ADDENDUM TO THE AVIFAUNAL IMPACT ASSESSMENT CONDUCTED FOR THE AUTHORISED KOKERBOOM 1 WIND ENERGY FACILTY NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

APPLICATION FOR AMENDMENT OF ENVIRONMENTAL AUTHORISATION

DEA REF. 14/12/16/3/3/2/985

Addendum report compiled by:

Chris van Rooyen and Albert Froneman

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AFRIMAGE Photography (Pty) Ltd t/a:
Chris van Rooyen Consulting
VAT#: 4580238113
email: vanrooyen.chris@gmail.com
Tel: +27 (0)82 4549570 cell

SUMMARY OF FINDINGS

The purpose of this addendum report is to conduct an additional avifaunal impact assessment based on an application for amendment to the environmental authorisation for the proposed Kokerboom 1 Wind Energy Facility (WEF) near Loeriesfontein in the Northern Cape.

- **Larger rotor diameter**

The most recent research on this topic concluded that to minimize bird collisions, wind farm electricity generation capacity should be met through deploying fewer, large turbines, rather than many, smaller ones. Worst scene scenario would be if the original 64, 4MW turbines are constructed, which means the overall risk will remain as assessed originally. Should larger turbines be constructed, the number of turbines will be reduced, which will reduce the overall collision risk to the birds. The proposed amendment will therefore not affect the original assessment as far as the risk of mortality through collisions with the turbines are concerned.

- **Electrocutions on the proposed 33kV overhead lines**

The new proposed lay-out will result in a potential increase of 50% in the length of the overhead medium voltage (MV) lines (from 22km to 32km). In the original assessment, the risk of mortality through electrocution was rated as **Medium**. This would no longer be valid if the amendment is granted, because the potential increase in the length of the MV overhead network would result in the risk of electrocution mortality increasing to **High**.

The following is recommended to reduce the potential risk of electrocution to **Low**:

- By far the most important recommendation is to keep the length of overhead MV lines to an absolute minimum. The EA states in Condition 59 that all internal powerlines must be buried. It is however accepted that compelling reasons may exist which necessitate the construction of a limited section of overhead MV line. It is therefore recommended that all internal powerlines are buried as per Condition 59 of the EA, unless compelling reasons exist, verified by a suitably qualified, independent ecologist and/or geologist, for a section of powerline to be constructed above ground. Under no circumstances should the overhead lines exceed the 22km as assessed in the original lay-out.
- The avifaunal specialist and the Endangered Wildlife Trust's (EWT) Wildlife and Energy Working Group must be engaged by the developer to provide input into the design of the proposed poles to be used, and they must approve the final design of all poles i.e. suspension poles, strain poles and terminal poles. This must include the physical inspection of a replica of an actual pole or a three-dimensional digital model showing all details, because the design drawings do not always show adequate technical details of aspects which could be highly dangerous for birds.

- **Collisions with the proposed 33kV overhead lines**

The new proposed lay-out will result in a potential increase of 50% in the length of the overhead MV lines. In the original assessment, the risk of mortality through powerline collisions was rated as **Medium**. This would no longer be valid if the amendment is granted, because the potential increase in the length of the MV overhead network would result in the risk of collision mortality increasing to **High**.

The original mitigation proposed to reduce the risk of collision was to have all the powerlines marked with bird flight diverters (BFDs) for their entire length on the conductors of the line, 5m apart, alternating black and white. This recommendation remains valid, but it must be supplemented as follows to reduce the potential risk of collision mortality to **Low**:

- By far the most important recommendation is to keep the length of overhead MV lines to an absolute minimum. The EA states in Condition 59 that all internal powerlines must be buried. It is however accepted that compelling reasons may exist which necessitate the construction of a limited section of overhead MV line. It is therefore recommended that all internal powerlines are buried as per Condition 59 of the EA, unless compelling reasons exist, verified by a suitably qualified, independent ecologist and/or geologist, for a section of powerline to be constructed above ground. Under no circumstances should the overhead lines exceed the 22km as assessed in the original lay-out.

Re-location of construction camps

- The relocation of the construction camps has the potential for disturbance of priority species, unless the relocation does not infringe on any of the avifaunal buffer zones. The proposed amendment states that these locations will remain outside sensitive areas. **If this is indeed the case, then the original assessment will not be affected, and will remain as Low.**

Contents

1. Brief

The purpose of this addendum report is to conduct an additional avifaunal impact assessment based on an application for amendment to the environmental authorisation for the Kokerboom 1 Wind Energy Facility (WEF) near Loeriesfontein in the Northern Cape. The original avifaunal assessment and 12 months pre-construction monitoring was carried out by Chris van Rooyen Consulting (2017). The project received an environmental authorisation (EA) on 29 November 2017.

The proposed changes are tabled below. The changes relevant to avifauna are highlighted in yellow:

Component	Authorised	Proposed Amendment
Facility area	• Proposed project footprint: 6,716ha. • Temporary construction footprint: approximately 155ha. • Permanent footprint: approximately 80ha.	• Proposed project footprint: 6,716ha. • Temporary construction footprint: approximately 154ha. • Permanent footprint: approximately 79ha.
Site access	The site will be accessed via a proposed new access road on Farm RE/227, which will branch off the Nuwepos Road (preferred alternative).	No amendment required.
Export capacity	Up to 256MW.	No amendment required.
Number of turbines	Up to a maximum of 64.	No amendment required.
Turbine generation capacity	Up to 4MW.	Up to 6.5MW[1].
Hub height from ground level	Up to 150m.	No amendment required.
Rotor diameter	Up to 150m.	Up to 180m.
Blade Tip Height **Error! Bookmark not defined.**	Maximum upper tip height: 225m. Minimum lower tip height: 40m.	Maximum upper tip height: 240m. Minimum lower tip height: 40m.
Area occupied by substations	Approximately 14,400m^2	No amendment required.
Location of substation	30º27'36.92"S 19º26'1.58"E	A new location is proposed approximately 850m south east (30°28'6.42"S 19°26'15.88"E) of the authorised substation location.
Area occupied by both permanent and construction laydown areas	Total: approximately 114,100 m^2 • Construction laydown areas: up to 34,100m^2 (including site camp and cement batching area). • Permanent laydown areas: approximately 80,000m^2 (hard stands).	No amendment required.
Location of construction camps/ laydown areas	• Construction camp/laydown area 1: 30º29'10.54"S 19º29'38.18"E	The two construction camps/ laydown areas (combined footprint of approximately 34,100m^2) will be relocated to the most practical locations

[1] Note that the capacity of the WEF will be capped at 256MW (being the authorised maximum capacity) despite the increased turbine generation capacity. The actual number of turbines constructed, will also depend on the available turbine technology in South Africa at the specific point in time that construction commence.

Component	Authorised	Proposed Amendment
	• Construction camp/laydown area 2: 30º27'43.14"S 19º25'57.72"E	determined by the construction contractor, closer to the time of construction. The number of construction camps/ laydown areas will be restricted to up to two sites with a combined footprint not exceeding 34,100m^2. These locations will remain outside sensitive areas and must be approved by the Environmental Control Officer prior to construction commencing.
Area occupied by buildings	Approximately 14,400m^2.	No amendment required.
Width and length of internal roads	Total: approximately 1,960,000m^2. • Construction: up to approximately 20m (width) x approximately 70km (length) =1,400,000m^2. • Permanent: approximately 8m (width) x approximately 70km (length) = 560,000m^2.	Total: approximately 1,820,000m^2. • Construction: up to approximately 20m (width) x approximately 65km (length) =1,300,000m^2. • Permanent: approximately 8m (width) x approximately 65km (length) = 520,000m^2.
Proximity to grid connection	Approximately 12km from proposed substation to existing Eskom Helios Substation as the crow flies.	No amendment required.
Internal powerline/cables	The final layout included in the Final EIA Report (2017) includes MV powerlines that does not follow internal access roads. However, Condition 58 of the EA states that: *"All internal powerline/cables must follow internal access roads."* In addition, Condition 59 requires *"all powerlines linking the turbines to the onsite substation must be buried."* The total length of potential MV lines which was assessed is approximately 22km according to the original layout.	In the new lay-out, where feasible, internal powerlines/cables have been aligned with internal access roads. Approximately 32km of potential MV overhead lines have been proposed in order to provide efficiencies in the plant design, to limit energy losses between the turbines and substation, and in the event that trenching cannot be implemented in some ecologically sensitive areas, or for geological reasons.

2. Terms of reference

Due to these proposed changes, and in accordance with the National Environmental Management Act (NEMA) (No. 107 of 1998), a re-assessment of potential impacts on the associated avifauna is required to be undertaken before an EA can be granted for the revised WEF development.

The impact which is specifically relevant in this instance is the risk of priority species mortality due to:

- Collisions with the wind turbines;
- Electrocutions on the proposed MV 33kV overhead lines; and
- Collision with the proposed MV 33kV overhead lines.

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

- Address the implications of the proposed amendments in terms of the potential impact(s);
- Conduct a re-assessment of the significance (before and after mitigation) of the identified impact(s) in light of the proposed amendments (as required in terms of the 2014 EIA Regulations);

- Include a statement as to whether the proposed amendments will result in a change to the significance of the impact assessed in the original EIA for the proposed project (and if so, how the significance would change); and
- Review and revise if necessary, the mitigation measures proposed in the original report.

3. The findings of the original bird impact assessment report

3.1 Collisions with the wind turbines

The original bird impact assessment specialist report concluded as follows as far the risk of bird collisions with the wind turbines are concerned (see impact assessment table on page 69):

IMPACT TABLE 3: KOKERBOOM 1		
Environmental Parameter	Avifauna	
Issue/Impact/Environmental Effect/Nature	Mortality of priority species due to collisions with the turbines in the **operational** phase (pre-mitigation)	
Extent	**Local** - Within a 10km radius around the site.	
Probability	**Probable.** Estimated 5 to 95% chance of the impact occurring.	
Reversibility	**Irreversible**. Once a bird is killed it cannot be reversed.	
Duration	**Long term.** The risk of collision will be present for the life-time of the development.	
Magnitude	**Medium**. Natural and/ or social functions and/ or processes are *notably* altered.	
Confidence	**Sure**. Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	Local	Local
Probability	Probable	Probable
Reversibility	Irreversible	Irreversible
Duration	Long term	Long term
Magnitude	Medium	Low
Significance rating	**Medium**	**Low**
Mitigation measures	• A 200m no-go buffer is proposed around water points as they serve as focal points for bird activity. • Formal monitoring should be resumed once the turbines have been constructed, as per the most recent edition of the best practice guidelines (Jenkins *et al.* 2011). The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of adaptive management. The purpose of this would be (a) to establish if and to what extent displacement of priority species has occurred through the altering of flight patterns post-construction, and (b) to search for carcasses at turbines. • As an absolute minimum, post-construction monitoring should be undertaken for the first two years of operation, and then repeated again in year 5, and again every five years thereafter unless monitoring results indicate an alternate monitoring programme would be more appropriate. The exact scope, nature and frequency of the post-construction monitoring will be informed on an ongoing	

IMPACT TABLE 3: KOKERBOOM 1	
	basis by the results of the monitoring through a process of adaptive management. • The minimum turbine tip height (ground clearance) should be at least 30-40m to reduce the risk of Red Lark mortality during display flight activity, with a preference for a higher rather than lower tip height within this range[2]. • Depending on the results of the carcass searches, a range of mitigation measures will have to be considered if mortality levels turn out to be significant, including selective curtailment of problem turbines during high risk periods if need be. • If turbines are to be lit at night, lighting should be kept to a minimum and should preferably not be white light. Flashing strobe-like lights should be used where possible (provided this complies with Civil Aviation Authority regulations). • Lighting of the wind farm (for example security lights) should be kept to a minimum. Lights should be directed downwards (provided this complies with Civil Aviation Authority regulations).

3.2 Electrocutions on the proposed 33kV overhead lines

The original bird impact assessment specialist report concluded as follows as far the risk of bird electrocutions on the MV lines are concerned (see impact assessment table on page 70):

IMPACT TABLE 4: KOKERBOOM 1		
Environmental Parameter	Avifauna	
Issue/Impact/Environmental Effect/Nature	Mortality of priority species due to electrocutions on the internal MV overhead powerlines (pre-mitigation)	
Extent	**Local** - Within a 10km radius around the site.	
Probability	**Probable.** Estimated 5 to 95 % chance of the impact occurring.	
Reversibility	**Irreversible**. Once a bird is killed it cannot be reversed.	
Duration	**Long term.** The risk of electrocution will be present for the life-time of the development.	
Magnitude	**Medium**. Natural and/ or social functions and/ or processes are *notably* altered.	
Confidence	**Sure**. Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	Local	Local
Probability	Probable	Unlikely
Reversibility	Irreversible	Irreversible
Duration	Long term	Long term
Magnitude	Medium	Low
Significance rating	**Medium**	**Low**

[2] The EA granted in November 2017 specified a minimum rotor tip height of 40m.

IMPACT TABLE 4: KOKERBOOM 1	
Mitigation measures	• The design for the MV lines must be submitted to the Eskom-EWT Strategic Partnership for approval to ensure that the design is bird-friendly.

3.3 Collision with the proposed 33kV overhead lines

The original bird impact assessment specialist report concluded as follows as far the risk of bird collisions with the high voltage (HV) and MV lines are concerned (see impact assessment table on page 71):

IMPACT TABLE 5: KOKERBOOM 1		
Environmental Parameter	Avifauna	
Issue/Impact/Environmental Effect/Nature	Mortality of priority species due to collisions with the internal ME and HV overhead powerlines (pre-mitigation)	
Extent	**Local** - Within a 10km radius around the site.	
Probability	**Probable.** Estimated 5 to 95 % chance of the impact occurring.	
Reversibility	**Irreversible**. Once a bird is killed it cannot be reversed.	
Duration	**Long term.** The risk of collision will be present for the life-time of the development.	
Magnitude	**Medium**. Natural and/ or social functions and/ or processes are *notably* altered.	
Confidence	**Sure**. Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	Local	Local
Probability	Probable	Probable
Reversibility	Irreversible	Irreversible
Duration	Long term	Long term
Magnitude	Medium	Low
Significance rating	**Medium**	**Low**
Mitigation measures	• The HV powerline should be marked with BFDs for its entire length on the earth wire of the line, 5m apart, alternating black and white. See APPENDIX D for the type of BFD which is recommended. • The MV powerlines should be marked with BFDs for their entire length on the conductors of the line, 5m apart, alternating black and white. See APPENDIX D for the type of BFD which is recommended.	

3.4 Displacement of priority species due to disturbance

The original bird impact assessment specialist report concluded as follows as far the risk of displacement of priority species due to disturbance is concerned (see impact assessment table on page 67):

IMPACT TABLE 1: KOKERBOOM 1		
Environmental Parameter	Avifauna	
Issue/Impact/Environmental Effect/Nature	Displacement of priority species due to disturbance during **construction** phase (pre-mitigation)	
Extent	**Site specific.** The impact will only affect the site and immediate surroundings.	
Probability	**Probable.** Estimated 5 to 95 % chance of the impact occurring.	
Reversibility	Partially **reversible.** The construction activities will inevitably cause temporary displacement of some priority species. Once the source of the disturbance has been removed, i.e. the noise and movement associated with the construction activities, most species should re-colonise the areas which have not been transformed by the footprint. However, some species might not recover to pre-construction levels.	
Duration	**Short term** – up to 3 years after construction. Once the source of the disturbance has been removed, i.e. the noise and movement associated with the construction activities, most species should re-colonise the areas which have not been transformed by the footprint. However, some species might not recover to pre-construction levels, or may take years to recover.	
Magnitude	**High**. Natural and/ or social functions and/ or processes are *severely* altered	
Confidence	**Sure**. Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.	
	Pre-mitigation impact rating	**Post mitigation impact rating**
Extent	Site specific	Site specific
Probability	Probable	Probable
Reversibility	Reversible	Reversible
Duration	Short term	Short term
Magnitude	High	Medium
Confidence	Sure	Sure
Significance rating	**Low**	**Low**
Mitigation measures	• Restrict the construction activities to the construction footprint area. • Do not allow any access to the remainder of the property during the construction period. • A 200m exclusion zone should be implemented around the existing water points where no construction activity or disturbance should take place. In the case of the waterpoint located at 30°29'40.99"S 19°28'46.65"E the buffer zone may be relaxed to 150m to accommodate a stretch of road of 225m in length to prevent the road being pushed deeper into two drainage lines.	

4. Potential impact of larger turbines

4.1 Larger rotor diameter

The new proposed turbine dimensions necessitate a re-assessment of the potential risk of collisions.

The new turbine dimensions will result in a potential increase of up to 20% in rotor swept area for an individual turbine, compared to the original authorised specifications. Interestingly, and counter to expectations, the majority of published scientific studies indicate that an increase in rotor swept area do not automatically translate into a larger collision risk. Most of the studies found turbine dimensions to play a less important role in the magnitude of the collision risk relative to other factors such as topography, turbine location, morphology, behaviour and a species' inherent ability to avoid the turbines, and may only be relevant in combination with other factors, particularly wind strength and topography (see Howell 1997, Barrios & Rodriguez 2004; Barclay *et al.* 2007, Krijgsveld *et al.* 2009, Smallwood 2013; Everaert 2014). However, three studies found a correlation between turbine hub height and mortality (De Lucas *et al.* 2008; Loss *et al.* 2013 and Thaxter *et al*. 2017). See below a summary of published findings on the topic:

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

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

4.2 Reduced number of turbines

Should the proposed amendment be granted, the number of turbines could either stay the same if 4MW turbines are constructed, i.e. 64 turbines, or it could potentially reduce, to accommodate the larger 6.5MW turbines (depending on the available technology in South Africa). If only 6.5MW turbines are constructed, the number of turbines will be reduced to around 40 turbines.

The most recent research on this topic (Thaxter *et al*. 2017) concluded that for birds, larger turbine capacity (megawatts) increased collision rates; however, deploying a smaller number of large turbines with greater energy output reduced total collision risk per unit energy output. In other words, although there was a positive relationship between wind turbine capacity and collision rate per turbine, the strength of this relationship was insufficient to offset the reduced number of turbines required per unit energy generation with larger turbines. Therefore, to minimize bird collisions, wind farm electricity generation capacity should be met through deploying fewer, large turbines, rather than many, smaller ones.

Based on the most recent research on this topic, it is concluded that the overall risk of collision to birds will either remain as it is, or it could potentially be reduced. Worst scene scenario would be if the original 64, 4MW turbines are constructed, which means the overall risk will remain as assessed originally. **The proposed amendment will therefore not affect the original assessment as far as the risk of mortality through collisions with the turbines are concerned.**

4.3 Re-location of construction camps

The relocation of the construction camps has the potential for disturbance of priority species, unless the relocation does not infringe on any of the avifaunal buffer zones. The proposed amendment states that these locations will remain outside sensitive areas. **If this is indeed the case, then the original assessment will not be affected, and will remain as Low.**

5. Potential impact of increased MV overhead line network

5.1 Electrocutions on the proposed 33kV overhead lines

According to the Final EIA Report (Aurecon 2017), each turbine will be connected to the on-site substation via medium voltage cables (~33kV lines). Where feasible, these cables will be laid underground in trenches running generally alongside internal roads. Where burying of cables is not possible due to technical, geological, environmental or topographical constraints, then overhead powerlines (on basic wooden or concrete monopoles) will be erected.

The original lay-out which was assessed contained a potential overhead MV network amounting to a maximum of approximately 22km. In the new proposed lay-out, the maximum network size is increased to about 32km, which constitutes a potential increase of 50% in the length of the overhead MV lines. In the original assessment, the risk of mortality through electrocution was rated as **Medium**. **This would no longer be valid if the amendment is granted, because the potential increase in the length of the MV overhead network would result in the risk of mortality increasing to High.**

The original mitigation proposed to reduce the risk of electrocution to **Low** was to use a bird-friendly design which was approved by the Endangered Wildlife Trust's (EWT) Wildlife and Energy Working Group, through the mechanism of the Eskom – EWT Strategic Partnership, for the MV overhead lines. This recommendation remains valid, but it need to be further unpacked in more detail. The following is therefore recommended to reduce the potential risk of electrocution to **Low**:

- By far the most important recommendation is to keep the length of overhead MV lines to an absolute minimum. The EA states in Condition 59 that all internal powerlines must be buried. It is however accepted that compelling reasons may exist which necessitate the construction of a limited section of overhead MV line. It is therefore recommended that all internal powerlines are buried as per Condition 59 of the EA, unless compelling reasons exist, verified by a suitably qualified, independent ecologist and/or geologist, for a section of powerline to be constructed above ground. Under no circumstances should the overhead lines exceed the 22km as assessed in the original lay-out.
- The avifaunal specialist and the Endangered Wildlife Trust's (EWT) Wildlife and Energy Working Group must be engaged by the developer to provide input into the design of the proposed poles to be used, and they must approve the final design of all poles i.e. suspension poles, strain poles and terminal poles. This must include the physical inspection of a replica of an actual pole or a three-dimensional digital model, because the design drawings do not always show adequate technical details of aspects which could be highly dangerous for birds.

5.2 Collisions with the proposed 33kV overhead lines

As stated above, the original lay-out contained a potential overhead MV network amounting to a maximum of approximately 22km. In the new proposed lay-out, the maximum network size is increased to about 32km, which constitutes a potential increase of 50% in the length of the overhead MV lines. In the original assessment, the risk of mortality through collision with the combined HV and MV powerline network was rated as **Medium**. **This would no longer be valid if the amendment is granted, because the potential increase in the length of the MV overhead network would result in the risk of mortality increasing to High.**

The original mitigation proposed to reduce the risk of collision was to have all the powerlines marked with BFDs for their entire length on the conductors of the line, 5m apart, alternating black and white. This recommendation remains valid, but it must be supplemented as follows to reduce the potential risk of collision mortality to **Low**:

- By far the most important recommendation is to keep the length of overhead MV lines to an absolute minimum. The EA states in Condition 59 that all internal powerlines must be buried. It is however accepted that compelling reasons may exist which necessitate the construction of a limited section of overhead MV line. It is therefore recommended that all internal powerlines are buried as per Condition 59 of the EA, unless compelling reasons exist, verified by a suitably qualified, independent ecologist and/or geologist, for a section of powerline to be constructed above ground. Under no circumstances should the overhead lines exceed the 22km as assessed in the original lay-out.

6. Summary of findings

6.1 Larger rotor diameter

The most recent research on this topic concluded that to minimize bird collisions, wind farm electricity generation capacity should be met through deploying fewer, large turbines, rather than many, smaller ones. Worst scene scenario would be if the original 64, 4MW turbines are constructed, which means the overall risk will remain as assessed originally. Should larger turbines be constructed, the number of turbines will be reduced, which will reduce the overall collision risk to the birds. The proposed amendment will therefore not affect the original assessment as far as the risk of mortality through collisions with the turbines are concerned. Should a larger turbine be installed (i.e. larger than 4MW) the number of turbines required would reduce, which would be associated with a reduced risk of collisions with turbine blades.

6.2 Electrocutions on the proposed 33kV overhead lines

The new proposed layout will result in a potential increase of 50% in the length of the overhead MV lines. In the original assessment, the risk of mortality through electrocution was rated as **Medium**. This would no longer be valid if the amendment is granted, because the potential increase in the length of the MV overhead network would result in the risk of electrocution mortality increasing to **High**.

The following is recommended to reduce the potential risk of electrocution to **Low**:

- By far the most important recommendation is to keep the length of overhead MV lines to an absolute minimum. The EA states in Condition 59 that all internal powerlines must be buried. It is however accepted that compelling reasons may exist which necessitate the construction of a limited section of overhead MV line. It is therefore recommended that all internal powerlines are buried as per Condition 59 of the EA, unless compelling reasons exist, verified by a suitably qualified, independent ecologist and/or geologist, for a section of powerline to be constructed above ground. Under no circumstances should the overhead lines exceed the 22km as assessed in the original lay-out.
- The avifaunal specialist and the Endangered Wildlife Trust's (EWT) Wildlife and Energy Working Group must be engaged by the developer to provide input into the design of the proposed poles to be used, and they must approve the final design of all poles i.e. suspension poles, strain poles and terminal poles. This must include the physical inspection of a replica of an actual pole or a three-dimensional digital model, because the design drawings do not always show adequate technical details of aspects which could be highly dangerous for birds.

6.3 Collisions with the proposed 33kV overhead lines

The new proposed lay-out will result in a potential increase of 50% in the length of the overhead MV lines. In the original assessment, the risk of mortality through powerline collisions was rated as **Medium**.

This would no longer be valid if the amendment is granted, because the potential increase in the length of the MV overhead network would result in the risk of collision mortality increasing to **High**.

The original mitigation proposed to reduce the risk of collision was to have all the powerlines marked with BFDs for their entire length on the conductors of the line, 5m apart, alternating black and white. This recommendation remains valid, but it must be supplemented as follows to reduce the potential risk of collision mortality to **Low**:

- By far the most important recommendation is to keep the length of overhead MV lines to an absolute minimum. The EA states in Condition 59 that all internal powerlines must be buried. It is however accepted that compelling reasons may exist which necessitate the construction of a limited section of overhead MV line. It is therefore recommended that all internal powerlines are buried as per Condition 59 of the EA, unless compelling reasons exist, verified by a suitably qualified, independent ecologist and/or geologist, for a section of powerline to be constructed above ground. Under no circumstances should the overhead lines exceed the 22km as assessed in the original lay-out.

7. References

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environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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 Kokerboom 1 Wind Energy Facility in the Northern 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

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

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

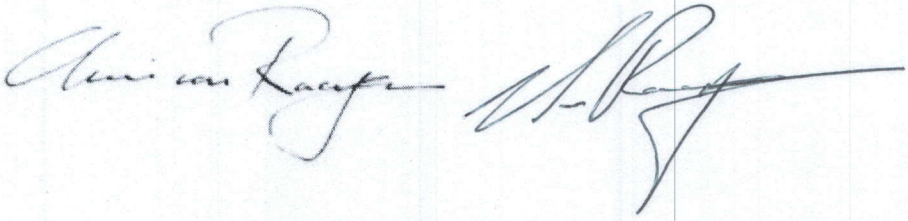
1. SPECIALIST INFORMATION

Specialist Company Name:	**Chris van Rooyen Consulting**			
B-BBEE	Contribution level 4		Percentage Procurement recognition	0
Specialist name:	**Chris van Rooyen**			
Specialists Qualifications:	**Chris van Rooyen BA LLB**			
Professional affiliation/registration:	I work in association with and under the supervision of my business partner and co-author Albert Froneman SACNASP registered Professional Natural Scientist (reg. nr 400177/09) – specialist field: Zoological Science.			
Physical address:	**30 Roosevelt Street, Robindale, 2194, Randburg**			
Postal address:	**P.O. Box 2676, Fourways**			
Postal code:	**2055**	Cell:	**0824549570**	
Telephone:	n/a	Fax:	**N/A**	
E-mail:	**Vanrooyen.chris@gmail.com**			

2. DECLARATION BY THE SPECIALIST

I, Chris van Rooyen, declare that –

- I act as the independent specialists 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;
- We declare that there are no circumstances that may compromise our objectivity in performing such work;
- We 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 of the Specialist

Afrimage Photography (Pty) Ltd t/a Chris van Rooyen Consulting

Name of Company:

4 March 2019

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Chris van Rooyen, 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

Afrimage Photography (Pty) Ltd t/a Chris van Rooyen Consulting

Name of Company

04 March 2019

Date

7208846 3 CPOST
TSEPANG TSOLOANE

Signature of the Commissioner of Oaths

2019-03-05

Date 30 BOUNDARY ROAD, ROBINDALE

SOUTH AFRICAN POLICE SERVICE
COMMUNITY SERVICE CENTRE
2019 -03- 05
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