PROPOSED PAULPUTS NORTH WIND ENERGY FACILITY AND ASSOCIATED INFRASTRUCTURE EA AMENDMENT, NORTHERN CAPE PROVINCE

Bat Assessment

On behalf of

Arcus Consultancy Services (Pty) Ltd

February 2021

Prepared By:

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1 INTRODUCTION

Paulputs Wind Energy Facility (RF) (Pty) Ltd ('PWEF'), a wholly owned subsidiary of WKN Windcurrent SA (Pty) Ltd, was granted environmental authorisation for the 300 MW (75 Turbine) Paulputs Wind Energy Facility (WEF) and its associated 132 kV grid connection on 11 December 2019 by the Department of Environment, Forestry and Fisheries (DEFF) (DEFF Reference No. 14/12/16/3/3/2/1120). PWEF are proposing to give permission to Paulputs Wind Energy Facility North (RF) (Pty) Ltd and Paulputs Wind Energy Facility South (RF) (Pty) Ltd to **split and amend** the Environmental Authorisation (EA) into three amendment applications for EA: (1) Paulputs South WEF (2) Paulputs North WEF and (3) Paulputs North WEF Grid Connection.

Paulputs Wind Energy Facility North (RF) (Pty) Ltd ('Paulputs North'– The Applicant) intents to construct and operate a 150MW WEF (Paulputs North WEF) consisting of up to 40 turbines, with a hub height of up to 180m, blade length of up to 110m and a rotor diameter of up to 220m. All infrastructure is to be located on the west of the N14 Highway. This amendment application and report will be referred to as the 'proposed amendment'.

The aim of this report is to assess the impact of this change on bats for the proposed Paulputs North WEF. The following proposed amendments are relevant to this report:

- Increase the hub height from up to 140 m to up to 180 m.
- Increase the rotor diameter from up to 180 m to up to 220 m.

2 METHODOLOGY

In carrying out this assessment, Arcus conducted a literature review on bats and wind energy impacts with a focus on the relationship between turbine size and bat fatality.

In addition Arcus carried out the pre-construction bat monitoring and are therefore familiar with the project and its associated impacts.

3 REVIEW

The core issue relevant to this assessment is the impact to bats due to increasing the size of the turbines at the Paulputs North WEF. The proposed amendment to the turbines at the wind farm would result in a greater per turbine rotor swept area and hence a potentially greater likelihood bats would collide with turbine blades or experience barotrauma. Currently, the maximum rotor swept area for each turbine is 25,449 m^2 and based on the amendment being applied for, this would increase to up to 38,014 m^2 (a 67% increase).

Numerous studies support the hypothesis that taller wind turbines are associated with higher numbers of bat fatalities. Rydell et al. (2010) found a significant positive correlation between bat mortality with both turbine tower height and rotor diameter in Germany. However, there was no significant relationship between bat mortality and the minimum distance between the rotor and the ground. The maximum tower height in their study was 98 m and data on rotor diameter were not given. In addition, there was no relationship between bat fatality and the number of turbines at a wind energy facility. However, the largest wind energy facility in this study only has 18 turbines (Rydell et al. 2010) which is significantly fewer than the Paulputs North WEF.

In Greece, Georgiakakis et al. (2012) found that fatalities were significantly positively correlated with tower height but not with rotor diameter. In their study, maximum tower height and rotor diameter were 60 m and 90 m respectively. In Minnesota and Tennessee, USA, both Johnson et al. (2003) and Fiedler et al. (2007) showed that taller turbines with a greater rotor swept area killed more bats. The maximum heights of turbines in these two studies were 50 m and 78 m respectively. In Alberta, Canada, bat fatality rates differed partly due to differences in tower height, and the relationship was also influenced by bat activity (Baerwald and Barclay 2009). For example, sites with high activity but relatively short towers had low bat fatality and sites with low activity and tall towers also had low bat fatality. At sites with high bat activity, an increase in tower height increased the probability of fatality. Maximum turbine height and rotor diameter in this study was 84 m and 80 m respectively. Despite the above support for the hypothesis that taller wind turbines kill more bats, in a review of 40 published and unpublished studies in South America, Thompson et al. (2017) found no evidence that turbine height or the number of turbines influences bat mortality. Berthinussen et al. (2014) also found no evidence of modifying turbine design to reduce bat fatalities. The relationship between bat mortality and turbine size, or number of turbines at a wind energy facility, is therefore equivocal.

Turbine size has increased since the above studies were published and no recent data of the relationship between bat fatality and turbine size is available. The maximum size of the turbines in the literature reviewed (where indicated in each study) for this assessment had towers of 98 m and blade diameters of 90 m. Some towers were as short as 44 m and had blade tips extending down to only 15 m above ground level. The towers and blades under consideration in this assessment are significantly taller than this. Currently, the approved turbine dimensions would have a maximum ground clearance of 50 m and a maximum tip height of 230 m. The amendment would result in the blade tips extending from 70 m above ground level to 290 m, based on the maximum dimensions being applied for (i.e. a turbine with 110 m blades and a 180 m hub height).

It is possible that some bats species, particularly those not adapted to use open air spaces, are being killed at a lower turbine blade sweep, thus by increasing the blade length and having a shorter distance between the ground and the lowest rotor point may have a negative impact and potentially place a greater diversity of species at risk. In South Africa, evidence of fatality for species which typically do not forage in open spaces high above the ground, is available from several wind energy facilities (Aronson et al. 2013; Doty and Martin 2012; MacEwan 2016). Although Rydell et al. (2010) did not find a significant relationship between bat mortality and the minimum distance between the rotor and the ground, data from Georgiakakis et al. (2012) suggest that as the distance between the blade tips and the ground increases, bat fatality decreases.

Given the lack of published data available on wind energy facilities with turbines of a comparative size, the impact of the proposed amendments on bats cannot be fully described. Hein and Schirmacher (2016) suggest that bat fatality could continue to increase as turbines intrude into higher airspaces since bats are known to fly at high altitudes (McCracken et al. 2008; Peurach et al. 2009; Roeleke et al. 2018). However, McCracken et al. (2008), who recorded free-tailed bats in Texas from ground level up to a maximum height of 860 m, showed that bat activity was greatest between 0 and 99 m. This height band accounted for 27% of activity of free-tailed bats, whereas the 100 m to 199 m height band only accounted for 6%.

In South Africa, simultaneous acoustic monitoring at ground level and at height is a minimum standard for environmental assessments at proposed wind energy facilities. Based on unpublished data from 16 such sites Arcus has worked at, bat activity and species diversity is greater at ground level than at height. Therefore, even though bats are recorded at heights that would put them at risk from taller turbines, the proportion of bats that would be at risk might be less. Further, the number of species that might be impacted would decrease because not all bat species use the airspace congruent with the rotor swept area of modern turbines owing to morphological adaptations related to flight and echolocation. Bats that are adapted to use open air space, such as free-tailed and sheath-tailed bats, would be more at risk.

In the United Kingdom, both Collins and Jones (2009) and Mathews et al. (2016) showed that fewer species with lowered activity, were recorded at heights between 30 m and 80 m compared to ground level. In two regions in France, Sattler and Bontadina (2005) recorded bat activity at ground level, 30 m, 50 m, 90 m and 150 m and found more species and higher activity at lower altitudes. Roemer et al. (2017) found that at 23 met masts distributed across France and Belgium, 87% of bat activity recorded was near ground level. However, the authors also showed a significant positive correlation between a species preference for flying at height and their collision susceptibility, and between the number of bat passes recorded at height and raw (i.e. unadjusted) fatality counts. In a similar study in Switzerland, most bat activity was recorded at lower heights for most species but the European free-tailed bat had greater activity with increasing height (Wellig et al. 2018). These results suggest that on average, bat activity is greater at lower heights, and that there are important differences across species – those species adapted to using open air spaces are at greater risk

4 IMPACT ASSESSMENT

Based on the pre-construction monitoring data, two thirds of the sample nights had low to moderate activity. During summer and spring the activity was higher accounting for ca. 40 % and 30 % of total activity respectively. Activity was dominated by the Egyptian free-tailed bat and was lower at height and greater in the north east of the site near trees, shrubs and aquatic habitats which provide more suitable foraging habitat in an otherwise arid landscape.

The main mitigation measure to protect bats is to adhere to the sensitivity map in the final EIA report which contained buffers of several important bat features. The DEA screening tool suggest a high sensitivity buffer of 500 m around wetlands and rivers. It is of the specialist's opinion to buffer hydrological features such as wetlands, rivers and farm dams by 200 m while drainage lines can be buffered by 100 m. Potential roosts such as rocky crevices, trees and buildings have been buffered by 200m. No parts of the turbines, including the blade tips, should enter these buffers (Figure 1).

These buffer distances are also dependant on size of the turbine being used. For example, if the turbine blades sweep close to ground level, the turbine base would need to be moved further from the buffer edge. To account for this, a 110 m buffer (the maximum blade length being considered) was added to all buffers to ensued that the blade does not sweep into any bat buffers.

No bat activity data is available in the area between the heights of 12 m and 100 m, or over 100 m. Because the available pre-construction monitoring data show activity is higher closer to ground level, it would be preferential to maximize the distance between the ground and blade tips by using turbines with the shortest possible blades and the highest possible hub height. This would reduce the number of species potentially impacted upon by turbine blades during the operational phase. It would also be preferential to use shorter blades so that they don't intrude into higher airspaces and in so doing reduces the potential impact to high flying species such as free-tailed bats which dominated activity on site. Despite the lower activity at height, increasing evidence suggests that bats actively forage around wind turbines (Cryan et al. 2014; Foo et al. 2017) so the installation of turbines in the landscape may alter bat activity patterns, either by increasing activity at height and/or increasing the diversity of species making use of higher airspaces.

Of the impacts identified in the EIA, only mortality of species due to collision with turbine blades or due to barotrauma were identified.

The potential collision impact is currently rated as high before, and low after mitigation with adherence to the sensitivity buffers being the major mitigation measure proposed. A second mitigation measure that must be used if residual impacts exceed bat fatality thresholds is the use of curtailment which is provided for in the EIA. Curtailment would initially be limited to February, August and October (Table 1). Based on a turbine with a 220 m rotor diameter and 180 m hub height (i.e. the maximum dimensions being applied for), these impacts would remain high before and low after mitigation. The appropriate mitigation measures required would be ensuring all turbines are outside buffers which has been adhered to (Figure 1). Even though the cumulative impacts will be higher, the impact rating will remain medium before and low after mitigation. Curtailment is the remaining mitigation measure to reduce residual impacts during operation and must be continuously refined and adapted based on incoming bat fatality data.

Table 1: Curtailment Parameters for the Paulputs North Wind Farm

	February	**August**	**October**
Time Period	Between 4 and 5 hours after sunset	1 hour after sunset	Between 4 and 5 hours after sunset
Temperature (°C)	11 – 27	10 – 27	16 – 27
Wind Speed (ms^{-1})	4 – 11	4 – 13	5 – 13
Relative Humidity (%)	20 – 40	5 – 25	10 – 30
For example, in February curtailment should be applied between four and five hours after sunset when the temperature is between 11 °C and 27 °C, or wind speed is between 4 ms^{-1} and 11 ms^{-1}, or relative humidity is between 20 % and 40 % if fatality threshold were exceeded.			

5 CONCLUSION

It is unlikely that the amendments to the turbine dimensions proposed at the Paulputs North WEF would result in a change in impacts as assessed in the approved Paulputs WEF FEIR – including cumulative impacts. Impacts may be slightly lower for some species as the turbines would reach higher above the ground based on the maximum dimensions being applied for, and this is an advantage of the proposed amendments. However, for high flying species, the higher tip height may result in a greater impact, which is a disadvantage.

The key initial mitigation measure that should be implemented at the Paulputs North WEF would be adherence to buffer distances in this report and in the approved Paulputs WEF FEIR. This has already been adhered to (Figure 1). Residual impacts that occur will need to be evaluated during the operational phase using carcass searches to monitor actual impacts and assess these against published thresholds. If thresholds are exceeded, curtailment will need to be applied according to the parameters in the FEIR and in this report (Table 1). Any further mitigation measures recommended by the appointed operational specialist must be adhered to by Paulputs North WEF.

6 REFERENCES

Aronson, J.B., Thomas, A.J., Jordaan, S.L., 2013. Bat fatality at a wind energy facility in the Western Cape, South Africa. African Bat Conservation News 31, 9-12.

Baerwald, E.F., Barclay, R.M.R., 2009. Geographic variation in activity and fatality of migratory bats at wind energy facilities. Journal of Mammalogy 90, 1341-1349.

Berthinussen, A., Richardson, O.C., Altringham, J.D., 2014. Bat Conservation - Global evidence for the effects of interventions. Pelagic Publishing.

Collins, J., Jones, G., 2009. Differences in bat activity in relation to bat detector height: implications for bat surveys at proposed windfarm sites. Acta Chiropterologica 11, 343-350.

Cryan, P.M., Gorresen, P.M., Hein, C.D., Schirmacher, M.R., Diehl, R.H., Huso, M.M., Hayman, D.T.S., Fricker, P.D., Bonaccorso, F.J., Johnson, D.H., Heist, K., Dalton, D.C., 2014. Behavior of bats at wind turbines. Proceedings of the National Academy of Sciences 111, 15126-15131.

Doty, A.C., Martin, A.P., 2012. Assessment of bat and avian mortality at a pilot wind turbine at Coega, Port Elizabeth, Eastern Cape, South Africa. New Zealand Journal of Zoology, 1-6.

Fiedler, J.K., Henry, T.H., Tankersley, R.D., Nicholson., C.P., 2007. Results of bat and bird mortality monitoring at the expanded Buffalo Mountain Windfarm, 2005, Tennessee Valley Authority, Knoxville, Tennessee.

Foo, C.F., Bennett, V.J., Hale, A.M., Korstian, J.M., Schildt, A.J., Williams, D.A., 2017. Increasing evidence that bats actively forage at wind turbines. PeerJ 5, e3985-e3985.

Georgiakakis, P., Kret, E., Carcamo, B., Doutau, B., Kafkaletou-Diez, A., Vasilakis, D., Papadatou, E., 2012. Bat fatalities at wind farms in north-eastern Greece. Acta Chiropterologica 14(2), 459-468.

Hein, C.D., Schirmacher, M.R., 2016. Impact of wind energy on bats: a summary of our current knowledge. Human–Wildlife Interactions 10(1):19–27.

Johnson, G.D., Erickson, W.P., Strickland, M.D., Shepherd, M.F., Shepherd, D.A., Sarappo, S.A., 2003. Mortality of bats at a large-scale wind power development at Buffalo Ridge, Minnesota. The American Midland Naturalist 150, 332-342.

MacEwan, K., 2016. Fruit bats and wind turbine fatalities in South Africa. African Bat Conservation News 42.

Mathews, F., Richardson, S., Lintott, P., Hosken, D., 2016. Understanding the Risk of European Protected Species (Bats) at Onshore Wind Turbine Sites to Inform Risk Management. Report by University of Exeter. pp 127.

McCracken, G.F., Gillam, E.H., Westbrook, J.K., Lee, Y.-F., Jensen, M.L., Balsley, B.B., 2008. Brazilian free-tailed bats (Tadarida brasiliensis: Molossidae, Chiroptera) at high altitude: links to migratory insect populations. Integrative and Comparative Biology 48, 107-118.

Millon, L., Colin, C., Brescia, F., and Kerbiriou, C. 2018. Wind turbines impact bat activity, leading to high losses of habitat use in a biodiversity hotspot. Ecological Engineering 112:51-54.

Mitchell-Jones, T., Carlin, C., 2014. Bats and Onshore Wind Turbines Interim Guidance, In Natural England Technical Information Note TIN051. Natural England.

Peurach, S.C., Dove, C.J., Stepko, L., 2009. A decade of U.S. Air Force bat strikes. Wildlife Conflicts 3:199–207.

Roeleke, M., Bumrungsri, S., Voigt, C.C., 2018. Bats probe the aerosphere during landscape-guided altitudinal flights. Mammal Review 48, 7-11.

Roemer, C., Disca, T., Coulon, A., Bas, Y., 2017. Bat flight height monitored from wind masts predicts mortality risk at wind farms. Biological Conservation 215, 116-122.

Rydell, J., Bach, L., Dubourg-Savage, M.-J., Green, M., Rodrigues, L., Hedenström, A., 2010. Bat mortality at wind turbines in northwestern Europe. Acta Chiropterologica 12, 261-274.

Sattler, T., Bontadina, F., 2005. Grundlagen zur ökologischen Bewertung von zwei Windkraftgebieten in Frankreich aufgrund der Diversität und Aktivität von Fledermäusen. Unveröffentlichter Kurzbericht. SWILD, Zürich im Auftrag von Megawatt Eole, Stuttgart, 23 Seiten.

Thompson, M., Beston, J.A., Etterson, M., Diffendorfer, J.E., Loss, S.R., 2017. Factors associated with bat mortality at wind energy facilities in the United States. Biological Conservation 215, 241-245.

Wellig, S.D., Nusslé, S., Miltner, D., Kohle, O., Glaizot, O., Braunisch, V., Obrist, M.K., Arlettaz, R., 2018. Mitigating the negative impacts of tall wind turbines on bats: Vertical activity profiles and relationships to wind speed. PloS one 13, e0192493.

BAT SITE VERIFICATION REPORT

for the

PROPOSED PAULPUTS NORTH WIND ENERGY FACILITY, NORTHERN CAPE PROVINCE

Introduction

The National Gazette, No. 43110 of 20 March, 2020: "National Environmental Management Act (107/1998) Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act ('the Regulations'), when applying for Environmental Authorisation" includes the requirement that a Site Sensitivity Verification must be produced. The outcome of the Initial Site Sensitivity must be provided in a report format which:

a) Confirms or dispute the current use of the land and environmental sensitivity as identified by the national web based environmental screening tool;

b) Contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and

c) Is submitted together with the relevant reports prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

This initial site sensitivity report is produced to consider only the bats theme and to address the requirements of a) to c) above.

Initial Site Verification

Based on the DEFF Screening Tool, the Paulputs North WEF development site contains areas of high sensitivity due to the proximity to a river, wetland or within 500 m of a wetland (Figure 1).

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MAP OF RELATIVE BATS (WIND) THEME SENSITIVITY

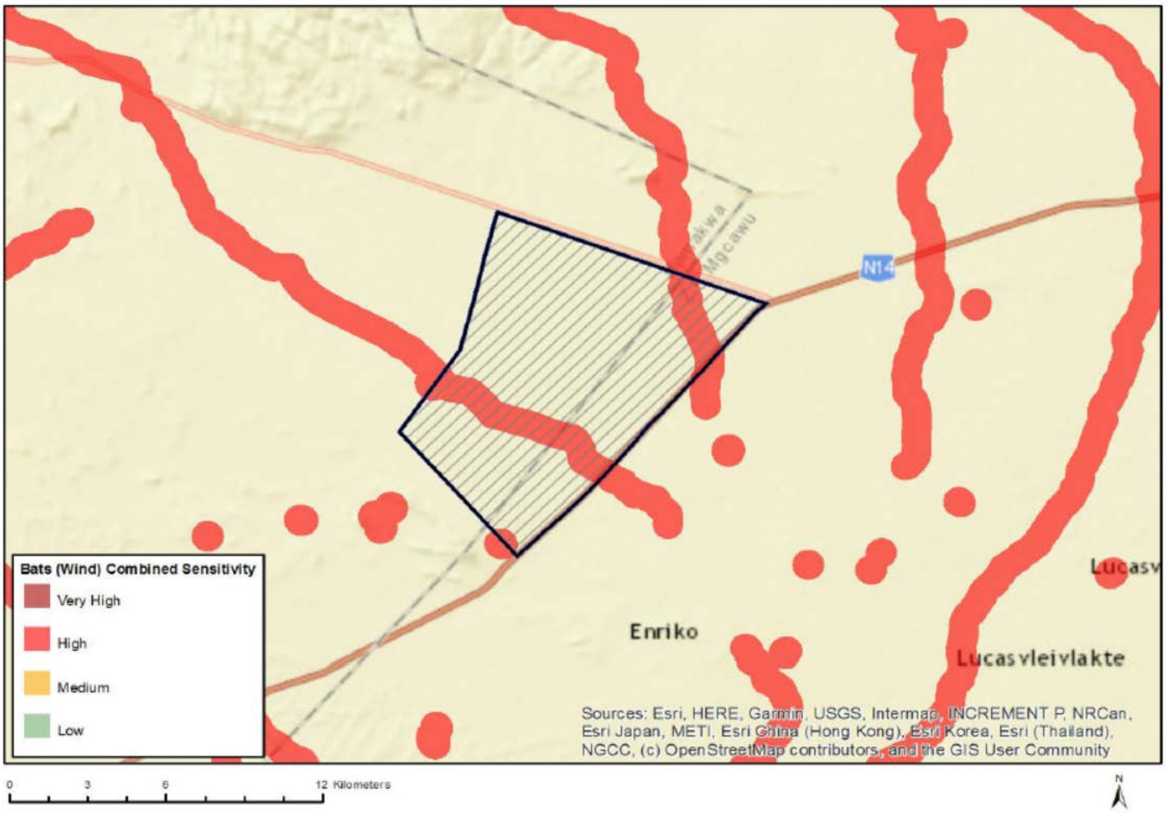

Figure 1: DEFF Screening Tool outcome for the bats (wind) theme

The baseline bats environment for the proposed development site was defined utilising a desktop study of the bat impact assessment report (J Aronson, 2019), produced for the authorised Paulputs WEF (DEFF Reference No. 14/12/16/3/3/2/1120), available bat locality data, literature and mapping resources. This information was examined to verify the potential location and abundance of bats, including their potential habitats which may be sensitive to the amendment of the Paulputs WEF development for the proposed Paulputs North WEF.

Outcome of the Initial Site Verification

After the selected resources were mapped, and studies reviewed, the resources were aggregated to produce an initial constraints map for the amended development, under the assumption that no significant changes have occurred on the proposed development site since the pre-construction field surveys, between 23 February 2018 and 11 April 2019 (Figure 2).

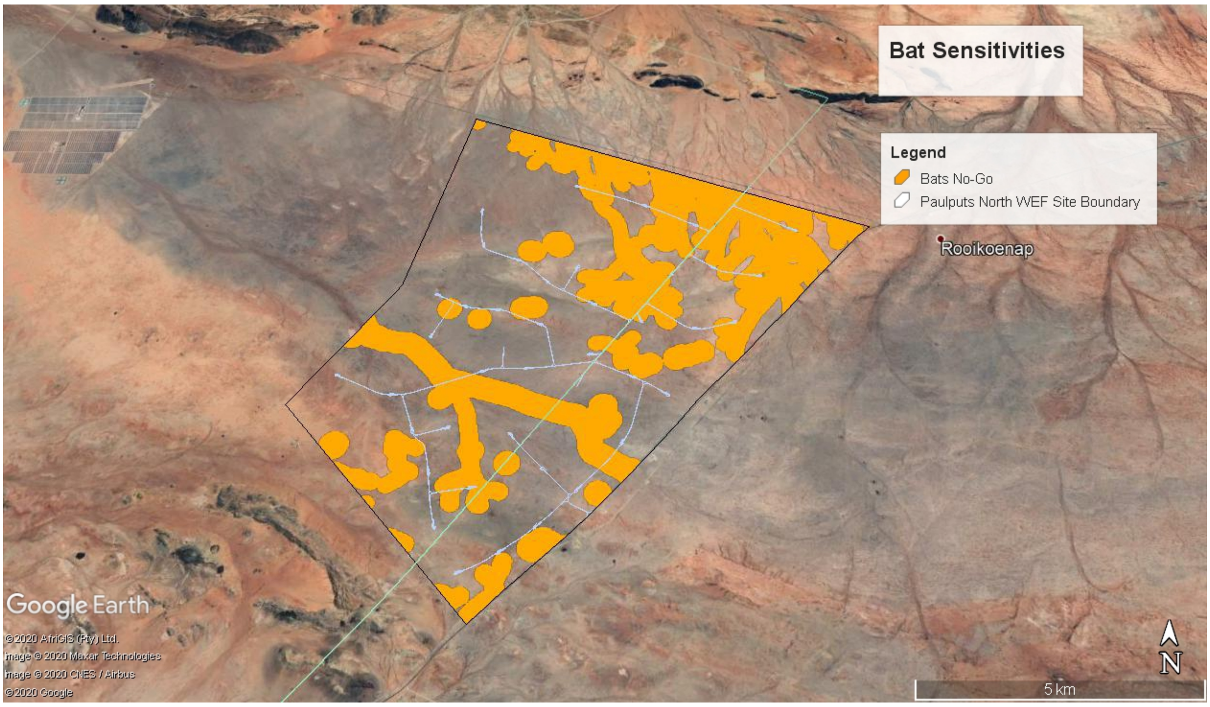

Figure 2: Constraints map produced by specialist

The methodology as described above which was used to determine the sensitivity of the bats confirmed the high sensitivity as identified by the screening tool. In conclusion, the DEFF Screening Tool identified one sensitivity rating within the development footprint, namely, high. This high sensitivity rating, in the specialist opinion, should be considered No-Go areas with the remainder of the site potentially hosting low to no sensitivity for bats.

The environmental sensitivity input assumed will be taken forward and considered in the amendment recommendation for the proposed Paulputs North WEF. Appropriate layout and development restrictions will be implemented.

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 Paulputs Wind Energy Facility, 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

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

1. SPECIALIST INFORMATION

Specialist Company Name:	Camissa Sustainability Consulting			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100%
Specialist name:	Jonathan Aronson			
Specialist Qualifications:	MSc (Zoology), MSc (Environment and Resource Management)			
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2. DECLARATION BY THE SPECIALIST

I, Jonathan Aronson, 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 of the Specialist

Camissa Sustainability Consulting

Name of Company:

03/05/2021

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Jonathan Aronson, 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

Camissa Sustainability Consulting

Name of Company

03/05/2021

Date

Signature of the Commissioner of Oaths

Date

Commissioner of Oaths ex Officio
Advocate A FRIEDMAN
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Attention: Ashleigh von der Heyden
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25 February 2021
IWS Project Ref: 3094_rev2

Dear Ashleigh

INDEPENDENT REVIEW OF THE BAT ASSESSMENT STATEMENTS ON THE PROPOSED AMENDMENTS FOR THE PAULPUTS WIND ENERGY FACILITY AND ASSOCIATED INFRASTRUCTURE, NORTHERN CAPE PROVINCE

As requested by Arcus Consulting (Arcus), IWS performed a review of the Arcus Bat Assessment Statements on the proposed amendments for the Paulputs Wind Energy Facility (PWEF) and associated infrastructure near Pofadder in the Northern Cape Province.

In brief, under the proposed amendments, the 300MW (75 turbine) PWEF will be split along the N14 Highway into the 150MW (40 turbine) PWEF North, and the 150MW (35 turbine) PWEF South. Of greatest relevance to bats is the increase in the proposed maximum turbine hub height from 140 m to 180 m, and the proposed maximum turbine rotor diameter from 180 m to 220 m.

In IWS' opinion, the Arcus Bat Assessment Statements on the proposed amendments include a satisfactory review of scientific literature on bat activity in relation to height above ground level, and bat fatality in relation to turbine dimensions.

IWS agrees, as concluded in the Statements, that:

- the available literature (which mostly applies to smaller turbines and WEFs overseas), is equivocal.
- a lower diversity (richness and abundance) of bat species may be impacted by the proposed increase in turbine blade ground clearance from 50 m to 70 m.
- aerial-foraging species such as the Egyptian Free-tailed Bat (*Tadarida aegyptiaca*), and migratory species such as the Natal Long-fingered Bat (*Miniopterus natalensis*), may be impacted more heavily by the increase in the proposed maximum rotor sweep zone area from 25 449 m^2 to 38 014 m^2 per turbine.

IWS also agrees with the evaluation in the Statements, that for the proposed amendments, the same potential impacts on bats and their habitats apply, and the overall significance ratings of these remain unchanged. This is because there will be no change in the delineated footprints for infrastructure, and the proposed taller turbines will be associated with an anticipated higher fatality of aerial-foraging bats but a lower fatality of near-ground (clutter and clutter-edge) foraging bats.

In terms of impact mitigation, it is important to note the total rotor sweep area will increase from a maximum of 1 908 675 m^2 for the (75 turbine) PWEF, to a maximum of 2 851 050 m^2 for the combined (40 turbine) PWEF North and (35 turbine) PWEF South. To compensate for this cumulative 33% increase in the total rotor sweep area, and the cumulative potential increase in associated bat fatality risk within the rotor sweep zone, IWS recommends that revised versions of the Bat Assessment Statements should highlight the following mitigation options:

- A possible reduction in the number of turbines comprising each WEF, so that the total rotor sweep area for the turbines comprising each WEF is minimized so far as possible; and/or
- A reduction in the length of the blades of the turbines, so that the total rotor sweep area for the turbines comprising each WEF is minimized so far as is possible.

A comparison of different potential turbine number and blade length combinations is provided in **Table 1**.

Table 1 Different turbine number and blade length combinations with the same total rotor sweep area

WEF	PWEF	Examples scenarios for PWEF North and PWEF South combined		
Number of turbines	75	63	55	50
Turbine blade length	90 m	100 m	105 m	110 m
Turbine rotor sweep area	25 449 m^2	31 811 m^2	34 703 m^2	38 014 m^2
Total rotor sweep area	1 908 675 m^2	1 908 675 m^2	1 908 675 m^2	1 908 675 m^2

Finally, IWS wishes to reiterate (as mentioned in our July 2019 and August 2019 review letters on the pre-construction bat monitoring for the PWEF), that specific curtailment recommendations and bat fatality thresholds must be specified for the PWEF North and PWEF South, for inclusion in their Environmental Authorisations. This is because:

- mitigation measures in a WEF's EIA and EMPr need to be very clearly defined, otherwise they cannot be enforced.
- from a project finance perspective, it is much harder to get approval for adaptive mitigation if this has not been planned for from the start.
- If operational monitoring is not done properly, accurate fatality estimates cannot be calculated to inform adaptive mitigation and management, which may result in more years of monitoring and more expense.

We trust that our comments will be helpful. If needed, we will gladly discuss these issues further.

Kind regards

Dr Caroline Lötter, Pr. Nat. Sci.

Inkululeko Wildlife Services (Pty) Ltd