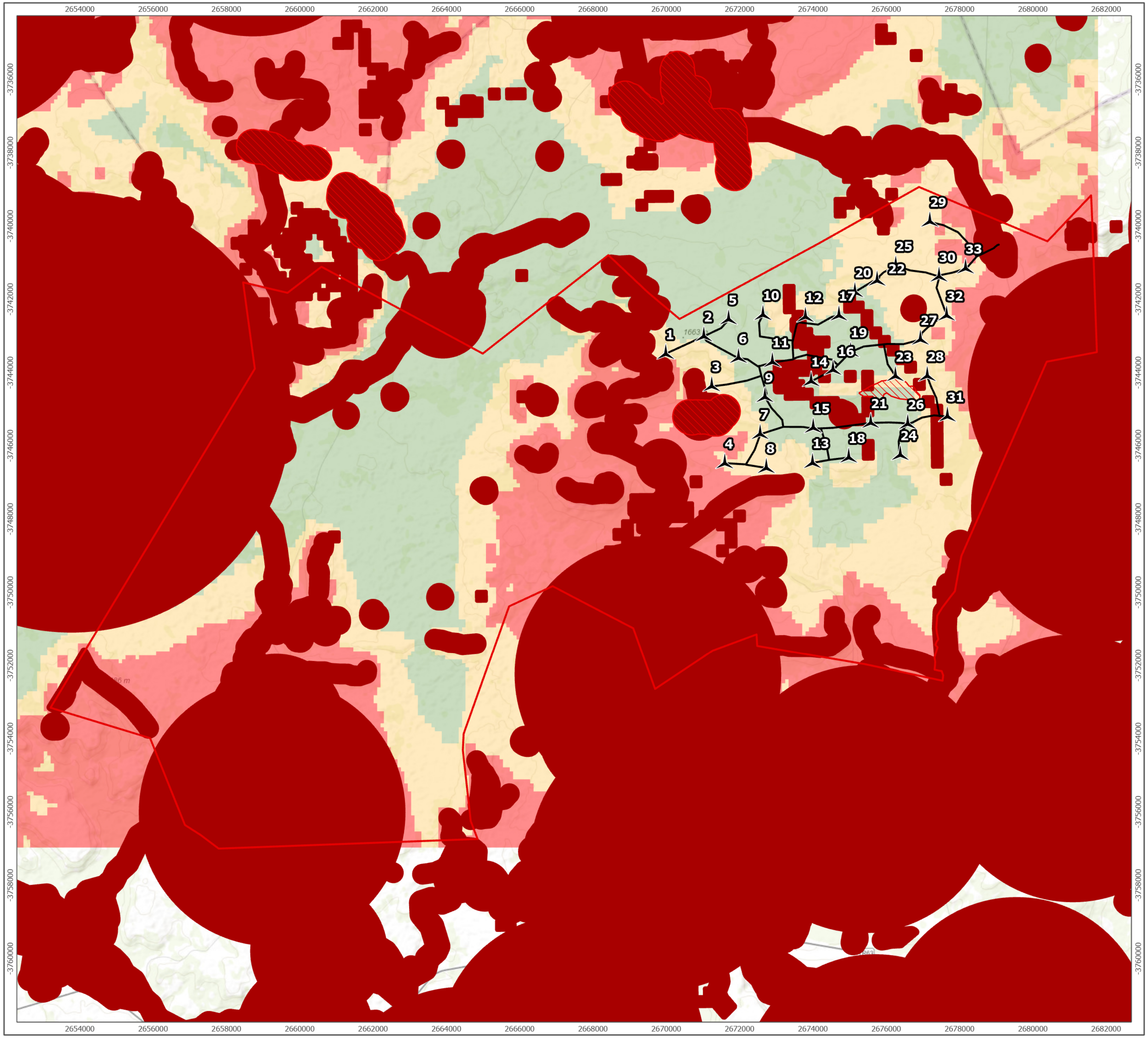
11 CONCLUSIONS AND RECOMMENDATIONS

The land use on site has not changed since the previous studies, however there appeared to be a reduction in the number of Blue Crane in and around the project site, the reasons for this are unclear. This did allow for the identification of a potentially important local site for the persistence of Blue Crane in the area, which resulted in an additional no-go buffer for WTGs and overhead powerlines. The rest of the avifaunal community and available habitats appeared to be unchanged and there is no reason to suspect any particular change to the avifaunal impacts as previously assessed. New information in the form of additional best practice guidelines and the results from other operational WEFs has been considered and incorporated into the revised mitigation measures where considered to be relevant, including additional ridge buffers and additional analyses (i.e. VERA) conducted to further reduce the risks for Verreaux's Eagle.

The increase of 35.8 % of the overall collision risk window (that would occur if the maximum number of WTGs at their maximum proposed dimensions were to be constructed) is a moderate increase, and this would be considered to be significant at this location due to the presence of Verreaux's Eagles in the area. It is highly unlikely, however, that the maximum number of WTGs of the maximum proposed dimensions would be required to meet the maximum total generation capacity of the facility. The total collision risk window would be smaller than that already authorised even if the maximum number of WTGs proposed by this amendment (33) are developed utilising the smallest WTGs currently under consideration.

As the project has already received environmental authorisation and the proposed amendment would likely ***significantly reduce the potential risk*** to Verreaux's Eagles and other avifauna compared to the original authorisation post-mitigation (i.e. through a vastly improved layout and a potential reduction in the number of turbines) it is the specialists opinion that the project should proceed through the proposed amendment process without additional monitoring being a requirement for the amendment authorisation.

Additional vehicle based transects of the project site and control site must be conducted prior to the commencement of construction activities with the aim of recording the status of Blue Crane to allow for more reliable BACI analyses to be conducted, this should not, however, be a requirement for the amendment authorisation but rather included in the EMPr. This is a new recommendation based on the most recent on-site observations and must be done regardless of the proposed amendment help determine if any changes to the utilisation of the area by Blue Crane can be attributed to external factors or potential displacement by the WEF.



ARCUS

- Phase 1 WEF Boundary
- Revised WTG Position
- Proposed Road
- Additional Rocky Ridge Buffer (WTG No-Go)
- Additional Blue Crane Buffer (WTG No-Go)
- Avifaunal No-Go Area (WTGs)
- VERA Low Collision Risk
- VERA Medium Collision Risk
- VERA High Collision Risk (WTG No-Go)

1:100 000 Scale @ A3

0 2,5 5 km NORTH

Produced By: OD	Ref: 3615-GIS-012
Checked By: AB	Date: 2020/09/11

Avifaunal Sensitivity Map
Figure 1

Umsinde Emoyeni WEF
Phase 1: Avifaunal Amendment

Z:\GIS\Projects\3615 Umsinde Emoyeni Amendment\3615 Umsinde Emoyeni Amendment_20200909.aprx\3615-GIS-012 Fig 1 Avifaunal Sensitivity Phase 1 VERA

APPENDIX I: VERREAUX'S EAGLE RISK ASSESSMENT REPORT

Verreaux's Eagle Risk Assessment
Site: Phase 1 Umsinde Emoyeni: 14/12/16/3/3/2/686
Phase 2 Umsinde Emoyeni: 14/12/16/3/3/2/687
Processed on: 2020 Aug 17

Project background: 25 Verreaux's eagle nests have been located during EIA monitoring in (n=4) and around (n=21) the proposed Umsinde wind energy developments. This document outlines the Verreaux's Eagle Risk Assessment (VERA) modelling which has been used to predict collision risk for Verreaux's eagle at the development, using these nest locations. Five nest locations are considered to be unoccupied, thus two scenarios have been presented: Scenario 1 (Fig. 3i) includes all nest locations and Scenario 2 excludes the five unoccupied nests (Fig. 3ii).

Model background: The VERA model is built from 57,285 at-risk GPS fix locations from 15 Verreaux's eagles each tracked between 18–895 days each, equivalent to a total of 13.6 bird-years of tracking data. For each nest, the VERA model calculates the collision risk potential on a 90x90m resolution in a 12km buffer around the nest location, nests within 1.5km of each other are treated as alternative nests of the same pair. The model takes into account the distance from the nest, distance to all other conspecific nests within 12km of a given nest, topographic slope, elevation and distance to slope. The model gives collision risk potential as a probability (a continuous value between zero and one). Collision risk potential is then re-classified as high, medium or low using model derived (Youden) thresholds calculated by cross-validating the results on territories of tracked eagles.

Model thresholds: The impacts of using different model thresholds can be checked using predictions from tracked eagles (Fig. 1) and from operational developments where collisions have occurred (Fig. 2).

High collision risk potential area: The high risk area is the area predicted to be most intensively used by eagles; for tracked eagles it incorporates 73% of the area used (Fig.1 – dashed line). 50% (7 of 14) of the known collisions have occurred in this area (Fig. 2 – dashed line). Development of wind turbines should not occur in these areas.

Medium collision risk potential: The medium risk area is also likely to be used by eagles; for tracked eagles it represents an additional 12% of the area used, thus protection of the high and medium risk areas can be expected to offer protection to 85% of an eagle's home range (Fig. 1 – dotted line). 79% (11 of 14) of the known collisions have occurred in the medium and high risk areas combined (Fig. 2 – dotted line). Development in this area should be avoided where possible and only proceed with additional specialist input.

Low collision risk potential: The low risk area (with ordinal risk predictions less 0.13) is the area predicted to be least used by eagles and development here poses the lowest risk to eagles within the 12km buffer. However this area is not without risk, and three collisions have occurred at operational wind energy sites, within areas that would be predicted to be low risk.

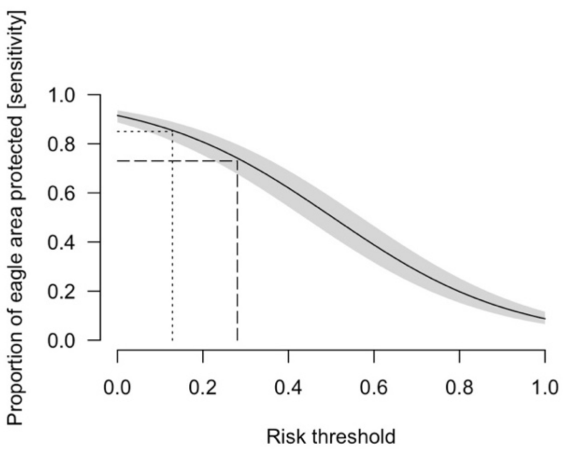


Figure 1. Proportion of the area used by tracked Verreaux's eagles which is protected along a gradient of thresholds used to classify collision risk, this is calculated on a 90x90 m cell basis and is equivalent to the model 'sensitivity'. Lines represent two risk thresholds; i.e. if a risk threshold of 0.13 is applied (dotted line) then 0.85 of the area used by eagles is protected (covered by medium and high risk areas), if a higher threshold of 0.28 (dashed line) is applied then 0.73 of the area used by eagles is protected (covered by high risk only).

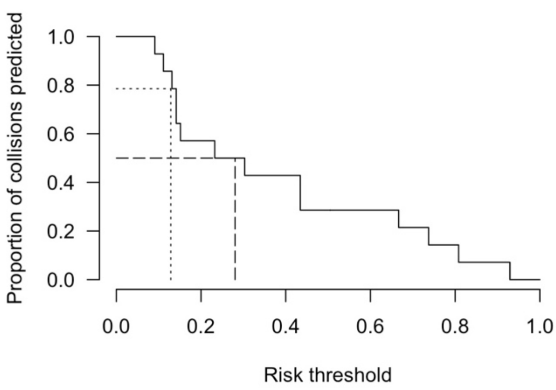


Figure 2. Proportion of known Verreaux's eagles collisions (n=14) correctly predicted by the model along a gradient of risk thresholds. 0.79 collisions were above the medium risk threshold (dotted line), while 0.5 were in the area considered to be high risk (dashed line).

Model results: The collision risk estimates are dependent on accurate information on nest locations and will only be reliable if all nest locations have been found and provided for this analysis. Recommendations are intended to minimise collision risk to resident adult eagles but will not be relevant to non-breeding eagles using the area. The modelling methods used here are currently being compiled for scientific publication and may be subject to further refinements. The final published VERA model may differ from the one used here, but it is unlikely to significantly change the overall patterns of risk outlined in this report. Risk classes of the proposed individual turbines (Fig. 3) were extracted from a 90 m radius buffer around the point location of each turbine (i.e. the proposed turbine blade footprint).

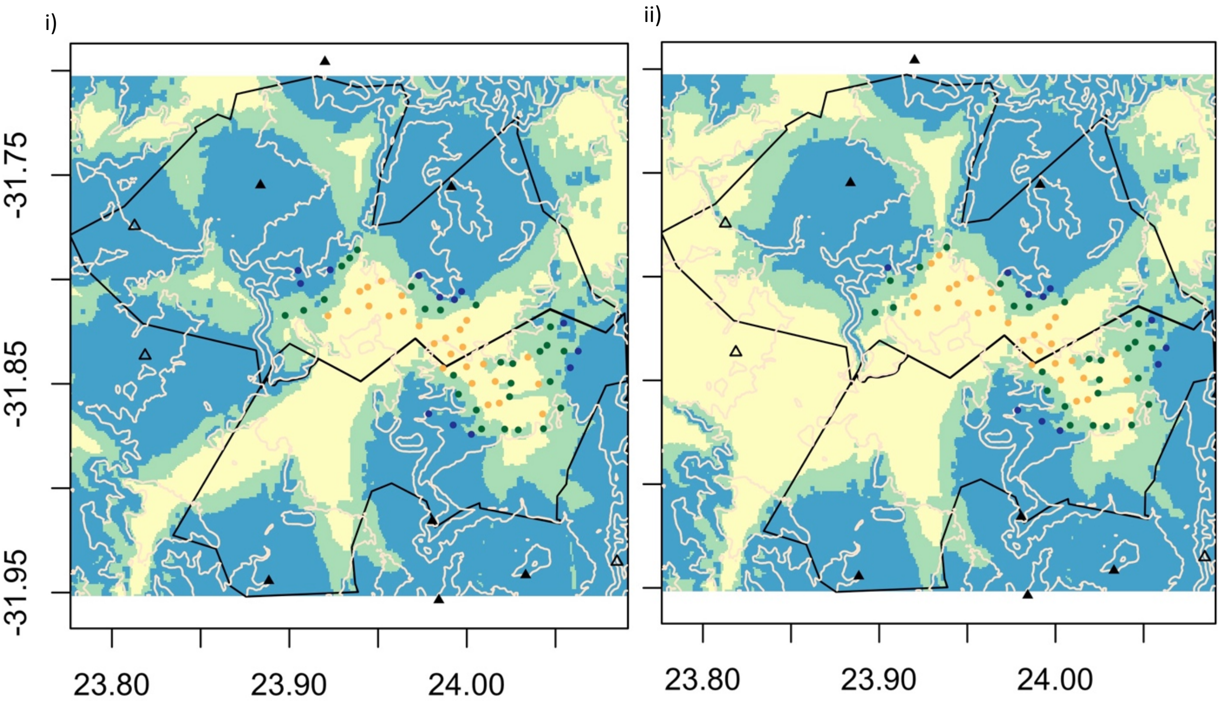


Figure 3. Verreaux's eagle collision risk potential for Umsinde wind energy developments. Nest locations are shown by triangles; occupied nests [▲] and unoccupied nests [∆]. i) Includes all nest locations in the modelling and ii) does not include unoccupied nests in the modelling. Collision risk potential is represented in high risk [blue]; medium risk [green] and low risk [yellow]. Proposed turbine locations are also colored by risk category; i) Scenario 1 turbine risk: high risk (n=13); medium risk (n=27); low risk (n=26). ii) Scenario 2 turbine risk: high risk (n=11); medium risk (n=26); low risk (n=29).

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed Amendment of the Phase 1 Umsinde Emoyeni Wind Energy Facility near Murraysburg, Western Cape Province

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

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Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
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Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1.

SPECIALIST INFORMATION

Specialist Company Name:	ARCUS CONSULTANCY SERVICES SOUTH AFRICA (PTY) LIMITED			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100
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Specialist Qualifications:	PhD ZOOLOGY (ORNITHOLOGY)			
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2. DECLARATION BY THE SPECIALIST

I, OWEN RHYS DAVIES, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

[signature]

Signature of the Specialist

ARCUS CONSULTANCY SERVICES SOUTH AFRICA (PTY) LIMITED

Name of Company:

2020-07-27

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, GWEN RHYS DAVIES, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

ARCUS CONSULTANCY SERVICES SOUTH AFRICA (PTY) LTD

Name of Company

2020-07-27

Date

7236137

Signature of the Commissioner of Oaths

2020-07-27

Date

SUID-AFRIKAANSE POLISIEDIENS
DIST. 3
STASIEBEVELVOERDER
27 JUL 2020
STATION COMMANDER
DIEPRIVIER, K.R/C.P.
SOUTH AFRICAN POLICE SERVICE