



## **SiVEST SA (PTY) LTD**

**PROPOSED CONSTRUCTION OF THE KOUP 2 WIND  
ENERGY FACILITY AND ASSOCIATED GRID  
INFRASTRUCTURE, NEAR BEAUFORT WEST,  
WESTERN CAPE PROVINCE, SOUTH AFRICA**

## **Bat Specialist Study**

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**Report Prepared by:** Stephanie Dippenaar Consulting trading as EkoVler

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# **KOUP 2 WIND: PRE-CONSTRUCTION BAT MONITORING *FINAL REPORT***

**August 2021**

*Prepared for:* **Genesis Koup 1 Wind (Pty) Ltd**  
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*This report only pertains to the conditions found at the above site at the time of the survey. This report may not be copied electronically, physically or otherwise, except in its entirety. If sections of the report are to be copied the approval of the author, in writing, is required. Furthermore, except for editing changes as agreed, no changes are to be made to this report that might change the outcome of this study without the approval of the author.*

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## **PROPOSED CONSTRUCTION OF THE KOUP 2 WIND ENERGY FACILITY AND ASSOCIATED GRID INFRASTRUCTURE, NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE, SOUTH AFRICA**

### **BAT SPECIALIST STUDY**

#### **EXECUTIVE SUMMARY**

Stephanie Dippenaar Consulting has been appointed by Genesis Koup 2 Wind (Pty) Ltd, to conduct a 12-month bat study, between March 2020 and April 2021, for the proposed Koup 2 Wind Energy Facility (WEF), east of Leeu Gamka and south of Beaufort West, along the N12 in the Central District Karoo Municipality of the Western Cape. The methodology and approach for this bat monitoring is primarily directed by the relevant South African Best Practice Guidelines for Pre-construction Monitoring of Bats at Wind Energy Facilities (Sowler, et al., 2017).

The proposed Koup 2 project is situated just outside the Beaufort West Renewable Energy Development Zone for wind and solar projects (REDZ 11) and proposes 32 wind turbine generators with a hub height and rotor diameter of 200m respectively, and associated infrastructure with a maximum generation capacity of up to 140 MW. 132 kV power lines will connect the Koup 2 WEF on-site substation to the national grid via the proposed Koup 1 collector substation, located on the Koup 1 WEF project site. Substation Option 2 is the preferred option, while there is no preferred option for the Construction Laydown Areas.

The study area is approximately 2477.4 ha, but the project area identified through preliminary suitability assessment by Genesis is approximately 1575.2 ha. This footprint area could likely to be further refined with the exclusion of sensitive areas determined through specialist studies. The proposed Koup 2 project will be developed on Portions 1 and 8 of Kaffirskraal Farm, original farm number 380, approximately 55 km south of Beaufort west in the arid Great Karoo region in the Western Cape.

The Koup 2 site is part of the Gamka Karoo vegetation unit in the arid Nama Karoo biome, which has a conservation status of Least concern (SANBI, 2021). Shrubland provides grazing for small livestock and game farming. The plains provide foraging opportunity for high flying bats, while the denser vegetation along the riverbeds comprises some suitable habitat for clutter- and clutter edge foraging bats.

Landuse in the area is mainly wilderness with eco-tourism, with game and sheep farming agricultural activities. The 5000 ha ROAM game and eco-tourism reserve and Rietvlei game reserve are situated

adjacent and to the south of Koup 2. Formal conservation areas include the Karoo National Park near Beaufort west and the Groot Swartberg nature reserve situated to the southwest, near Prins Albert.

Bats are adversely affected by the wind turbines that encroach on air space where they forage and commute. The most important aspect of the project that would affect bat populations adversely is the wind turbines themselves, through direct collisions and barotrauma. Other potential impacts to bats due to WEF developments include loss of existing and potential roosts and foraging area. Koppies with rocky ridges, low trees with associated denser vegetation along the riverbeds and livestock water points, could potentially attract bats to the study area. A small roost of *Nycteris thebiaca* (Egyptian slit-faced bat) was found at the Glen farm dwelling.

According to the likelihood of fatality risk, as indicated by the latest pre-construction guidelines (Sowler, et al., 2017), two species, namely *Tadarida aegyptiaca* (Egyptian free-tailed bat) and *Sauromy petrophilus* (Roberts's flat-headed bat), have a high risk of fatality due to its foraging habitat at high altitudes. Five more species, *Miniopterus natalensis* (Natal long-fingered bat), *Neoromicia capensis* (Cape serotine) and *Myotis tricolor* (Temminck's myotis bat), and the two fruit bat species, *Eidolon helvum* (African straw-coloured fruit bat) and *Rousettus aegyptiacus* (Egyptian rousette), have a medium to high risk of fatality. Fruit bats are not considered a high risk in the dry Koup area, but the proximity of the mountains towards the south, and the possibility that they might migrate over the development area, should not be ruled out.

During the monitoring period five species were recorded, with 95% of the calls representing the *Molossidae* family, mostly calls like *Tadarida aegyptiaca*, which is the dominant species on site. *T. aegyptiaca* has a high risk of collision and barotrauma. The rest of the species recorded are represented by relatively low numbers, with 11% of the calls like *Sauromy petrophilus*, also from the family *Molossidae*, and 4% *Neoromicia capensis*. 1% of the calls were like the endangered *Miniopterus Natalensis*.

General linear regression shows, cumulative distribution functions and cumulative distribution function heat maps of the bat activity with weather conditions were plotted. Due to the location at 112 m on the Met mast within the sweep of the proposed turbine blades, System E was, amongst others, used to inform a mitigation schedule.

The annual average bat activity is 0.41 bats per hour for the monitoring period at the proposed Koup 2 WEF site, which is within the range of low risk for the Nama Karoo terrestrial ecoregion (Sowler et al., 2017). The Bat Index or average hourly bat passes for the whole terrain indicate a general low activity as the systems at all the masts fall within the category of low risk. Bat activity at the 110m Met mast (E) was 0.35 bat passes per hour, the 20m Met mast (F) recorded the highest activity and the 10m mast (G) recorded the lowest bat activity.

System F, the lower Met mast system, recorded the same bat diversity than System E, situated at 112 m on the Met mast, although the latter portrayed lower activity, indicating that although activity is lower

at higher altitude, the species diversity is comparable. System G, on the temporary 10 m mast, situated towards the centre of the proposed terrain, shows substantially lower activity than the two other systems. The data recorded at this mast should be observed with caution as bat activity might increase if water collects in the nearby riverbed after spells of rain. Although the activity is lower, there is a relative higher occurrence of the Near Threatened *Miniopterus natalensis* at Mast G. As little variation has been shown between the low and high-altitude systems, and due to the foraging behaviour of *M. natalensis*, it is expected that this endangered species might also be active within the sweep of the turbine blades.

An expected increase in activity was recorded one to two hours after sunset, until a peak in activity was observed around 22:00. Thereafter, bat activity declined gradually up to approximately three to two hours before sunrise.

No bats passes were recorded during the seasonal transects in winter, spring and summer, while seven bat passes were recorded during autumn, on 25 April 2021. This is surprisingly high activity if compared to the other transects at Koup 2 WEF, as well those as transects at the adjacent proposed Koup 1 WEF. Three calls like *Miniopterus natalensis* and four calls like *Neoromicia capensis* were recorded.

The table below summarises the overall significance rating of impacts on bats by Koup 2 WEF according to SiVest Impact significance rating.

Phase	Impact before mitigation (negative)	Impact after mitigation (negative)
Construction	23 (5-23) Low	7 (5-23) Low
Operation	35 (24-42) Medium	25 (24-42) Medium
Decommissioning	8 (5-23) Low	5 (5-23) Low
Cumulative	47 (43-61) High	32 (24-42) Medium
Combined for the site	28 (24-42) Medium	17 (5-23) Low

Although the overall significance rating for Construction is rated as low before mitigation, the impact of clearing and excavation of natural habitat is rated medium, whereas the other two impacts rate low. The overall significance rating for Operation is medium, although three impacts rate high before mitigation. These impacts are direct collision and barotrauma by turning turbine blades and the impact on the genetic pool. Cumulative impacts before mitigation rates high due to the combined impact on bat mortality from direct collision and barotrauma and the impact on bat populations. After mitigation, the impact decreases to a medium cumulative impact.

For the cumulative effect, the total output of approximately 280 MW for approved WEFs within a 35km radius of Koup 2 WEF, was considered. With Koup 1 and 2 added to this as a unit, the output will be 560 MW. When considering the Nama-Karoo bat thresholds (Sowler, *et al.* 2017), the combined yearly hourly bat activity of Koup 2, namely 0.41 bats per hour, is Low. The collective Bat Index, including Beaufort West and Trakas WEFs, as well as Koup 1 is calculated at 2.98 bats per hour, which is High

(<1.15) for the Nama-Karoo. Specialist reports from WEFs considered in this assessment rate the impact on bats in this ecoregion without mitigation as High negative (-76 to -82) and Low negative (-26 to -32) after mitigation.

Cumulative impacts and significance rating for bats at Koup 2 include the cumulative effect of the destruction of active roosts and features that could serve as roosts (Medium before and Low after mitigation); cumulative bat mortality due to direct collision or barotrauma during foraging of resident bats (High before and Medium after mitigation) and migrating bats (High before and Medium after mitigation) as well as bat habitat loss over several farms (High before and Medium after mitigation). Furthermore, the cumulative reduction in size, genetic diversity, resilience, and persistence of bat populations (High before and Medium after mitigation). Although the developer of Koup 2 has no authority on other wind farms in the vicinity, it is important for the regulating department that operational monitoring and mitigation need to be implemented upon construction of all the WEFs to try to curb the significant collected impact.

It is recommended that no turbines or associated infrastructure are allowed in the High sensitivity areas. High-medium sensitivity zones should preferably be avoided, but due to the general low bat activity in certain areas, could be developed with strict mitigation measures. Medium sensitivity zones could be developed, but with limited mitigation due to the low bat activity. It is therefore recommended that turbines will be shifted from High sensitivity areas and that curtailment is applied under certain weather conditions to the turbines situated in the High-medium sensitivity zone. Close observation during the bat monitoring to be conducted during the post-construction phase should refine the curtailment schedule and apply it to more turbines, if necessary. Should curtailed turbines show consistent low activity through static recordings, as well as mortality in the low threshold range, the bat specialist could adapt curtailment again.

During April 2022, an updated layout was provided. After the layout changes, only two turbines are still situated within sensitivity zones, one in the High-medium and one in the Medium sensitivity zones.

It is recommended that curtailment be applied during the specified time periods when the relevant temperatures and wind speeds prevail for the turbine situated in the High-medium sensitivity zone. If the developer decides to reduce the number of turbines, the first option, after the wind regime has been considered, should be to remove the turbine in the High-medium sensitivity zones. Operational monitoring and carcass searches will inform this decision.

<b>CURTAILMENT FOR TURBINES IN HIGH-MEDIUM SENSITIVITY ZONES</b>			
<b>Months</b>	<b>Time periods</b>	<b>Temperature (°C)</b>	<b>Wind speed (m/s)</b>
Feb., March, April, May, Sept., Oct.	Two hours after sunset up to 8 hours after sunset	Above 12 °C	Below 11m/s



It is recommended that the following is included in the Environmental Authorisation:

- The final layout should adhere to the sensitivity map, as provided in Section 8.
- A mitigation scheme, as per Section 9.2 should apply to operational turbines right from the start, when turbines start to turn.
- No freewheeling of turbines is allowed when power is not generated. Turbines do not need to be at a standstill, but there should be minimum movement so that bats are not at risk when turbines are not generating power.
- Mitigation measures apply as per the EMPR.
- A minimum of two years operational bat monitoring as per the latest guidelines should be conducted. If the operational bat specialist is of the opinion that an extended period of operational monitoring is needed, the client should adhere to this.
- Would high mortality be experienced during the operational monitoring, further mitigation measures should be discussed with the bat specialist, using the mitigation recommendations as per the table below, as a starting point for discussions.

CURTAILMENT FOR TURBINES IN MEDIUM SENSITIVITY ZONE			
Months	Time periods	Temperature (°C)	Wind speed (m/s)
March, April, May, Sept., Oct.	One hour after sunset up to 8 hours after sunset	Above 12 °C	Below 11m/s

It should be noted that a year pre-construction bat monitoring is required by legislation in South Africa, but the semi-desert Nama Karoo environment is subjected to erratic climate conditions which varies from year to year. The sporadic rainfall seasons that sometimes occur in arid areas like the Karoo reflect on periods of insect emergence and accompanying higher bat activity. One should bear in mind that we are in a dry spell at present and that this could change during higher precipitation periods in future. These changes could result in changes in the bat activity and occurrence which have not been accounted for in this report.

Before mitigation, the potential Negative impact of the site is predicted to be of Medium Negative significance and if the applicant adheres to the proposed mitigation measures, the potential impact on bats from the proposed Koup 2 Wind Farm is predicted to continue to be of Low Negative significance. **Considering the findings of the one-year pre-construction monitoring undertaken at the proposed Koup 2 WEF site, the bat specialist is of the opinion that no fatal flaws exist, and environmental authorisation may be granted.**

**NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)**

<b>Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6</b>	<b>Section of Report</b>
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 1.2 and Appendix A.
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix A.
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1.
(cA) an indication of the quality and age of base data used for the specialist report;	Section 1.3.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 5, 11.5 and 11.6.
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Sections 6 and 7.
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.3.
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Sections 0 and 12.
g) an identification of any areas to be avoided, including buffers;	Section 11.6.
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 11.6.

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	Section 0.
k) any mitigation measures for inclusion in the EMPr;	Section 11.6.
l) any conditions for inclusion in the environmental authorisation;	Section 14.2.
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	See Table 15.
n) a reasoned opinion- <ul style="list-style-type: none"> <li>i. (As to) whether the proposed activity, activities or portions thereof should be authorised; <ul style="list-style-type: none"> <li>(iA) regarding the acceptability of the proposed activity or activities; and</li> </ul> </li> <li>ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;</li> </ul>	Section 14.2.
o) a description of any consultation process that was undertaken while preparing the specialist report;	Section 5.1.5
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	<b>N/A.</b> No feedback has yet been received from the public participation process regarding the bat specialist study.
q) any other information requested by the competent authority.	<b>N/A.</b> No information regarding the bat specialist study has been requested from the competent authority to date.

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
2) Where a government notice <i>gazetted</i> by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A



**KOUP 2 WIND:  
PRE-CONSTRUCTION BAT MONITORING  
*FINAL REPORT*  
*August* 2021**

**Prepared for: Genesis Koup 1 Wind (Pty) Ltd**

*Attention: Davin Chown*

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**SiVEST Environmental**

Bat Specialist Study

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**Date:** 9 September 2021

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**BAT SPECIALIST STUDY**

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SIVEST Environmental

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## List of Abbreviations

<b>BA</b>	Basic Assessment
<b>BESS</b>	Battery Energy Storage System
<b>CA</b>	Competent Authority
<b>CDF</b>	Cumulative Distribution Function
<b>CV</b>	Curriculum Vitae
<b>DEFF</b>	Department of Environment, Forestry and Fisheries
<b>EA</b>	Environmental Authorisation
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	Environmental Impact Assessment
<b>EMPr</b>	Environmental Management Programme
<b>GNR</b>	Government Notice Regulation
<b>Ha</b>	Hectares
<b>IPP</b>	Independent Power Producer
<b>kV</b>	Kilovolt
<b>MW</b>	Megawatt
<b>NEMA</b>	National Environmental Management Act (No. 107 of 1998)
<b>O&amp;M</b>	Operation and Maintenance
<b>REFs</b>	Renewable Energy Facilities
<b>REIPPPP</b>	Renewable Energy Independent Power Producer Procurement Programme
<b>SABAA</b>	South African Bat Assessment Association
<b>SANBI</b>	South African National Biodiversity Institute
<b>SSV</b>	Site Sensitivity Verification Report
<b>WEF</b>	Wind Energy Facility

## Glossary

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<i>Definitions</i>	
Bat monitoring systems	Ultrasonic recorders used to record bat calls
Torpor	A state of physical inactivity associated with lower body temperature and metabolism
SM4BAT	Wildlife Acoustics' full spectrum ultrasonic bat monitoring recorder
SMMU2	Wildlife Acoustic's ultrasonic microphones for recording bat sounds
Threshold	Bat activity threshold as provided by SABAA

## **KOUP 2 WIND:**

## **PRE-CONSTRUCTION BAT MONITORING**

### **FINAL REPORT**

**August 2021**

**Prepared for: Genesis Koup 1 Wind (Pty) Ltd**

**Attention: Davin Chown**

**Responsible Director of the SPV**

**Genesis** Koup 1 Wind (Pty) Ltd. & Genesis Koup 2 Wind (Pty) Ltd

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#### STATIC DETECTORS:

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**SiVEST Environmental**

Bat Specialist Study

Version No. 1

**Prepared by: Stephanie Dippenaar Consulting**



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SHE Representative Bird Surveyor & Advanced Anti- Poaching

*This report only pertains to the conditions found at the above site at the time of the survey. This report may not be copied electronically, physically or otherwise, except in its entirety. If sections of the report are to be copied the approval of the author, in writing, is required. Furthermore, except for editing changes as agreed, no changes are to be made to this report that might change the outcome of this study without the approval of the author.*

SiVEST SA (PTY) LTD

PROPOSED CONSTRUCTION OF **THE KOUP 2 WIND ENERGY FACILITY AND  
ASSOCIATED GRID INFRASTRUCTURE, NEAR BEAUFORT WEST,  
WESTERN CAPE PROVINCE, SOUTH AFRICABAT SPECIALIST STUDY**

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SiVEST Environmental

Bat Specialist Study

Version No. 1

Prepared by: Stephanie Dippenaar Consulting

**Date:** 9 September 2021

Page 2

# 1. INTRODUCTION

Genesis Enertrag Koup 2 Wind (Pty) Ltd (hereafter referred to as “Genesis”), has appointed SiVEST Environmental (hereafter referred to as “SiVEST”) to undertake the required Environmental Impact Assessment (EIA) / Basic Assessment (BA) processes for the proposed construction of the Koup 2 Wind Energy Facility (WEF) and associated grid connection infrastructure near Beaufort West in the Western Cape Province of South Africa.

The overall objective of the development is to generate electricity by means of renewable energy technology capturing wind energy to feed into the National Grid.

It is anticipated that the proposed Koup 2 WEF will comprise thirty-two (32) wind turbines with a maximum total energy generation capacity of up to approximately 140 MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132 kV overhead power line. A Battery Energy Storage System (BESS) will be located next to the onsite 33/132 kV substation. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.

In terms of the Environmental Impact Assessment (EIA) Regulations, which were published on 04 December 2014 [GNR 982, 983, 984 and 985) and amended on 07 April 2017 [promulgated in Government Gazette 40772 and Government Notice Regulation (GNR) R326, R327, R325 and R324 on 7 April 2017], various aspects of the proposed development are considered listed activities under GNR 327 and GNR 324 which may have an impact on the environment and therefore require authorisation from the National Competent Authority (CA), namely the Department of Environment, Forestry and Fisheries (DEFF), prior to the commencement of such activities. Specialist studies have been commissioned to assess and verify the project under the new Gazetted specialist protocols.

## 1.1 Terms of Reference

The *South African Best Practice Guidelines for Pre-construction Monitoring of Bats at Wind Energy Facilities* (Sowler, et al, 2017) requires that pre-construction monitoring be undertaken of the echolocation calls of bats to determine their seasonal and diurnal activity patterns over a 12-month period. Based on the requirements of this guideline, the following Terms of Reference is applicable to the monitoring exercise:

- Gathering information on bat species that inhabit the site, noting higher, medium or lower risk species groups; as indicated in Table 4, p16, of the guidelines (MacEwan, et al., 2020);
- Recording relative frequency of use by different species throughout the year;
- Monitoring spatial and temporal distribution of activity for different species;
- Identifying locations of roosts within and close to the site;
- Collecting details on how the surveys have been designed to determine presence of rarer species; and

- Describing the type of use of the site by bats; for example, their relative position from the turbine locations in terms of foraging, commuting, migrating, roosting, as can be observed through the monitoring data and site visits.

In conjunction with the above-mentioned guideline, the following South African guideline documents are also applicable to the study:

- *South African Bat Fatality Threshold Guidelines for Operational Wind Energy facilities* (MacEwan, et al., 2018).
- *Mitigation Guidance for Bats at Wind Energy Facilities in South Africa* (Aronson, et al., 2018).
- *South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments - Pre-Construction Edition 4.1 South African Bat Assessment Association* (MacEwan, et al., 2020).
- *South African good practice guidelines for operational monitoring for Bats at Wind Energy Facilities* (Aronson, et al., 2014).

In addition to the above, this study is required to meet the requirements specified in Appendix 6<sup>1</sup> of the 2014 National Environmental Management Act (No. 107 of 1998; NEMA) EIA Regulations (as amended). A Site Sensitivity Verification (SSV) report was also compiled (see Appendix B) in terms of the Assessment Protocols (GN 320 of 20 March 2020).

## 1.2 Specialist Credentials

Please see Appendix B for the Specialist CV.

## 1.3 Assessment Methodology

The methods of investigation of bats at the proposed WEF site are described below.

### 1.3.1 Desktop investigation of the development area as well as the surrounding environment

A desktop study is done of the site itself, using information provided by the applicant as well as information gathered through a literature review. Conservation areas in the vicinity are investigated and other renewable energy developments (within a radius of 35 km), particularly wind farms are noted for the discussion of cumulative effects.

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<sup>1</sup> To date, reporting requirements for bat specialist studies have not been published in terms of these protocols. As a result, this study must comply with Appendix 6 of the amended 2014 EIA Regulations.

### 1.3.2 Static Acoustic Monitoring

Static monitoring, using automated bat detector systems, provides an invaluable volume of data on the bats present on the site at various fixed locations that are representative of area and each of the biotopes present within the proposed study area as well as at varying altitudes. Static monitoring is essential in assessing the relative importance and temporal changes of features, locations and potential migratory routes (MacEwan, et al., 2020). The monitoring systems deployed within the study area, consist of four Wildlife Acoustics SM4BAT full spectrum bat detectors that are powered by 12 V, 7 Amp-h sealed lead acid batteries replenished by photovoltaic solar panels (**Table 1**). Two SD memory cards, class 10 speed, with a capacity of 64 GB each, or one 128 GB, are utilized within each detector to ensure substantial memory space with high quality recordings, even under conditions of multiple false environmental triggers.

Each detector is set to operate in continuous trigger mode from dusk each evening until dawn. Times were correlated with latitude and longitude and set to trigger half an hour before sunset. The trigger mode setting for the bat detectors, which record frequencies exceeding 16 kHz and -18 dB, is set to record for the duration of the sound and 1500 ms after the sound has ceased; this period is known as the trigger window. The data from these recorders are downloaded every two to three months and analysed to provide an approximation of the bat frequency and species diversity that visit and inhabit the site.

The position of the Met mast is decided by the developer and the bat monitoring systems (Systems E and F) on the Met mast represents the biotope associated with the plains of the Gamka Karoo (SANBI, 2012) vegetation type. When choosing the positions of temporary masts for bat monitoring equipment, representing different biotopes, proximity to possible bat conducive areas and accessibility to install a mast, are, amongst others, considered. The position of the 10 m mast is motivated as follow:

- **10 m Mast G:** This monitoring system represents the more central part and western part of the proposed wind farm. The mast was deployed close to a riverbed amongst the hills, where vegetation is a bit denser. This system also represents the property south of the border between the farms Glen and Reynardtskraal. Due to the inaccessibility for downloading data at Reynardtskraal, this system was installed as close as possible to the latter, to be representative of the Reynardtskraal property.

**Table 1: Summary of Passive Detectors deployed at the proposed Koup 2 Wind Energy Facility**

Detector	Situation	Coordinates	Microphone	Division ratio	High pass filter	Gain	Format	Trigger window	Calibration (on chirp) at the microphone when deployed
SM4BAT (Met E)	Met mast: mic at 110 m	32°50'8.81" S 22°24'23.06" E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Calibrated when installed by Windhunter, less than -8 dB
SM4BAT (Met F)	Met mast: mic at 20 m	32°50'8.81" S 22°24'23.06" E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Calibrated when installed by Windhunter, less than -8 dB
SM4BAT (Mast G)	Temporary mast: mic at 10 m	32°50'39,8" S 022°23'14,1" E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Drop to approximately -8,71 dB at the microphone

### 1.3.3 *Roost Surveys*

Roost surveys are conducted during site visits by the bat specialist and any known roosts are inspected. Areas where possible roosts could be located are investigated. It is not always possible to have access to all roosts, as they could be in crevices or roofs with limited ceiling space. If day roosts are identified, bat counts are done during sunset and if necessary detectors are installed for short periods at point sources to monitor roosts. It should be noted that the site is large and within the time span and limitations of the bat monitoring study, searching the whole site for roosts is not possible. Roost searches results are discussed in Section 5.

### 1.3.4 *Manual Surveys - Driven transects*

Manual activity surveys, such as driven transects, are necessary to gain a spatial understanding of the bat species utilising the site, in particular the identification of key features, potential commuting routes and overall activity within and surrounding the site. Transects complement the static monitoring surveys in terms of spatial coverage (Sowler, et al, 2017). As prescribed by the guidelines, seasonal transects comprising of at least two transect sessions per field visit, one for each season, are performed. A SM4BAT full spectrum recorder with the microphone mounted on a pole is used for transects. Starting at sunset up to approximately two hours after sunset, the vehicle is driven at a speed between 10 to 20 km/h along a set route. The next evenings transect commences from the opposite side and follows the same route. All transect routes are the same so that seasonal data can be compared. See Section 7 for the transect route and discussion of the results.

### 1.3.5 *Data Analysis*

Data are downloaded manually approximately once every two to four months. Acoustic files downloaded from the detectors are analysed for bat activity with respect to the number of bats passes and the bat species. The latest version of Wildlife Acoustics Kaleidoscope Pro is used for analysing the large quantities of data. Data analysed electronically are regularly tested by hand and up to now electronic data analysis for this project have been more than 90% accurate when comparing to individual call analysis. Data sets are from time to time converted to ZC files and verified by Analook software. In cases where there is uncertainty about a call, but it is clear that it is a bat calling, the call is classified as Unsure.

### 1.3.6 *Impact Assessment Methodology*

Potential impacts on bats were assessed in terms of the requirements of Appendix 6 of the 2014 EIA Regulations, as amended, for all project phases, i.e., Design, Construction, Operation and Decommissioning. The assessment also considers potential cumulative impacts that may result from other renewable energy facilities (REFs) and large-scale industrial developments within a 35 km radius and includes the following:

- A cumulative environmental impact statement noting whether the overall impact is acceptable; and
- A review of the specialist reports undertaken for other REFs and an indication of how the recommendations, mitigation measures and conclusion of the studies have been considered.

## 2. ASSUMPTIONS AND LIMITATIONS

Although it is an internationally accepted way of presenting bat data, the use of bat monitoring detectors to measure for relative abundance of bat activity as 'low', 'medium' or 'high', has limitations. This element of subjectivity is due to the extent that the results are based on the specialist's experience in interpreting the data into a qualitative baseline assessment report. A 'cautious' approach should be considered concerning accepting bat numbers as absolute true data and hence recent guidelines regarding bat monitoring recommends a 'standardised' approach and includes statistical formulas and calculations. Examples of assumptions and limitations in monitoring methods are highlighted below.

- The knowledge of certain aspects of South African bats such as population size, spatial and temporal movement patterns (e.g., migration and flying heights) and how bats may be impacted upon by wind energy is limited, as their behaviour differs when comparing the same European or American bat species.
- Data is extrapolated from echolocation surveys of bat calls over large areas, whereas acoustic monitoring only samples small areas of space. Furthermore, the sound recording of the bat echolocation call could be influenced by the type and intensity of the call, the bat species, the detector system used, the orientation of the signal relative to the microphone and other environmental conditions such as humidity.
- The accuracy of species identification is dependent on the calls used for proof of identity but can be influenced by variation in bat calls within species and between different species and overlapping of species call parameters. Although species names are mentioned, true species identification can only really be conducted when handling the bat. Species are identified as those that are the most likely due to call parameters and distribution maps, but confirmation of species will only be possible during the post construction phase if a bat carcass is collected.
- Bat detectors record bat activity, but the sensors cannot distinguish between a single bat passing multiple times, which could lead to double counting, or multiple bats of the same species passing the device once (Kunz, *et al.*, 2007).
- Comparative studies of bat activity from similar locations are used to verify baseline information. Due to overlap of calls, it is not possible to provide an exact number of bats passing the recorder. Therefore, the number of bats passing is not an exact count, but as close as possible under the given circumstances and within the limitations of the survey techniques.
- Bats do not echolocate in a uniform, monotonous way. For example, when they go on a feeding frenzy, it is difficult to identify a species from the sound of a call. Sometimes a species could also echolocate at a frequency somewhat higher or lower than the normal identifiable frequency. These calls could then be nearer to the range of another species. For this study, bat calls from unidentifiable species were recorded as 'unsure'. These calls are identified as a bat, but uncertainty exists as to the species identification.
- The weather stations were only situated on the Met mast and are extrapolated for the other monitoring stations. Although it is deemed sufficient for the purpose of this study, ideally each system should have its own weather station.

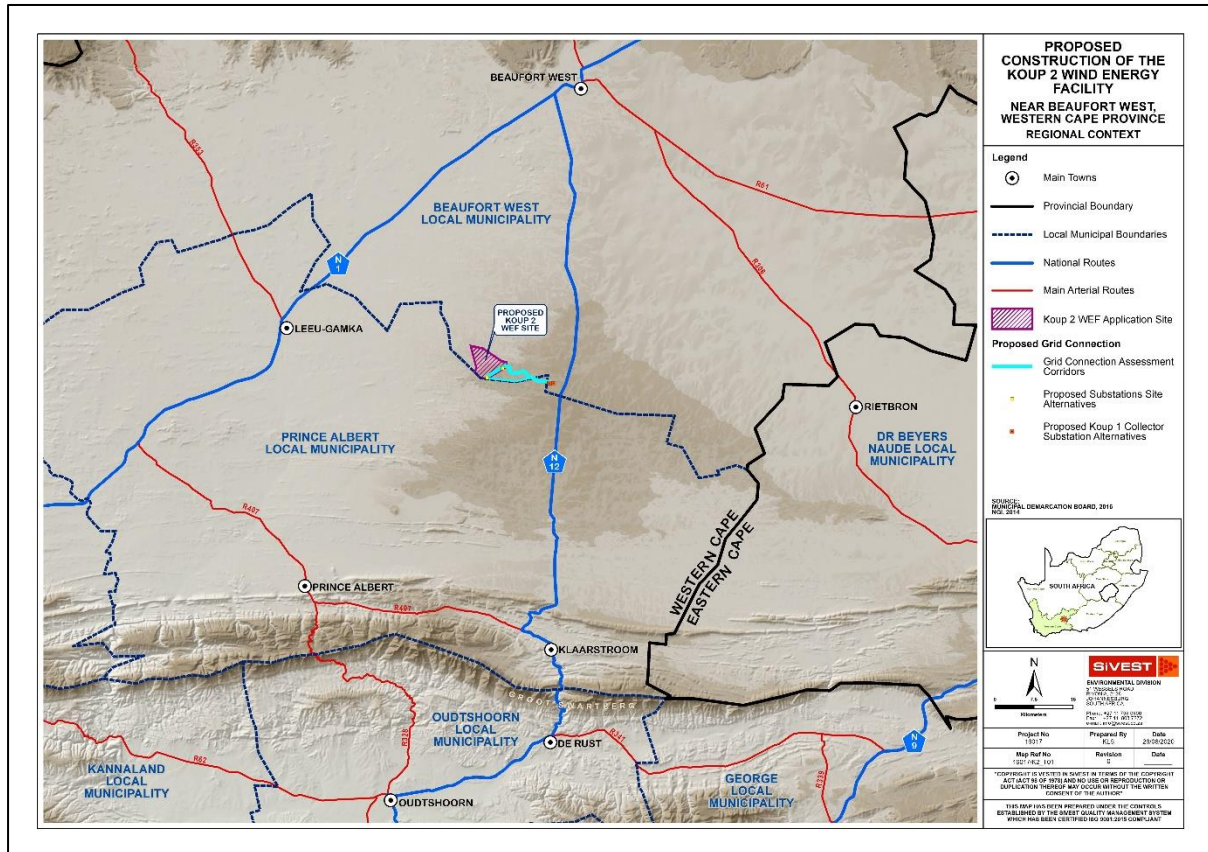
- Transects only provide a snapshot in time and do not determine spatial distribution on the site, although areas of high activity or nights with high activity could be uncovered.
- It is not possible to search the entire site as well as the wider neighbouring terrain for bat roosts. However, the site is walked through as thoroughly as possible, keeping in mind the time constraints of an environmental assessment, any roosts or indication of bat presence discovered in this process are incorporated into the study.
- The one two-track route along the riverbed at Reynardskraal was a challenge, resulting in not including it in our transects route. We also avoid deploying equipment on that part of the wind energy development, as regular visits to this area might have posed a problem. A system was then deployed on the southwestern border of Glen, close to a riverbed and amongst hills, with relative denser vegetation, to be representative of the Reynardskraal property.
- Only a year of pre-construction bat monitoring is required by legislation in South Africa, but the semi-desert Karoo environment is subjected to erratic climate conditions which varies from year to year, which could result in a sporadic change in the bat situation. Bat monitoring might be conducted during a dry spell which might result in underestimating the bat population.
- Ongoing research and new knowledge gained from current projects will continuously inform this field of scientific practice.



### 3. TECHNICAL DESCRIPTION

#### 3.1 Project Location

The proposed WEF and associated grid connection infrastructure is located approximately 55 km south of Beaufort West in the Western Cape Province and is within the Beaufort West and Prince Albert Local Municipalities, in the Central Karoo District Municipality.



**Figure 1: Regional context map**

##### 3.1.1 WEF

The WEF application site as shown on the locality map below (**Figure 2**) is approximately 2477.408 hectares (ha) in extent and incorporates the following farm portions:

- Portion 1 of the farm Kaffirs Kraal No 380
- Portion 8 of the Kaffirs Kraal No 380

A smaller buildable area (1575 ha) has however been identified because of a preliminary suitability assessment undertaken by Genesis and this area is likely to be further refined with the exclusion of sensitive areas determined through various specialist studies being conducted as part of the EIA process.



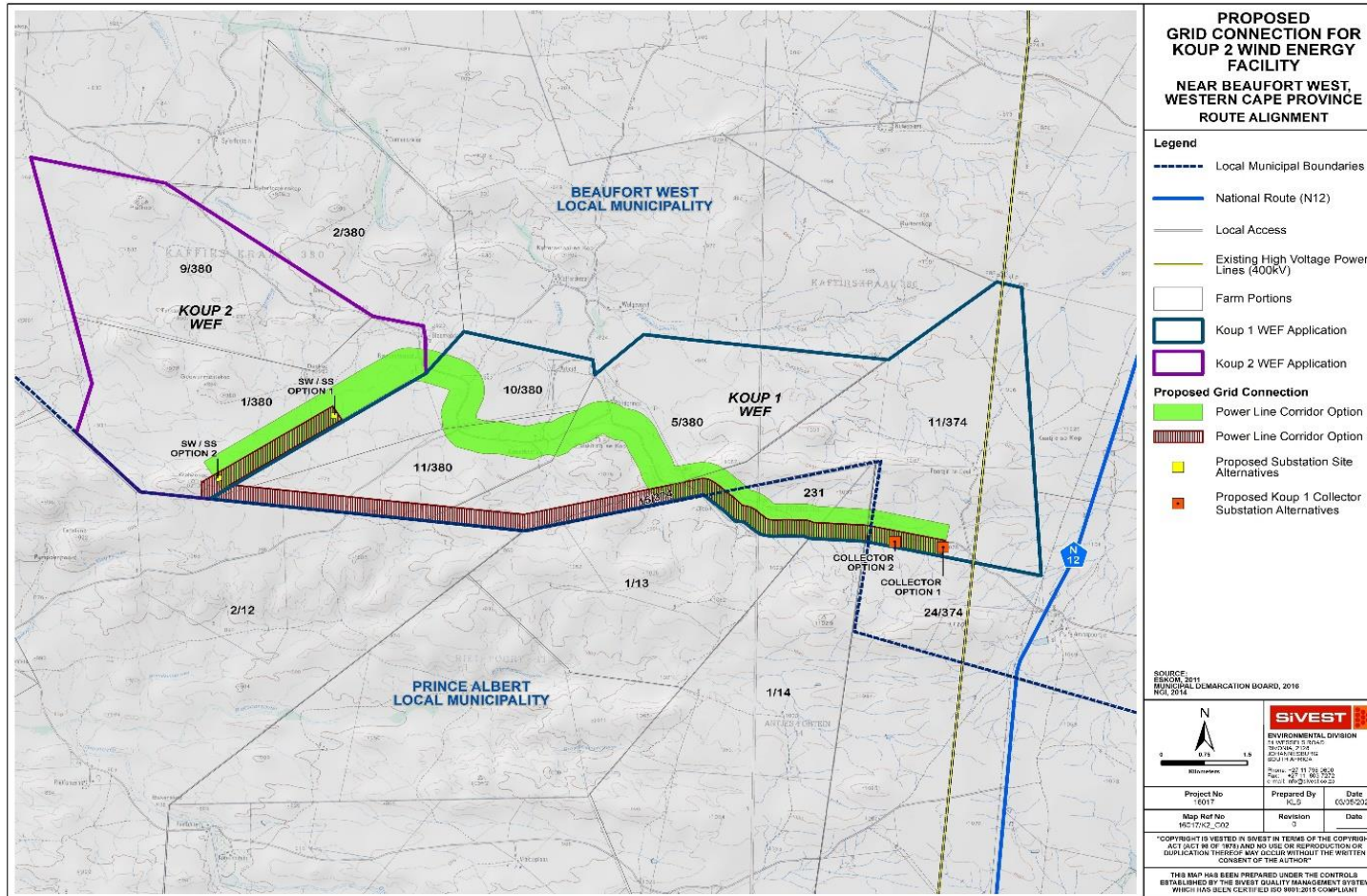


Figure 3: Proposed 132kV power line route alignment

## 3.2 Project Description

It is anticipated that the proposed Koup 2 WEF will comprise 32 wind turbines with a maximum total energy generation capacity of up to approximately 140 MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132 kV overhead power line. A Battery Energy Storage System (BESS) will be located next to the onsite 33/132 kV substation. The 132 kV overhead power line will however require a separate EA and is subject to a Basic Assessment (BA) process, which is currently being undertaken in parallel to the EIA process. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise of an array of containers, outdoor cabinets and/or storage tanks. The proposed Koup 2 WEF would include the components described in the following subsections.

### 3.2.1 Wind Farm Components

- Up to 32 wind turbines, each between 5.6 MW and 6.6 MW, with a maximum export capacity of approximately 140 MW. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). The final number of turbines and layout of the WEF will, however, be dependent on the outcome of the Specialist Studies conducted during the EIA process;
- Each wind turbine will have a hub height and rotor diameter of up to approximately 200 m;
- Permanent compacted hardstanding areas / platforms (also known as crane pads) of approximately 90 m x 50 m (total footprint of approx. 4 500 m<sup>2</sup>) per turbine during construction and for on-going maintenance purposes for the lifetime of the proposed development;
- Each wind turbine will consist of a foundation of up to approximately 15 m x 15 m in diameter. In addition, the foundations will be up to approximately 3 m in depth;
- Electrical transformers adjacent to each wind turbine (typical footprint of up to approximately 2 m x 2 m) to step up the voltage to 33 kV;
- One (1) new 33/132 kV on-site substation and/or combined collector substation, occupying an area of approximately 1.5 ha. The proposed substation will be a step-up substation and will include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substation has been included in the WEF EIA and in the grid infrastructure BA (substation and 132 kV overhead power line) to allow for handover to Eskom. Following construction, the substation will be owned and managed by Eskom. The current applicant will retain control of the low voltage components (i.e., 33 kV components) of the substation, while the high voltage components (i.e., 132 kV components) of this substation will likely be ceded to Eskom shortly after the completion of construction.
- The wind turbines will be connected to the proposed substation via medium voltage (33 kV) cables. Cables will be buried along access roads wherever technically feasible.
- A Battery Energy Storage System (BESS) will be located next to the onsite 33/132 kV substation. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks;

- Internal roads with a width of between 8 m and 10 m will provide access to each wind turbine. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. Turns will have a radius of up to 50 m for abnormal loads (especially turbine blades) to access the various wind turbine positions. It should be noted that the proposed application site will be accessed via an existing gravel road from the N12 National Route;
- One (1) construction laydown / staging area of up to approximately 2.2 ha. It should be noted that no construction camps will be required to house workers overnight as all workers will be accommodated in the nearby town;
- One (1) permanent Operation and Maintenance (O&M) building, including an on-site spares storage building, a workshop and an operations building to be located on the site identified for the construction laydown area.
- A wind measuring lattice (approximately 120 m in height) mast has already been strategically placed within the wind farm application site to collect data on wind conditions;
- No new fencing is envisaged at this stage. Current fencing is standard farm fence approximately 1 to 1.5 m in height. Fencing might be upgraded (if required) to be up to approximately 2 m in height; and
- Water will either be sourced from existing boreholes located within the application site or will be trucked in, should the boreholes located within the application site be limited.

### 3.2.2 Grid Components

The proposed grid connection infrastructure to serve the Koup 2 WEF will include the following components:

- One (1) new 33/132 kV on-site substation and/or collector substation, occupying an area of up to approximately 1 ha. The proposed substation will be a step-up substation and will include an Eskom portion and an IPP portion, hence the substation has been included in both the EIA for the WEF and in the BA for the grid infrastructure to allow for handover to Eskom. The applicant will remain in control of the low voltage components (i.e., 33 kV components) of the substation, while the high voltage components (i.e., 132 kV components) of this substation will likely be ceded to Eskom shortly after the completion of construction; and
- One (1) new 132 kV overhead power line connecting the on-site and/or collector substation via the proposed Koup 1 collector substation and thereby feeding the electricity into the national grid. Power line towers being considered for this development include self-supporting suspension monopole structures for relatively straight sections of the line and angle strain towers where the route alignment bends to a significant degree. Maximum tower height is expected to be approximately 25 m.

### 3.3 Layout alternatives

#### 3.3.1 Wind Energy Facility

Design and layout alternatives will be considered and assessed as part of the EIA. These include alternatives for the substation locations and for the construction / laydown area. The proposed site alternatives are shown in Figure 4 below.

#### 3.3.2 Grid Components

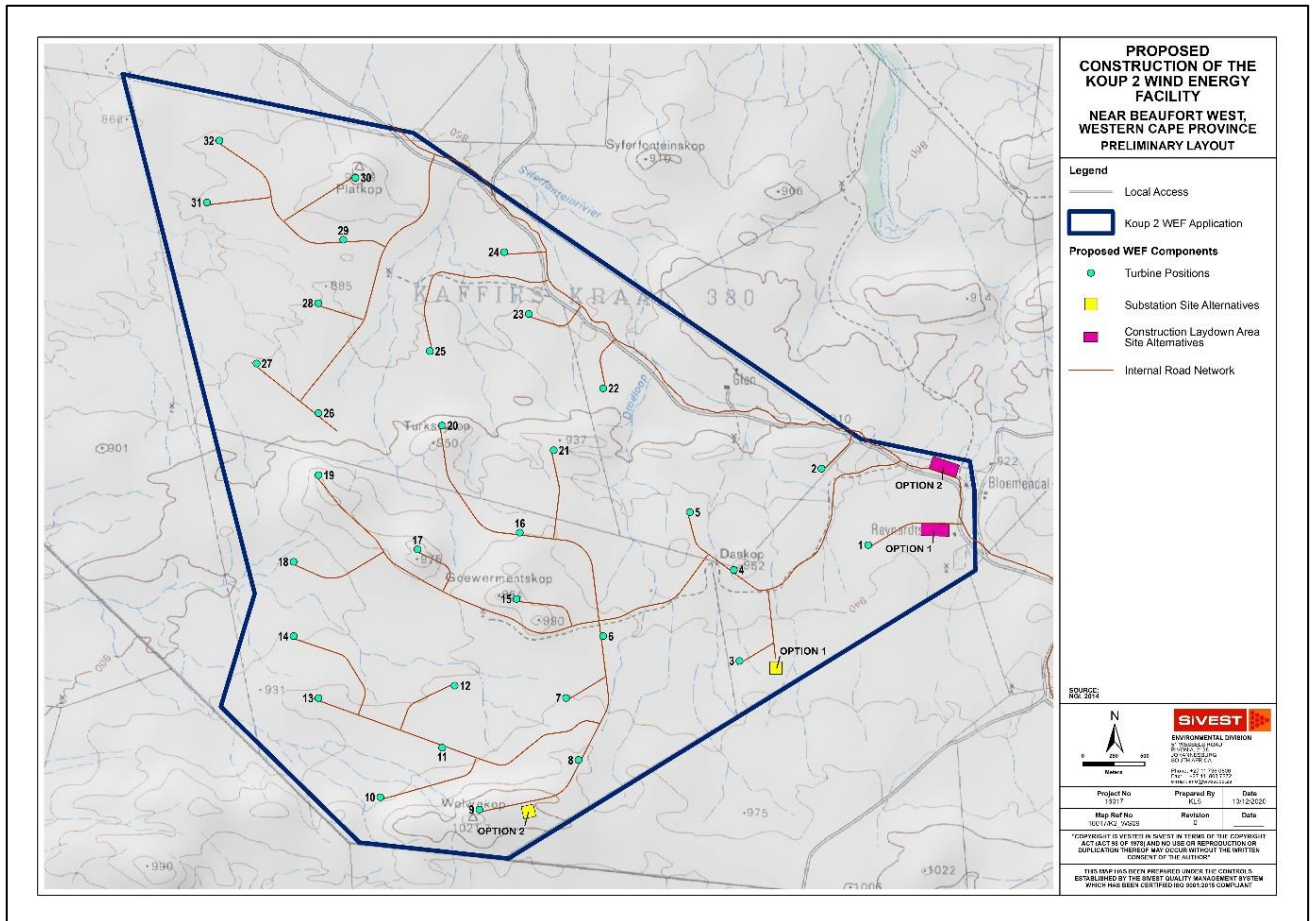
The grid connection infrastructure proposals include two (2) switching and collector substation site alternatives and two (2) power line route alignment alternatives ( Figure 3). These alternatives will be considered and assessed as part of the BA process and will be amended or refined to avoid identified environmental sensitivities.

Both power line route alignments will be assessed within a 600 m and 300 m wide assessment corridor (150 m on either side of power line). These alternatives are described below:

- **Power Line Corridor Option 1** is approximately 12 km in length, linking either substation / collector Option 1 or Option 2 to the proposed Koup 1 Collector Option 1 or Option 2. This route alignment will be assessed within a 600 m wide corridor (300 m on either side of the power line).
- **Power Line Corridor Option 2** is approximately 13.2 km in length, linking either substation / collector Option 1 or Option 2 to the proposed Koup 1 Collector Option 1 or Option 2. This route alignment will be assessed within a 300 m wide corridor (150 m on either side of the power line).

#### 3.3.3 No-go Alternative

The 'no-go' alternative is the option of not undertaking the proposed WEF and / or grid connection infrastructure projects. Hence, if the 'no-go' option is implemented, there would be no development. This alternative would result in no environmental impacts from the proposed project on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report.



**Figure 4: Alternatives proposed as part of the Koup 2 WEF**

#### 4. LEGAL REQUIREMENT AND GUIDELINES

Environmental law in the form of legislation, policies, regulations and guidelines which outline and manage development practice to ensure informed decision making and sound risk management of current and future projects, i.e., the impact of the proposed development on the ambient bat environment:

- Constitution of the Republic of South Africa (Act No. 108 of 1996)
- National Environmental Management Act (NEMA, Act No. 107 of 1998)
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
- Convention on the Conservation of Migratory Species of Wild Animals (1979)
- Convention on Biological Diversity (1993)
- The Equator Principles (2013)
- The Red List of Mammals of South Africa, Swaziland and Lesotho (2016)
- National Biodiversity Strategy and Action Plan (2005)
- Aviation Act (Act no 74 of 1962)

The relevant versions of the South African Bat Assessment Association (SABAA) guidelines informing wind energy developments are followed as applicable throughout the monitoring process. These include the following:

- *South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments – Pre-Construction* (Sowler, et al., 2017).
- *South African Good Practice Guidelines for Pre-construction Monitoring of Bats at Wind Energy Facilities* (MacEwan, et al., 2020).
- *Mitigation Guidance for Bats at Wind Energy Facilities in South Africa* (Aronson et al., 2018).
- *South African Bat Fatality Threshold Guidelines* (MacEwan, et al., 2020).
- *South African Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities* (Aronson et al., 2020).



## 5. DESCRIPTION OF THE RECEIVING ENVIRONMENT

### 5.1 Regional features and climate

#### 5.1.1 Climate

Generally, July is the driest month with an average of 7 mm rainfall, whereas March shows an inclination towards being the peak rainfall month with an average of 26 mm rainfall (Figure 5). A difference of approximately 19 mm in rainfall is evident between the driest and wettest months (meteoblue, 2020).

The average maximum temperature presents a range of 13°C, while the average minimum temperature presents a range of 14°C. The highest maximum recorded temperature on a hot day is 38°C, the lowest minimum temperature being -1°C. The hottest months of the year are January and February, while the coldest months are June and July (meteoblue, 2020).

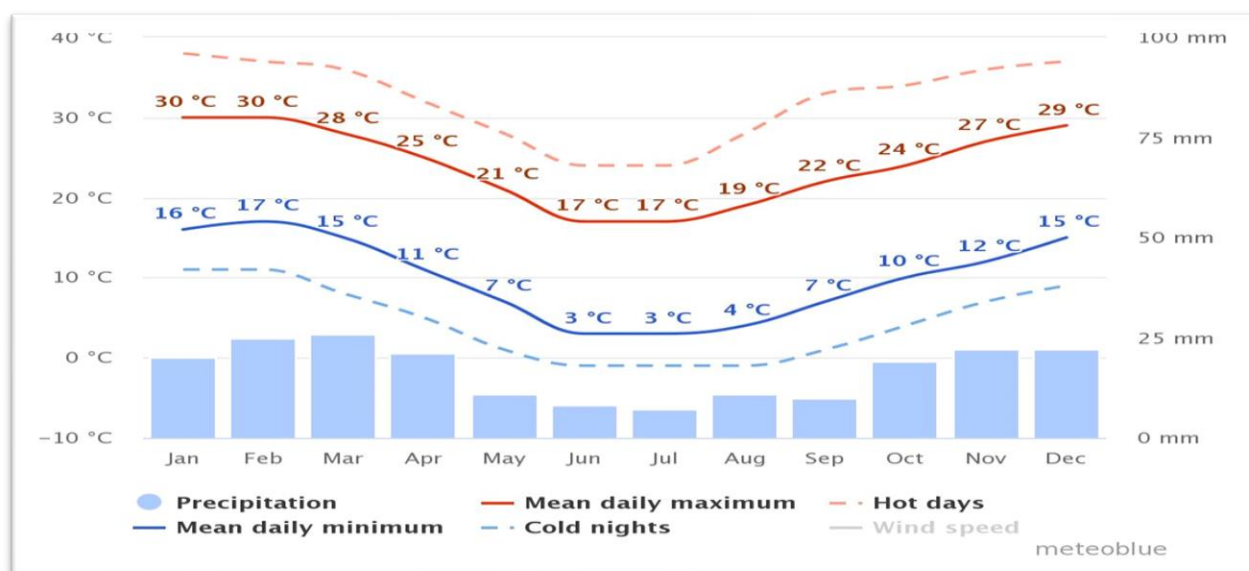


Figure 5: Climate profile of the Leeu Gamka area (Meteoblue, 2020).

#### 5.1.2 Vegetation

The proposed study area falls within the Nama Karoo Biome and regionally within the Lower Karoo Bioregion, with Gamka Karoo being the single dominant vegetation type found within the study area (SANBI, 2012) and Olsen, et al., (2001) classifying it as deserts and xeric shrublands. The Gamka Karoo vegetation unit occurs mainly in the Western Cape and Eastern Cape Provinces, between the Great Escarpment (Nuweveld Mountains) in the north and the Cape Fold Belt mountains (mainly the Swartberg Mountains) in the south. The landscape comprises slightly undulating plains, covered with dwarf spinescent shrubland and low trees.

Following good rains, drought-resistant grasses may dominate on the sandy basins. Being in the rain shadow of the Cape Fold Belt, the Gamka Karoo is considered one of the most arid units of the Nama Karoo Biome.

Rainfall occurs mainly in summer and autumn, with a peak in March.

Although only 2% of this vegetation type is formally conserved in the Karoo National Park, very little of the original landuse is transformed, and it is therefore considered Least Threatened (Mucina & Rutherford, 2012).

### 5.1.3 Protected Areas

Several protected areas are located to the south of the Koup 2 WEF site, all situated in proximity of the Swartberg mountains (Figure 6). As the crow flies, the Henry Kruger Private Reserve is the nearest registered reserve and is located approximately 45 km north-west of Koup 2. The Karoo National Park is approximately 60 km to the north of the site. The proposed power line runs through the Steenbokkie Private Nature Reserve, located a few kilometres east of Beaufort West, and north-east of the proposed WEF. The latter has no formal conservation status and comprises mainly a guest farm offering tourist accommodation, game viewing, hiking, hunting and mountain biking.

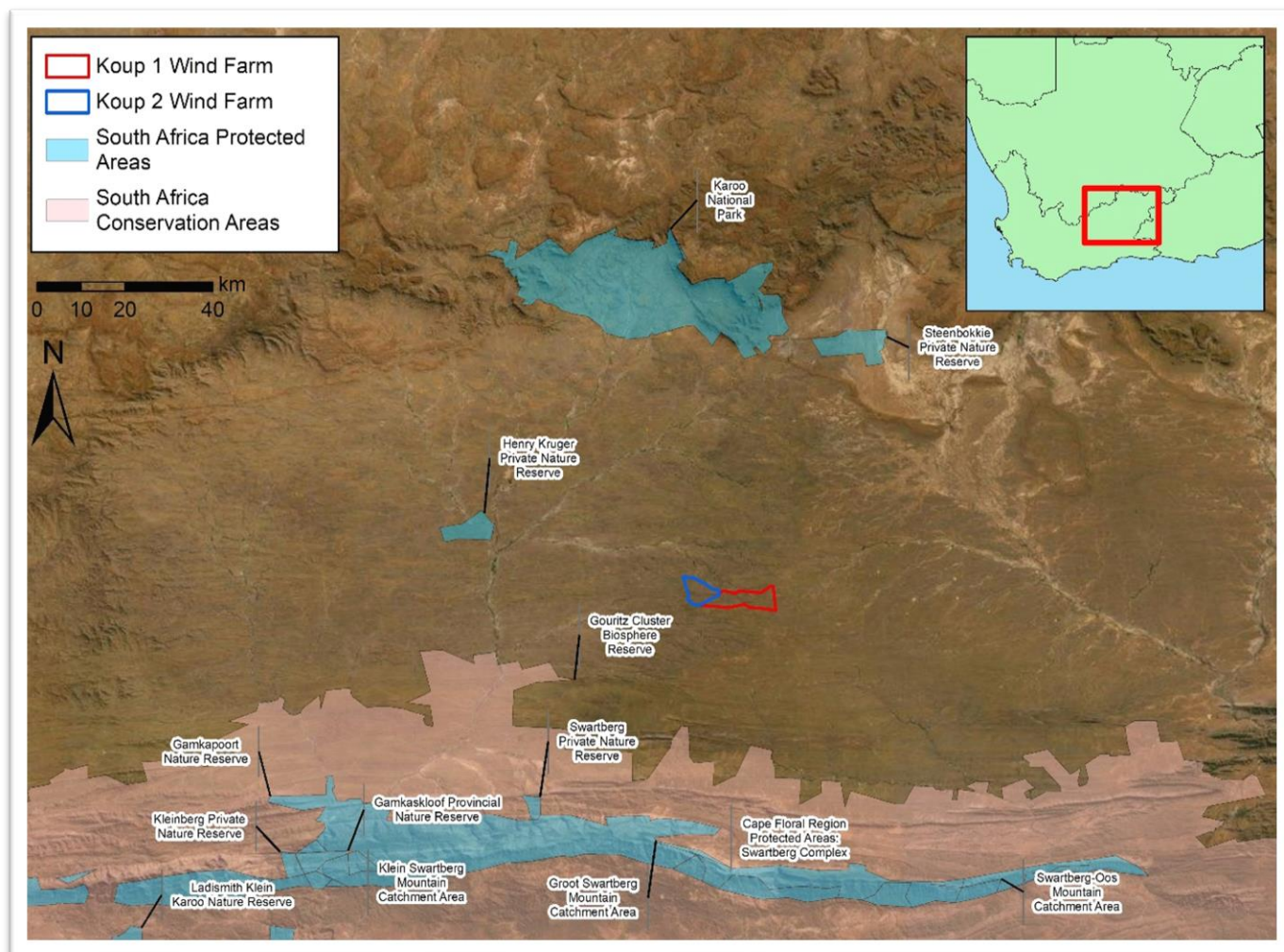


Figure 6: Protected areas in the vicinity of Koup 2 WEF.

#### 5.1.4 Landuse

Due to the low average annual rainfall, the farmlands' carrying capacity in the Koup area is low, resulting in large farm units that can sustain only small numbers of livestock (e.g., Merino and Dorper sheep). Many of the farms do not keep livestock anymore and are focused on game. Although there are a few cattle at Glen, the farm units comprising the Koup 2 area, do not have any small livestock.

#### 5.1.5 Interviews with landowners and people staying on the property


As a bat specialist we value the local knowledge of people knowing and staying on the farms; Therefore, we have at least one interview during the monitoring, either by visiting the people or through a telephonic interview. Locals will often provide you with information concerning roosts and seasons when there is more bat activity on the properties. The following interviews were conducted during the monitoring periods:

- Rickus Bothma, landowner of Glen: Visit on 6 March 2020 and further telephonic conversations on 23 September 2020 and 24 April 2021 concerning the *Nycteris thebaica* roost at this farm dwelling.
- Aletta Pretorius, landowner: Telephonic conversation on 4 March 2020;
- Carolina Nel, landowner: Telephonic conversation on 4 March 2020;
- Thys Brits, farm on Kareerivier and Arbeid: Visit on 6 March 2021;
- Gerrit Steenkamp, landowner and farmer: Telephonic conversation on 4 March.

## 5.2 Environmental features favourable to bats

Bats are dependent on suitable roosting sites provided mainly by human structures, vegetation, exfoliating rock, rocky outcrops, derelict mine and aardvark holes and caves (Monadjem, et al., 2010). The foraging utility of a site is further determined by the availability of food and water. Thus, the vegetation, geomorphology and geology of an area are important predictors of bat species diversity and activity levels, as indicated in Table 2.

**Table 2: Environmental features that may be favourable to bats.**

	<p><b>Vegetation</b></p> <p>Although most of the site is covered in the typical Karoo vegetation of the area, for those bats that might prefer roosting in vegetation or under the bark of trees, trees situated in the dry riverbeds could provide roosting opportunity</p>
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### Rock formations and rock faces

Rock formations along the hill tops and along the river valleys provide ample roosting opportunities for bats. An example is the dry river valley at the southwestern side of the farm, Glen, bordering Reynardtskraal, which provides ample roosting opportunities (see adjacent photo).



### Human dwellings

Human dwellings could provide roosting space for some bat species. The garage at Glen has a small roost of Egyptian slit-faced bats (*Nycteris thebaica*). The landowner said the roost was there as long as he remembers, although their numbers often vary (during the site visit, 12 bats were counted). *N. thebaica* has a conservation status of Least Concern and has a low potential risk of collusion by wind turbines, as they tend to be a clutter forager. The author of this report has encountered this species at other prospecting wind farms in the Karoo, where they often dwell in derelict buildings in open Karoo vegetation with no trees or drainage lines in site.

**Open water and food sources** Water troughs for the livestock and open cement reservoirs provide permanent, open water sources for bats right throughout the year. During spells of rain, stagnant water collects in small pans and dry ditches and serve as breeding ground for insects and as food for bats. High insect activity could result in higher bat presence after sporadic rainy periods. Livestock is also an attraction to flies, which in turn could serve as a food source for bats.

## 5.3 Diversity of bat species in the local area

The extent to which bats may be affected by the proposed wind farm will depend on the extent to which the proposed development area is used as a foraging site or as a flight path by local bats.

A summary of bat species distribution, their feeding behaviour, preferred roosting habitat, and conservation status is available in Table 3. The bats mentioned in the underneath table have distribution ranges covering the Koup 2 WEF development and bats that had been confirmed up to now on the site itself or other wind farms in the area, are marked as such. The proposed wind farm falls within the distributional ranges of six families and approximately 12 species. Table 3 follows the most recent distribution maps of Monadjem *et al.* (2010). It should be noted that this table will be adapted as the monitoring progresses.

Of the 12 species which have distribution maps overlaying the proposed development area, four have a conservation status of Near Threatened in South Africa and one Vulnerable, while three have a global conservation status of Near Threatened.

*Eptesicus hottentotus* (the Long-tailed serotine) and *Cistugo seabrae* (the Angolan wing-gland bat) are endemic to Southern Africa. Mainly due to agricultural activities the endemic bat species have limited suitable habitat left (Monadjem, 2010).

Bats could be divided in three groups according to their foraging behaviour:

- Clutter: Bats that prefer to forage closer to the ground and amongst vegetation. These bats would most likely prefer to forage in the Karoo riverine vegetation along the drainage lines, or closer to the Karoo bushes, e.g., *Nycteris thebaica* (Egyptian flit-faced bat), a species which roost at Koup 2. Although it is expected that bats foraging in clutter will not be at a high risk of collision, little is known about the flight patterns of bats in South Africa and they could change their flight behaviour when they are not foraging, for example, if they are migrating.
- Clutter-edge: These bats forage amongst vegetation as well as open-air, e.g., *Neoromicia capensis* (Cape serotine bat), and are recorded at our low monitoring systems and above 100 m.
- Open-air: *Tadarida aegyptiaca* (Egyptian free-tailed bat) from the Molossidae family, is an example of an open-air forager. This is also the pre-dominant species recorded at Koup 2. Molossids in general have high-aspect-ratio wings and high wing loading (long, narrow wings), adapted for flying in open air at high altitudes, and could fly 1 000 m above ground level. At Koup 2, most calls from the high sampling points have been similar to *T. aegyptiaca*. In general, they are also the most impacted upon species at present on existing wind farms.

According to the likelihood of fatality risk, as indicated by the latest pre-construction guidelines (MacEwan, et al, 2020), two species, namely *Tadarida aegyptiaca* (Egyptian free-tailed) and (*Sauromy petrophilus*) Roberts's flat-headed bat, have a high risk of fatality due to its foraging habitat at high altitudes. Five more species, *Miniopterus natalensis* (Natal long-fingered bat), *Neoromicia capensis* (Cape serotine) and *Myotis tricolor* (Temminck's myotis bat), and the two fruit bat species, *Eidolon helvum* (African straw-coloured fruit bat) and *Rousettus aegyptiacus* (Egyptian rousette), have a medium to high risk of fatality. Fruit bats are not considered a high risk in the dry Koup area, but the proximity of the mountains south of the site and the possibility that they might migrate over the area, should not be ruled out.

Table 3: Potential bat species occurrence at the proposed Koup 2 WEF (Monadjem, et al. 2010; IUCN, 2017). Highlighted yellow cells indicate confirmed presence at the development site, or on the neighbouring Koup 1 WEF site.

Family	Species	Common Name	SA conservation status	Global conservation status (IUCN)	Roosting habitat	Functional group (type of forager)	Migratory behaviour	Likelihood of fatality risk*	Bats confirmed in vicinity
PTEROPODIDAE	<i>Eidolon helvum</i>	African straw-coloured fruit bat	Not evaluated	Least Concern	Little known about roosting behaviour	Broad wings adapted for clutter. Studies outside of South Africa list fruit and flowers in its diet	Migrater. Recorded migration up to 2 518 km in 149 days, and 370 km in one night.	Medium-High	
	<i>Rousettus aegyptiacus</i>	Egyptian rousette	Least Concern	Least Concern	Caves	Broad wings adapted for clutter. Fruit, known for eating Ficus species.	Seasonal migration up to 500 km recorded. Daily migration of 24 km recorded.	Medium-High	
MINIOPTERIDAE	<i>Miniopterus natalensis</i>	Natal long-fingered bat	Near Threatened	Near Threatened	Caves	Clutter-edge, insectivorous	Seasonal, up to 150 km	Medium-High (High according to the 2020 bat guidelines and bat monitoring experience at post-con wind developments.	✓
NYCTERIDAE	<i>Nycteris thebaica</i>	Egyptian flit-faced bat	Least Concern	Least Concern	Cave, Aardvark burrows, road culverts, hollow trees. Known to make use of night roosts.	Clutter, insectivorous, avoid open grassland, but might be found in drainage lines	Not known	Low	✓

Family	Species	Common Name	SA conservation status	Global conservation status (IUCN)	Roosting habitat	Functional group (type of forager)	Migratory behaviour	Likelihood of fatality risk*	Bats confirmed in vicinity
MOLISSIDAE	<i>Tadarida aegyptiaca</i>	Egyptian free-tailed bat	Least Concern	Least Concern	House roofs, caves, rock crevices, under exfoliating rocks, hollow trees	Open-air, insectivorous	Not known	High	✓
	<i>Sauromys petrophilus</i>	Robert's Flat-faced	Least Concern	Least Concern	Narrow cracks, under exfoliating of rocks, crevices.	Open-air, insectivorous		High	✓
RHINOLOPHIDAE	<i>Rhinolophus capensis</i>	Cape horseshoe bat (endemic)	Near Threatened	Near Threatened	Caves, old mines. Night roosts used	Clutter, insectivorous	Not known	Low	
	<i>Rhinolophus clivus</i>	Geoffroy's horseshoe bat	Near Threatened	Least Concern	Caves, old mines. Night roosts used	Clutter, insectivorous		Low	
VESPERTILIONIDAE	<i>Neoromicia capensis</i>	Cape serotine	Least Concern	Least Concern	Roofs of houses, under bark of trees, at basis of aloes	Clutter-edge, insectivorous	Not known	Medium-High	✓
	<i>Myotis tricolor</i>	Temminck's myotis	Near Threatened	Least Concern	Roosts in caves, but also in crevices in rock faces, culverts and	Limited information available	Not known	Medium-High	

Family	Species	Common Name	SA conservation status	Global conservation status (IUCN)	Roosting habitat	Functional group (type of forager)	Migratory behaviour	Likelihood of fatality risk*	Bats confirmed in vicinity
					manmade hollows				
	<i>Eptesicus hottentotus</i>	Long-tailed serotine (endemic)	Least Concern	Least Concern	Caves, rock crevices, rocky outcrops	Clutter-edge, insectivorous	Not known	Medium	✓
	<i>Cistugo seabrae</i>	Angolan wing-gland bat (endemic)	Vulnerable	Near Threatened	Possibly buildings, but no further information	Clutter-edge, insectivorous	Not known	Low	

\*Fatality risk according to the bat guidelines (Sowler, et al, 20217)



## 6. MONITORING RESULTS

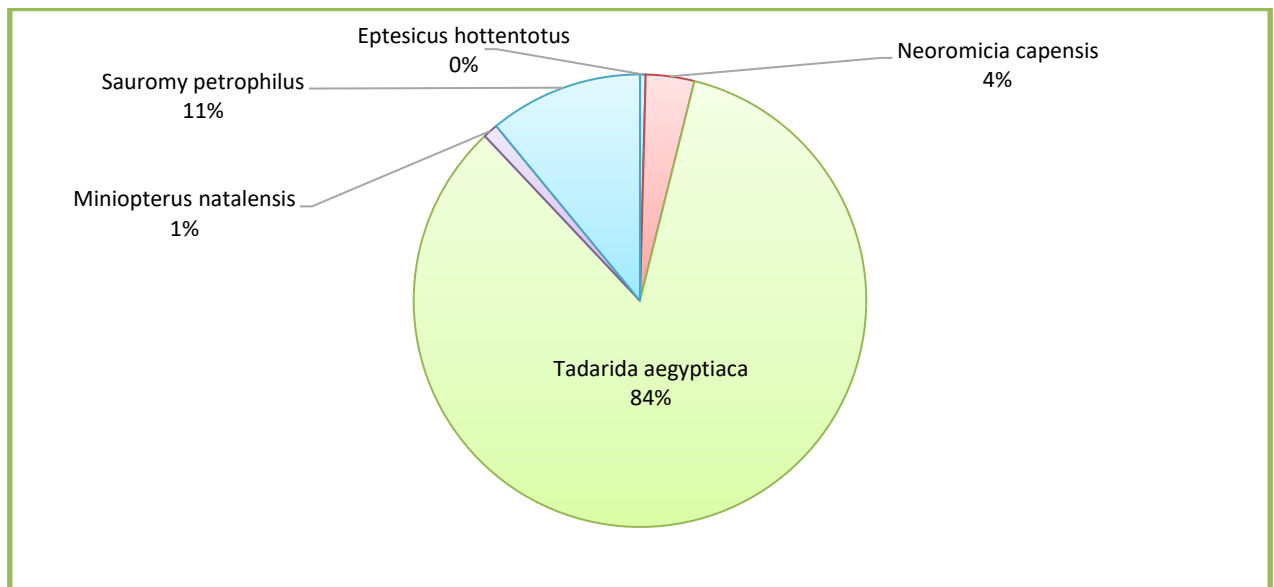
Passive monitoring data for the period between 5 March 2020 and 24 April 2021 is included in this progress report. It is important to note that static recordings have limitations, as discussed in Section One, but do provide a scientifically sound method of assessing the bat situation on site.

Three months data failure was experienced at the System G, situated at 20 m on the Met mast, resulting in a data gap between 26 September 2020 and 21 January 2021. For various reasons, were experienced at System C, a 10 m mast situated on the eastern part of the wind farm. Data from the other systems are deemed sufficient to cover for this system. Data from all seasons were gathered the gap was filled extrapolating data.

Although graphs and weather plots were drafted for all systems and various circumstances, only selected graphs were included in this report. The bat specialist could be contacted if more details are requested.

### 6.1 Bat Species Diversity

Calls similar to five (5) of the 12 species that have distribution maps overlaying the proposed development site had been recorded by the static recorders, see **Table 3** and Figure 7. This is a surprisingly high species diversity for the dry area. Where a species is in the pie charts is shown as 0%, it indicates that the species was recorded, but the number of calls recorded is not statistically significant.

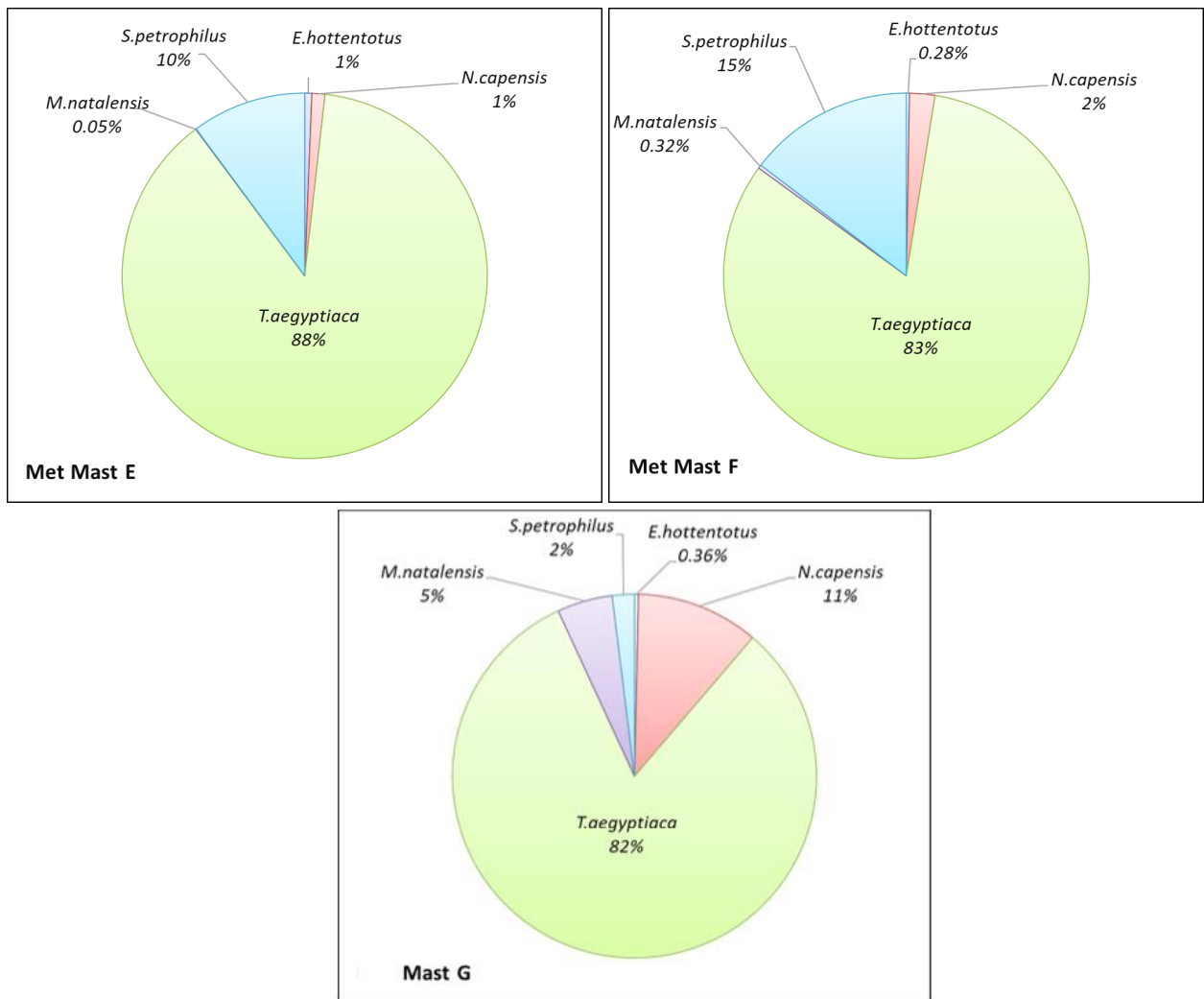


**Figure 7: Species diversity at Koup 2 WEF**

The data from the static recordings confirm the species diversity on the site. 95% of the calls represent the Molossididae family, with 84% representative of the *Tadarida aegyptiaca* (Egyptian free-tailed bat), and 11% of Robert's *Sauromys petrophilus* (Flat-faced bat) as shown in **Error! Reference source not found.** Four percent of the activity is representative of the *Neoromicia capensis* (Cape Serotine) and less than one percent of the *Eptesicus hottentotus* (Long-tailed serotine), both these species belong to the family Vespertilionidae,

with the latter being an endemic species. All these bats have a conservation status of Least Concern in Southern Africa and globally. One percent of the calls represent the Near threatened *Miniopterus natalensis* (Natal long-fingered bat) from the family Miniopteridae.

All the bats recorded up to now have a **medium-high** or **high risk** of being negative impacted upon by the wind turbines. Bats can be divided in their preferred foraging altitudes and are adapted, mostly by the physiology of their wings, to forage in lower altitudes (clutter) amongst the bushes and trees, medium altitudes and open air (high flying bats). The species diversity is often higher at lower altitudes, but at Koup 2 WEF, the lower altitude system (F) on the Met mast recorded nearly similar species diversity than the 110 m system (E) at the Met mast. The 10 m mast (G), located southwest at the border of Glen and Reynardtskraal, depicts a different species diversity, with a higher percentage of the Near Threatened *M. natalensis* and *N. capensis*, the latter being a Least Threatened species. The dominant family at all the systems, is clearly Molossidae, with the highest number of calls representative of *T. aegyptiaca*.



**Figure 8: Different species composition at 110 m (Met mast E), 20 m (Met mast F), and 10 m (Met mast G)**

## 6.2 Species distribution and activity per monitoring station

Figure 9 clearly shows that Mast F, the 20 m mast, recorded the highest bat activity. Although the species diversity, as indicated in Section 6.1, is similar, the recorded activity at the Met mast is higher at 20 than at 110 m. Activity is usually higher at lower altitude, as there tend to be more insect activity at lower altitude. System G, situated on the 10 m mast, recorded the lowest activity. The latter is surprising as this system was situated amongst rock formations, riverine Karoo vegetation and a riverbed. Due to the environment where System G is situated, this data should be observed with caution, as the activity might increase if there is standing water after spells of rainfall.

One could speculate that the reason for higher activity at the Met mast when compared to Mast G, could be the proximity to the farm dwelling, with livestock drinking troughs situated in the area, providing a more permanent water source.

The relative higher occurrence of the Near Threatened *Miniopterus natalensis* at Mast G must be noted, as this endangered species could be active within the sweep of the turbine blades.

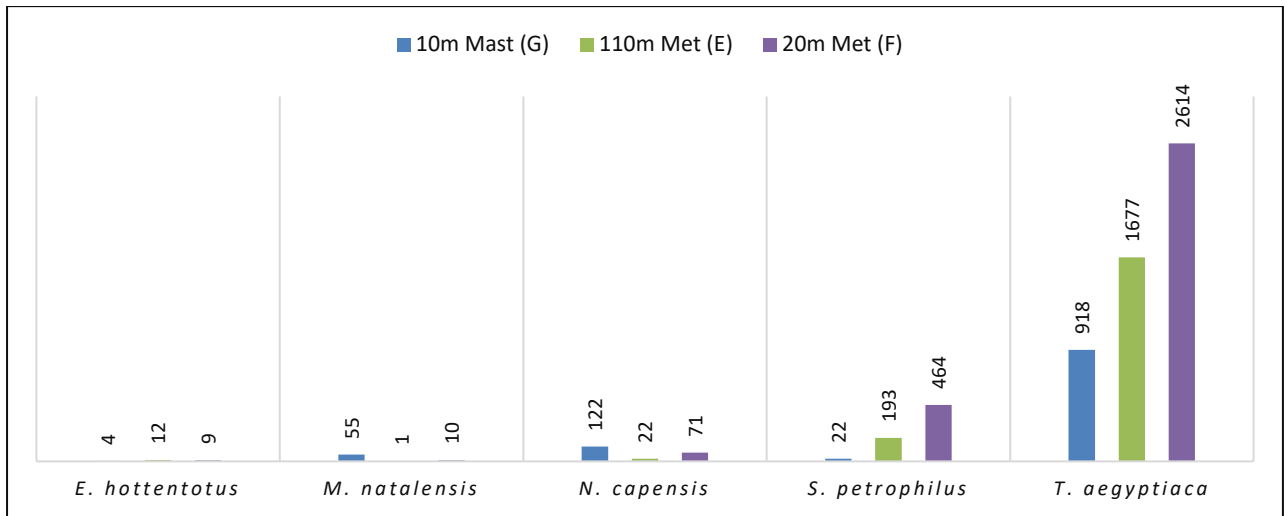


Figure 9: Species and activity per monitoring station

### 6.3 Temporal distribution over the monitoring period

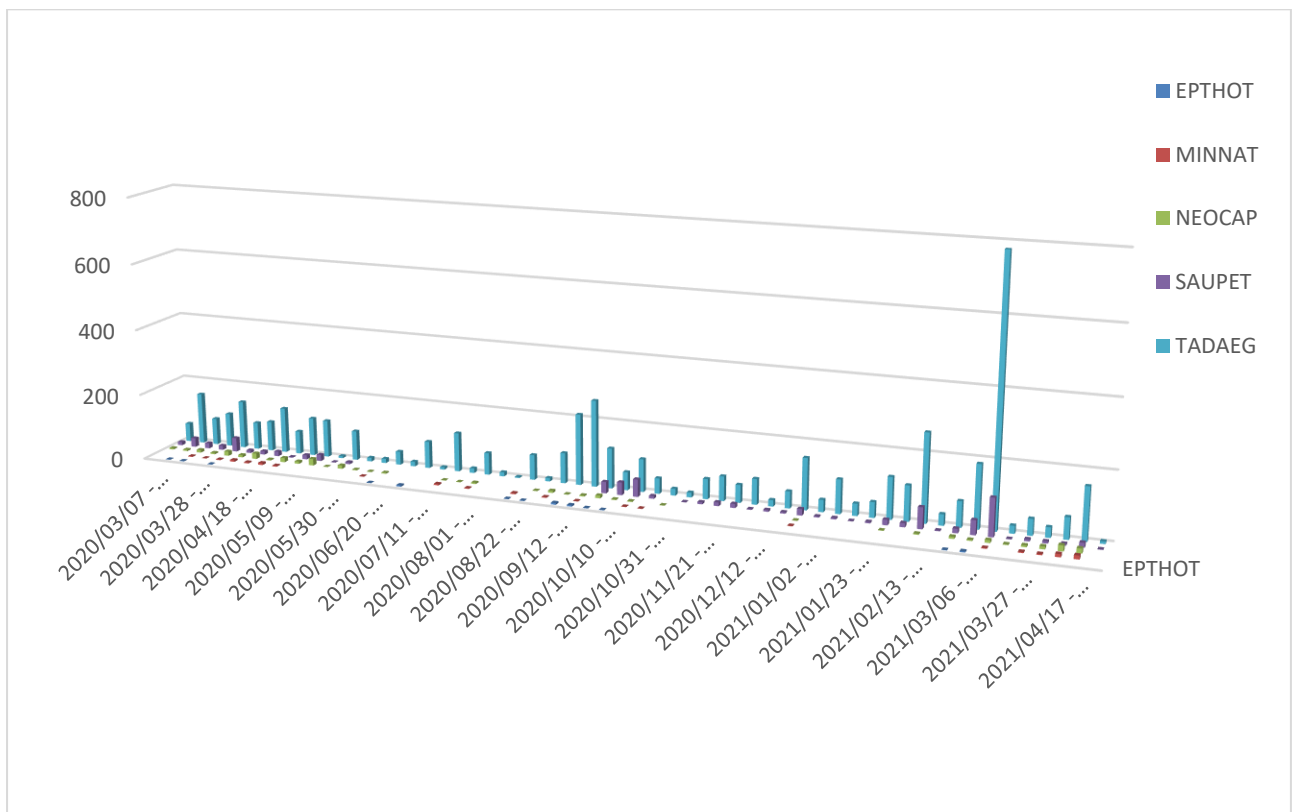
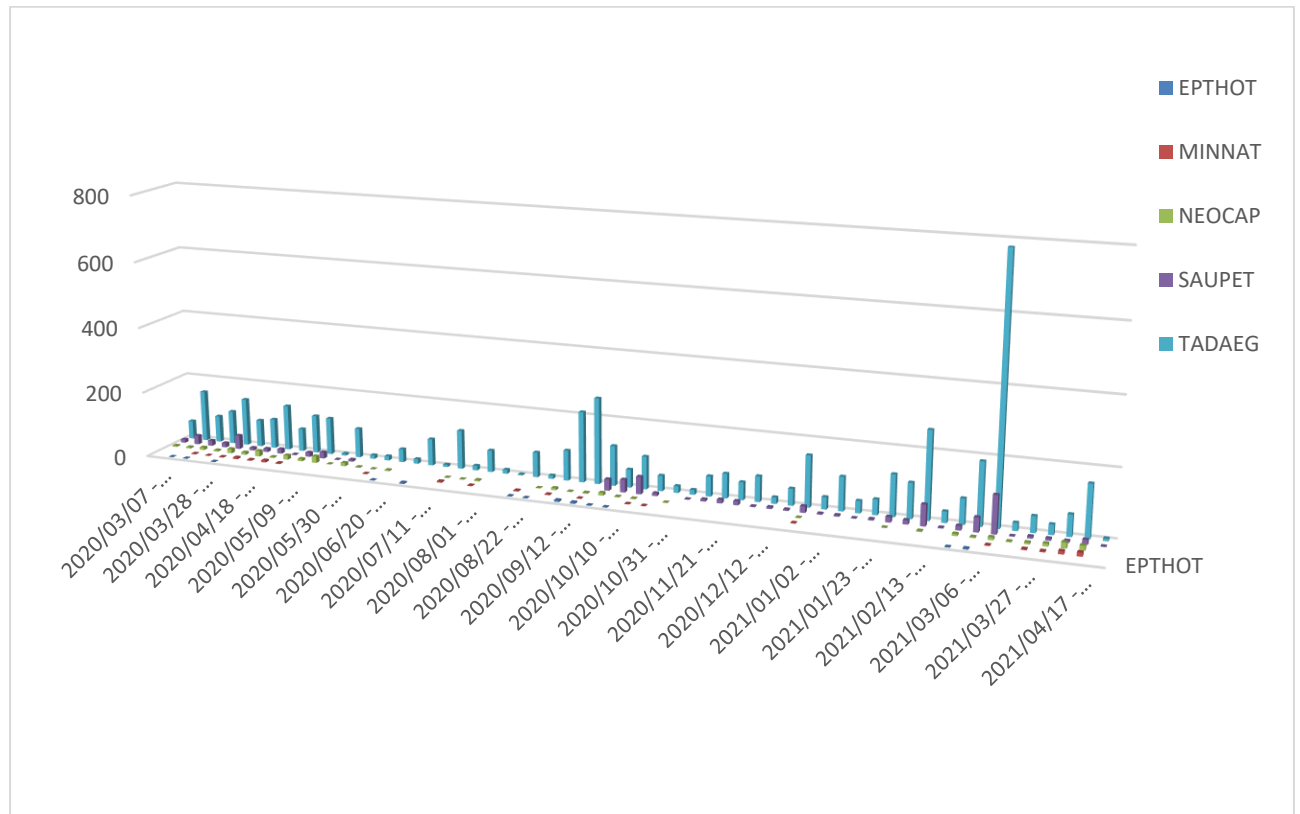


Figure 10 portrays the weekly temporal distribution of bat passes over the monitoring period. The light blue histogram depicts higher activity, indicating the higher occurrence of *T. aegyptiaca*, especially during autumn.

Lower activity levels are also evident during winter. There are some spikes of activity during springtime and summer and even small spikes during winter which will need to be closely observed. Bat activity spikes in winter need to be closely observed during operational monitoring, but due to the general low bat activity and relative low spikes, mitigation is not yet recommended for the winter season.

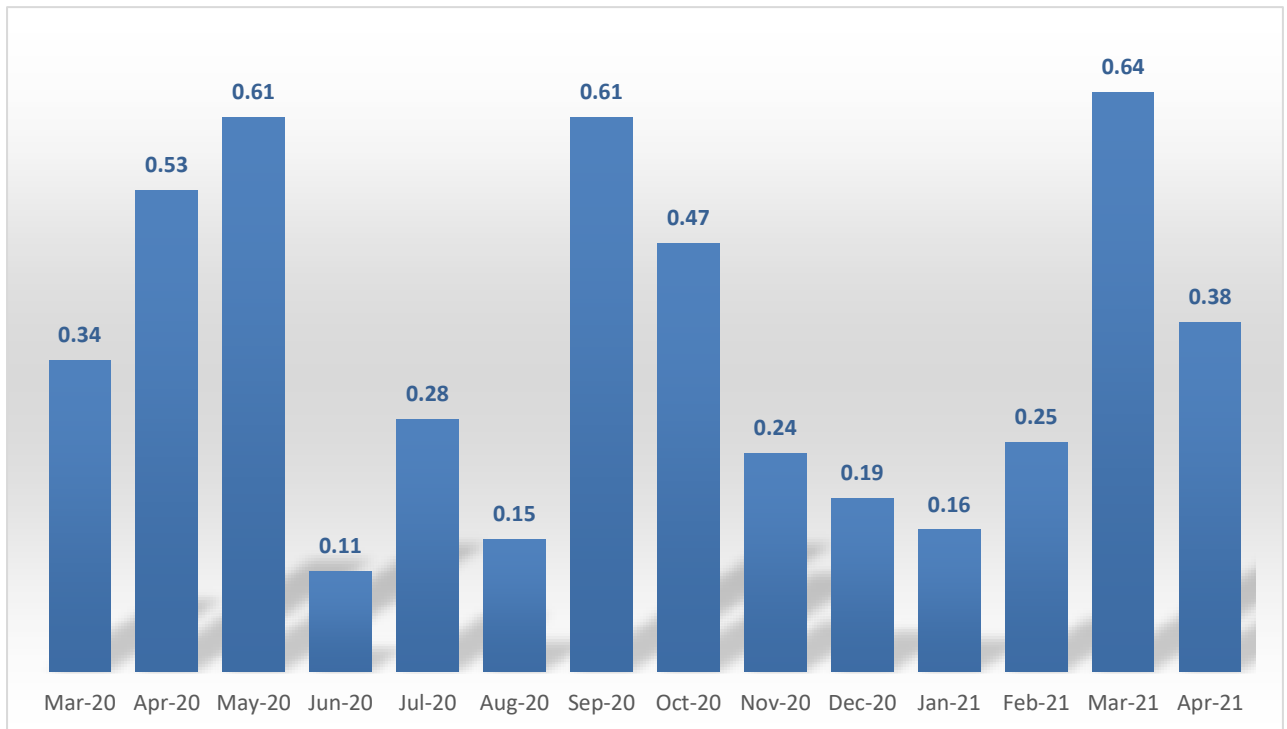


**Figure 10: Temporal distribution of bat passes over the monitoring period**

### 6.4 Monthly species activity

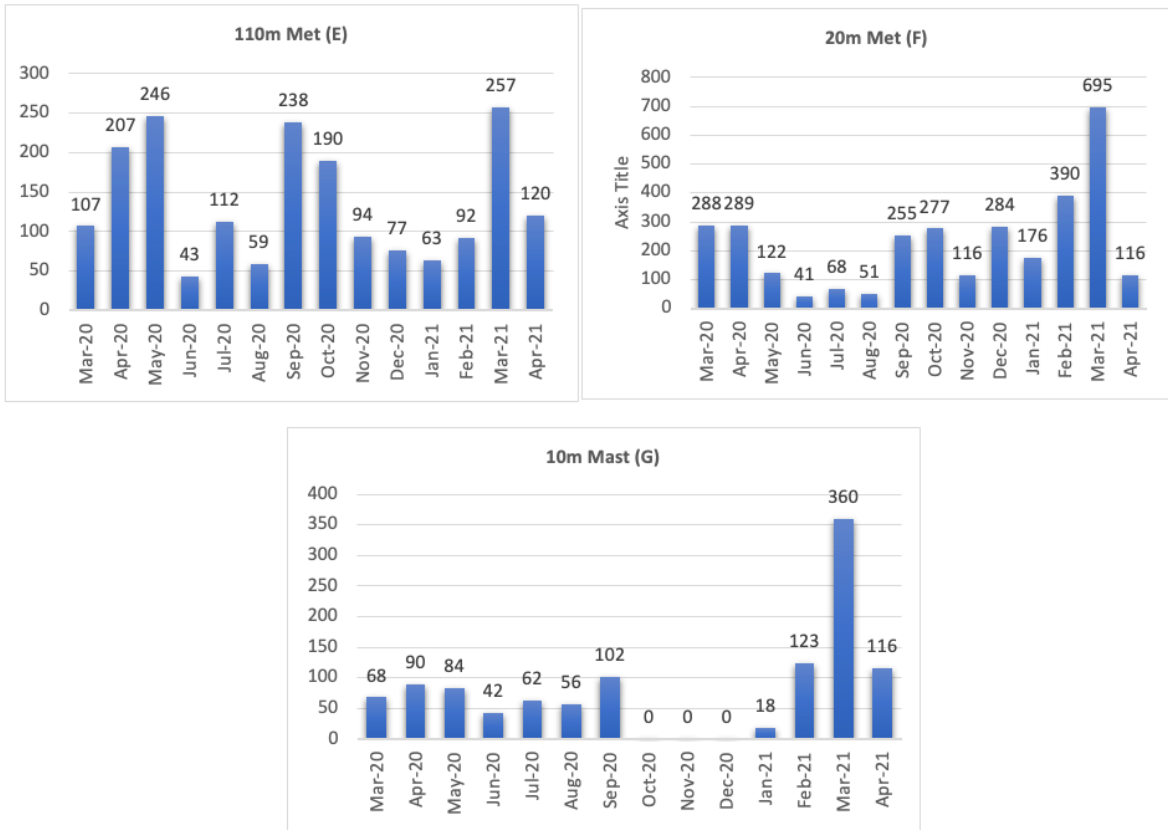
Monthly bat activity is portrayed in Figure 11. In the histogram below it is evident that the highest activity is during March, the first month of autumn, showing an increase from February, as well as a sharp reduction during June. The second activity peak was recorded in spring, namely September and October, after which bat activity declined by almost 50% in November. Bat activity at Koup 2 display expected patterns that is often experienced in the Nama-Karoo. Bats emerge from the colder months in early spring, while further increased activity is often displayed in later spring when young bats of some species start to leave the roost on their own. A slight decline in activity is then often experienced during early summer, while an increase is displayed in late summer and autumn, with a peak in activity during March at Koup 2, when bats stock up for the colder winter months. Also shown is a decline in activity as the temperature drops for the winter months. Low activity

is common during cold winter months and one could speculate that the occasional spike of activity could occur during relative warmer days in winter, or when there is a bit of insect emergence.



**Figure 11: Monthly average bat activity at the proposed Koup 2 WEF site.**

The highest peak in bat activity on the terrain is experienced at the 12 m System on Met mast (F), with peak activity portrayed in March with a total number of bat passes of 695, see Figure 11.

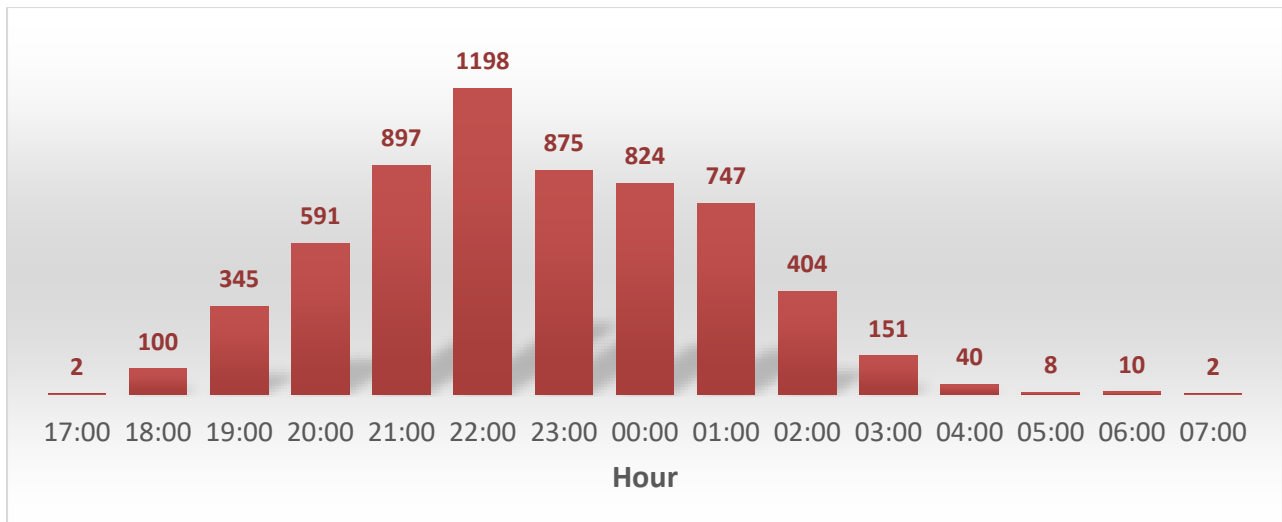


**Figure 12: Total monthly bat activity per monitoring station at the proposed Koup 2 WEF site. Mast G portrays the mentioned data failure from October 2020 to December 2020.**

### 6.5 Hourly bat passes

Bats are usually more active the first few hours after sunset, as they emerge from their roosts to forage and drink water. As sunrise approaches, they return to their roost and settle down for the day, resulting in a slight increase in activity a few hours before sunrise.

The total number of nightly bat passes per hour for the monitoring period is portrayed in Figure 13. This figure provides insight into the general distribution of bat activity during each night, from sunset to sunrise. As expected, a steep increase in activity is portrayed from after sunset, until a peak in activity around 21:00, is seen. From then a decline in activity begins up to approximately two to three hours before sunrise. This information is important if we need to recommend mitigation measures, as it shows the time of night when higher activity is experienced.



**Figure 13: Total hourly nightly bat passes**

Figure 13 incorporates data of the whole monitoring period and with the shift of sunset and sunrise, it is only providing a general trend. These patterns are of importance if mitigation measures are to be developed, as they indicate the most active periods during the night.

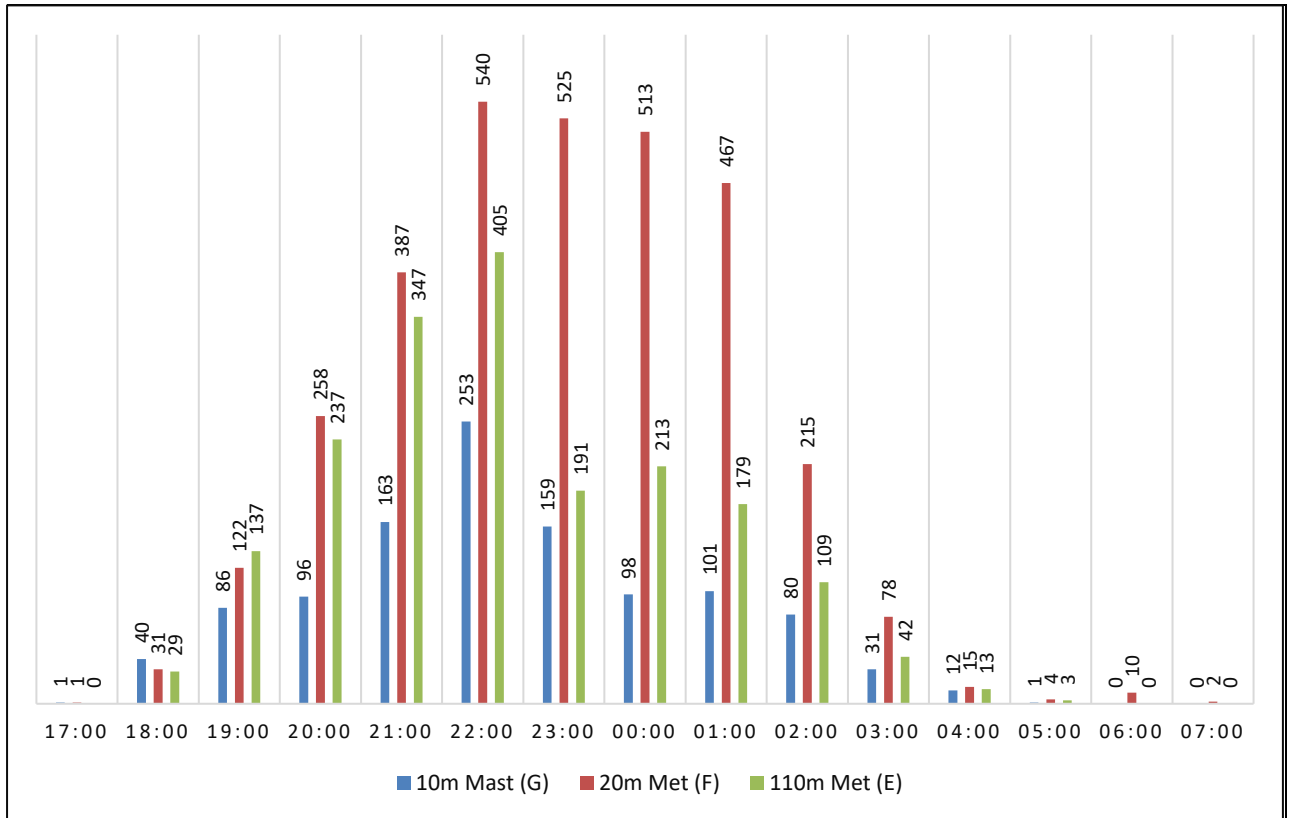
An increase in activity can be observed during the hours after sunset at all sampling points (Figure 14). There is, however, various activity patterns. A peak in bat activity at the 110 m Met mast (E) can be observed around 22:00 after which a sudden decline in activity is portrayed between 22:00 and 23:00 followed by a slight increase between 00:00 and 01:00, with the expected gradual decline until sunrise.

At the 20 m Met mast (F) the peak in activity can be observed around 22:00, after which there is a slight but gradual decline until 01:00 after which activity drops sharply towards sunrise, with a sharp decline between 1:00 and 2:00.

At the 10 m mast (G) bat activity gradually increases to peak around 22:00 after which a gradual decline in bat activity can be observed until sunrise.

Although there are some variations, in general bat activity peaks at 22:00 for all three systems. Bat activity is however significantly higher at an altitude of 20 m and shows high levels of activity over a longer period compared to the other two systems.





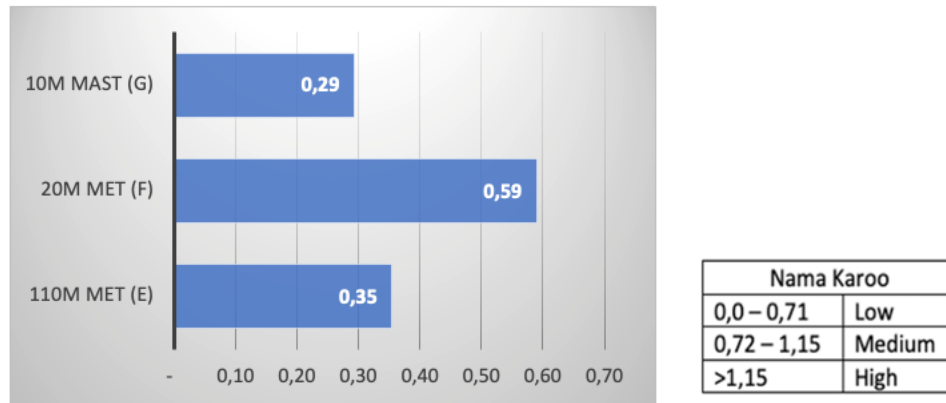
**Figure 14: Total nightly bat passes per hour per monitoring station.**

Figure 14 presents a breakdown of Figure 13, showing the distribution of bats at each monitoring station from sunset to sunrise. A similar pattern of higher activity two to three hours after sunset can be seen at all the sampling points. A general decline in activity is seen from 02:00 towards sunrise at all masts. Bats are usually more active the first few hours after sunset, as they emerge from their roosts to forage and drink water. As sunrise approaches, they return to their roosts and settle down for the day.

## 6.6 Mean hourly bat passes and the bat threshold

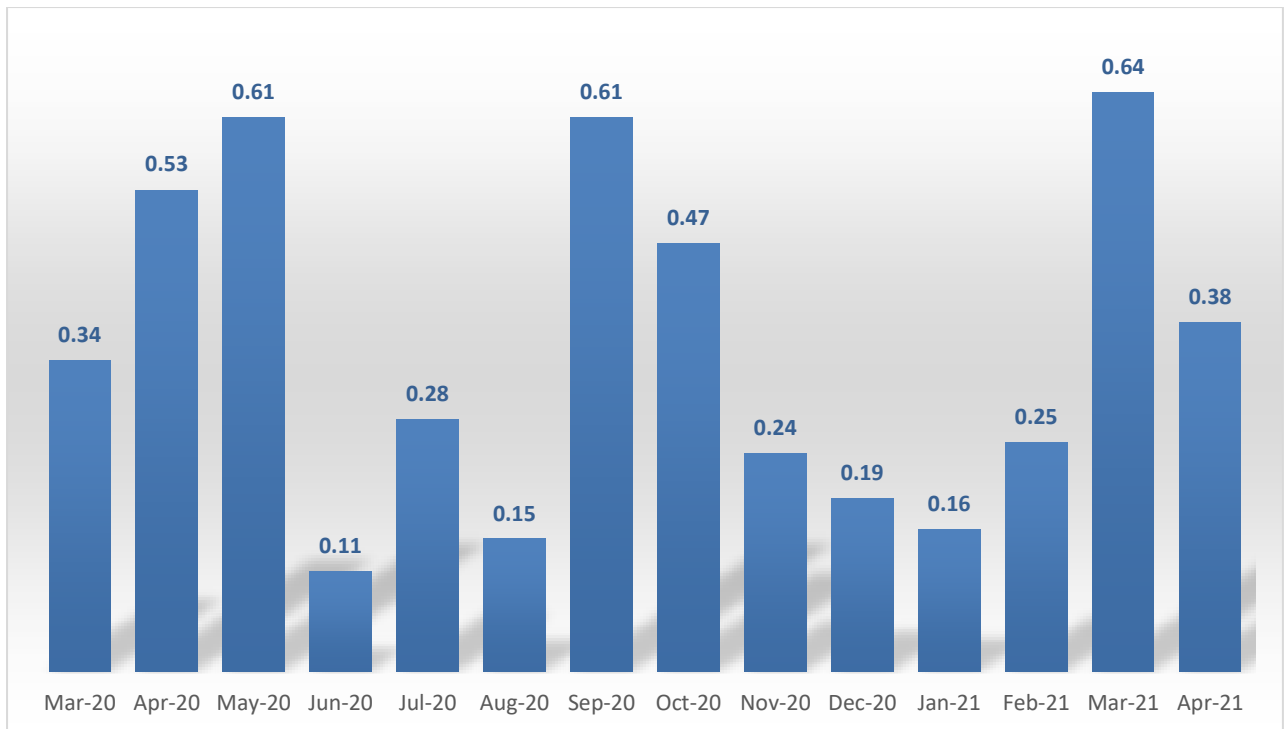
The South African Bat Fatality Threshold (MacEwan, *et al.* 2018) and Bat Best Practice Guidelines (Sowler, *et al.* 2017) reports result from early operational facilities in South Africa that show a linear increase in bat fatalities as more turbines are monitored. Threshold guidelines are calculated based on proportional bat occupancy per hectare (ha) for each of South Africa's terrestrial ecoregions to predict and assess cumulative impacts on bat fatalities as new WEFs are constructed. These biomes and ecoregions are identified by diverse biodiversity patterns determined by climate, vegetation, geology, and landforms (Dinerstein, *et al.* 2017 & Olson, *et al.* 2001). Threshold calculations add natural population dynamics and bat losses due to anthropogenic pressures to the sum to gauge the number of bat fatalities that may lead to population decline. The cluster of WEFs presented in the cumulative impact report share similar environmental and ecological conditions and species and are all part of the Nama Karoo Biome.

**Figure 15** indicates the annual average bat activity per hour for the monitoring systems at the proposed Koup 2 WEF site, showing the Low, Medium, and High thresholds as indicated by the bat guidelines (Sowler, *et al.* 2017). The annual average activity is 0.41 bats per hour for the 12-month monitoring period at the proposed Koup 2 WEF site, which is within the range of Low risk for the Nama Karoo terrestrial ecoregion, as indicated in the Pre-construction Bat Good Practice Guidelines (Sowler, *et al.*, 2017). All the monitoring systems at the site portray low average annual hourly bat activity according to the thresholds provided in the Pre-construction Bat Good Practice Guidelines (Sowler, *et al.* 2017). Monitoring system F, which was situated at 20 m on the Met mast, portrays the highest bat activity, namely 0,59 per hour.



**Figure 15: Mean hourly nightly bat passes over the 12-month monitoring period at the proposed Koup 2 WEF site.**

**Figure 16** depicts the mean hourly nightly bat passes for the 110 m monitoring system (E). The data from this system is deemed important, as it situated within the sweep of the proposed turbine blades. As indicated in Section 5.4, the month of March portrays the highest activity per hour, with overall relative high activity during autumn. Spring shows elevated activity in September and October, and peak activity at height is portrayed during March in autumn. Activity in general is categorised as low for bats in the Nama-Karoo.



**Figure 16: Mean hourly nightly bat passes per month for the 110 m monitoring system (E) at the proposed Koup 2 WEF site.**

## 6.7 Weather conditions and bat activity

The information provided in this section describes the relationship between weather conditions and bat activity, in particular activity within the rotor swept area of the turbine blades. Lower monitoring systems follow the same pattern, but as weather monitors are close to the high microphone, and the high microphone is within the rotor swept area of the turbine blades, it is believed that this system provides more accurate data to plot the weather data. This data is also used to compile a turbine curtailment schedule to be implemented from the onset of operation of the WEF. This curtailment schedule is used in conjunction with data from the monitoring systems from the adjacent proposed WEFs to refine mitigation strategies. Weather conditions, especially temperature and wind, have an influence on bat activity.

Literature (Arnett, *et al.*, 2008, Baerwald, *et al.*, 2009, Kunz, *et al.*, 2007), as well as observations from personal experience, indicate that bats tend to be more active at lower wind speeds and higher temperatures. Therefore, bats tend to be more active during warm, quiet nights, combined with elevated humidity; especially when there is an abundance of food, such as termites. Higher activity has also been reported during dark moon nights.

All the point sources were utilised for linear regression, which therefore shows the trends for the site.

Weather data from the 112 m sampling point (System E) on the Met mast was utilised for further statistical analyses, as this sampling system is situated in the area of collision. See Appendix D for weather distribution graphs wherein the number of nights was plotted over wind speed, temperature and humidity.

The following weather data from the Met mast was used:

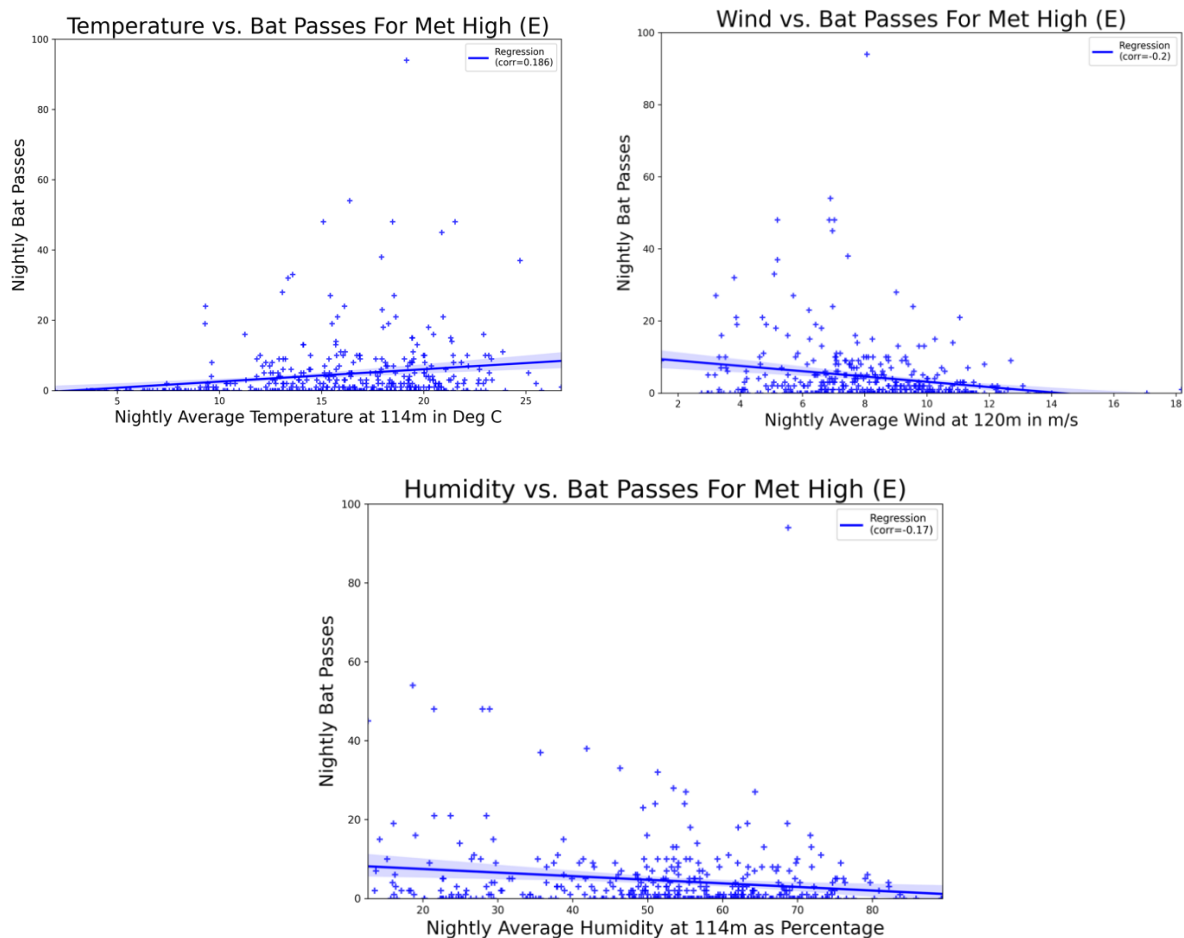
- Temperature data from 114 m thermometer on the Met mast.
- Wind data from the 120 m anemometer situated on the Met mast.
- Humidity data from 114 m on the Met mast.
- For 10 m sampling systems, where possible, weather systems that are situated at lower altitude on the Met mast, were used.

#### 6.7.1 Linear regression

Results of linear regression between weather conditions and combined bat activity of all the sampling points are provided in **Error! Reference source not found.** and summarised in Table 4. Bats are not always active during various weather conditions, resulting in linear regression results which do not provide much insight into the bat situation. Limited bat activity portrayed over one year and limited variation in weather data of one year sometimes display inadequate variation. See Appendix 5 for weather distribution graphs. As soon as more data is available during post construction, linear regression analyses should be applied to the data again.

**Table 4: Summary of linear regression**

Criteria	Correlation Coefficient	Description
Temperature and bat activity	0.186	Weak positive relationship between temperature and bat activity. As temperature increases so does the bat activity.
Wind speed and bat activity	-0.2	Weak negative relationship between wind and bat activity. As wind speed increases the bat activity decreases.
Humidity and bat activity	-0.17	Weak negative relationship between humidity and bat passes. As humidity increases the bat activity decreases.

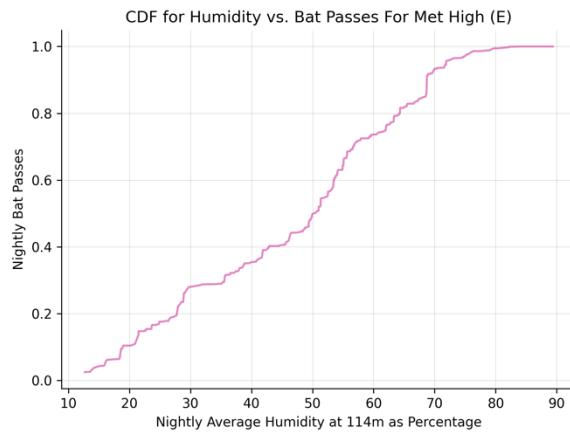
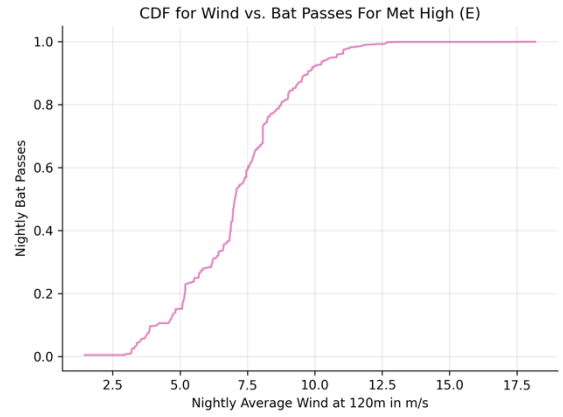
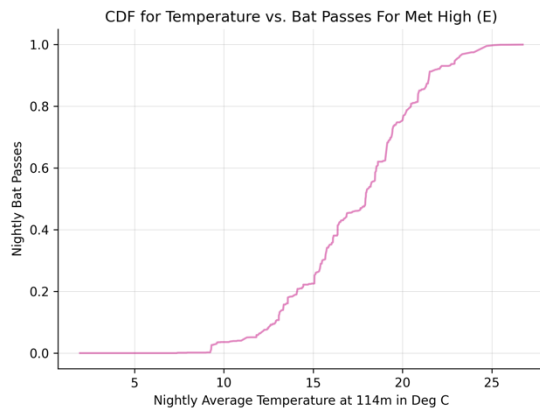


**Figure 17: Linear regressions of temperature, wind speed and humidity as predictors of the distribution of bat activity**

### 6.7.2 Cumulative distribution functions (CDFs)

**Figure 18** below illustrates the cumulative distribution functions, where cumulative means an increased quantity by successive additions, wherein cumulative bat passes recorded are plotted with temperature, wind speed and humidity data. Cumulative percentage bat passes at System E was plotted with wind speed, temperature and humidity and the following trends are observed:

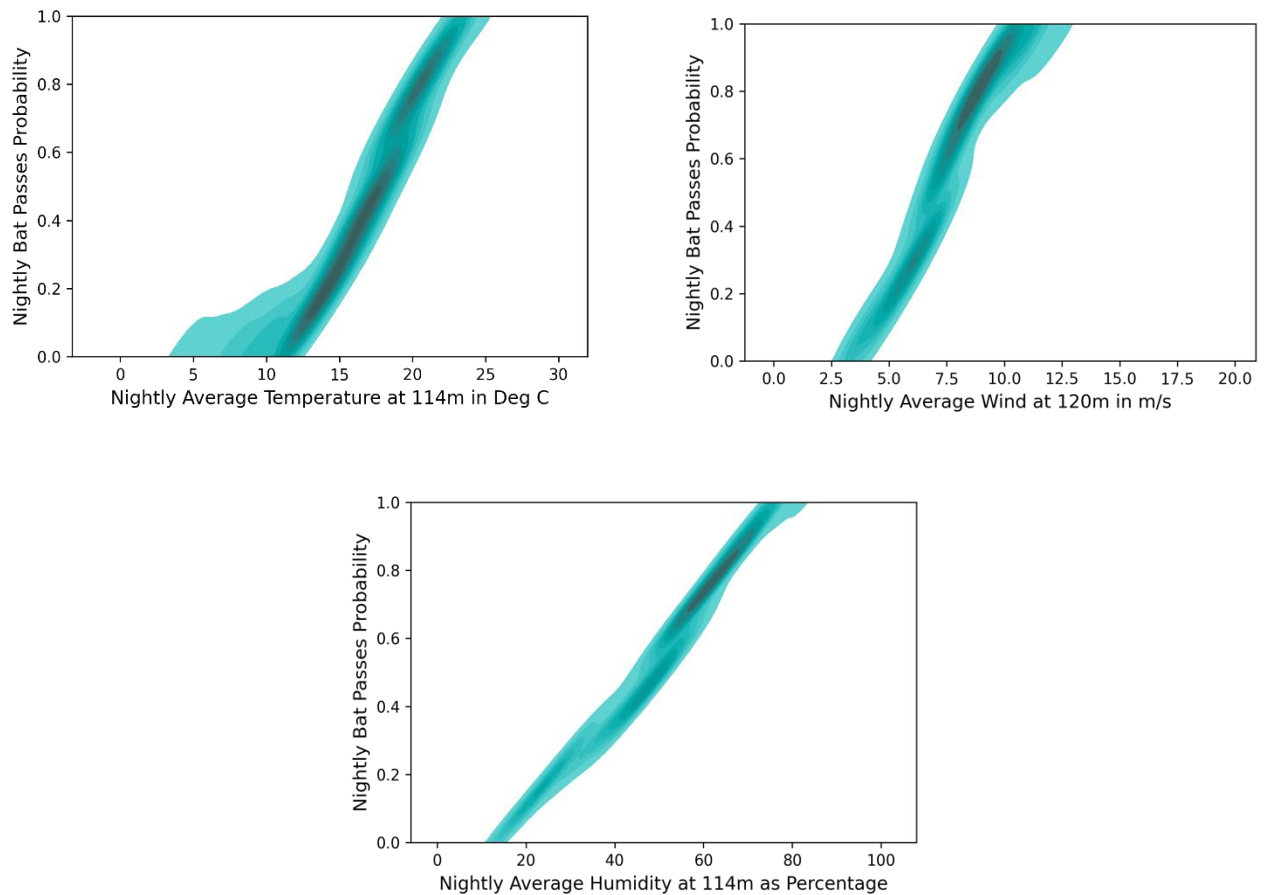
- Approximately 90% of the bat activity occurring above 13°C.
- Approximately 80% of the bat activity was recorded below 9m/s wind speed, with nearly all bat activity occurring below 11 m/s.
- Approximately 60% of the bat activity was recorded between 30% and 70% humidity.



**Figure 18: Cumulative Distribution Function (CDF) of nightly bat passes with nightly average temperature, wind speed and humidity.**

### 6.7.3 Cumulative distribution function heat maps

Cumulative Distribution Function (CDF) heat maps provide a better visualisation of the distribution of bat activity plotted with weather, see **Error! Reference source not found.9**. Darker areas indicate a concentration of activity.



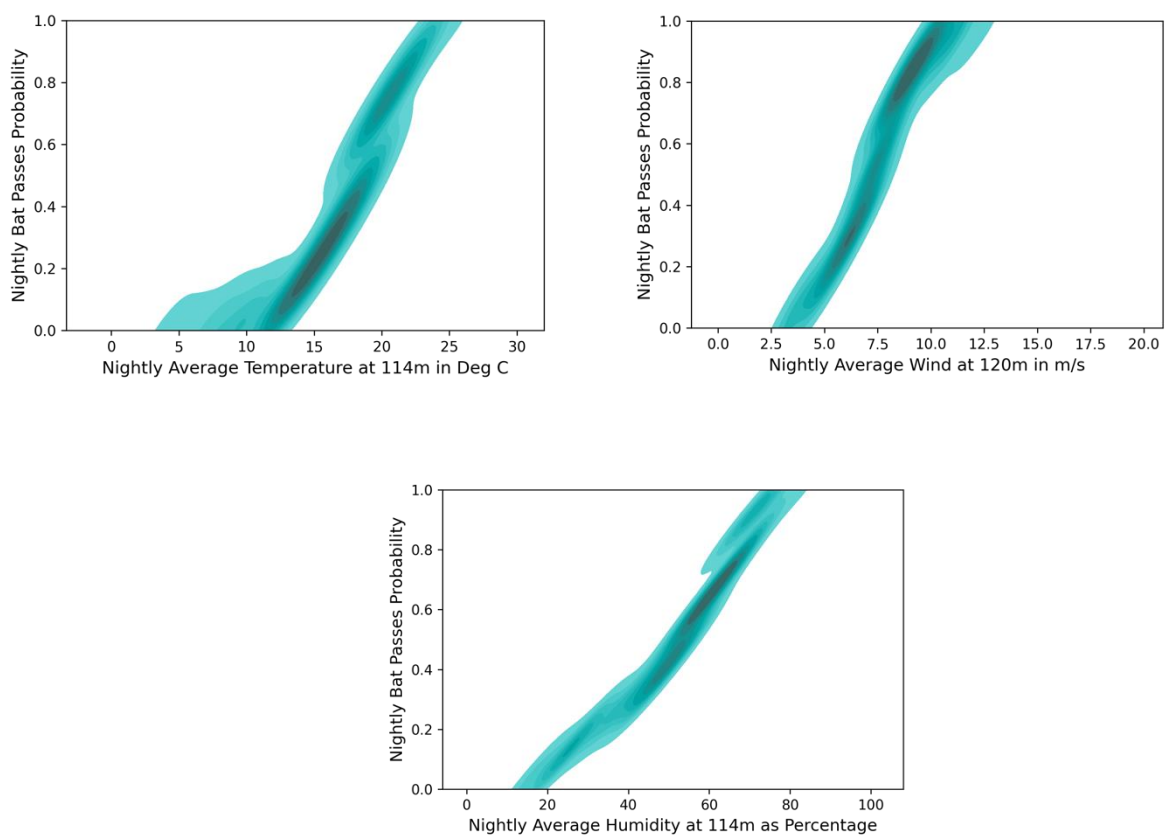
**Figure 19: Cumulative distribution function heat maps showing bat activity with temperature, wind speed and humidity.**

The density of bat passes during certain temperature, wind speed ranges and humidity can be clearly observed when CDF heat maps are plotted and from Figure 19, the following could be derived:

- **Nightly average activity and temperature:** Highest bat activity occurred between 12°C and 21°C.
- **Nightly average activity and wind speed:** Approximately 90% of the bats are active below 11 m/s, with an unexpected relative high activity around 8 m/s.
- **Nightly average activity and humidity:** Relative high bat activity is seen above 55% humidity, with a concentration of activity between 55% and 72% humidity.

It is clear from the CDF heat maps that the optimum conditions for bats are above 12 °C, with a wind speed below 11 m/s and humidity above 55% humidity.

Figure 20 depicts similar CDF heat maps for the combined data collection points, thus Systems E, F and G. Apart from humidity, where the data at height was the only available data, weather data from the lower altitude weather stations on the Met mast, as indicated, was used. When compared to Figure 19, similar patterns are seen between the wind and temperature plots, but the humidity plot for all the masts differ from the plots where only the high mast was used. The concentration of bats is shown to be between 20% and 80% humidity when all the systems data is considered, whereas the concentration of bats at the 112 m system (E) is between 40% and 80%. One could speculate that different species have different foraging behaviour, but most calls at all three systems were representing *T.aegyptiaca*. Whether this is a trend will only be established when more data over several years are collected and it would be interesting to repeat this exercise during post construction monitoring.

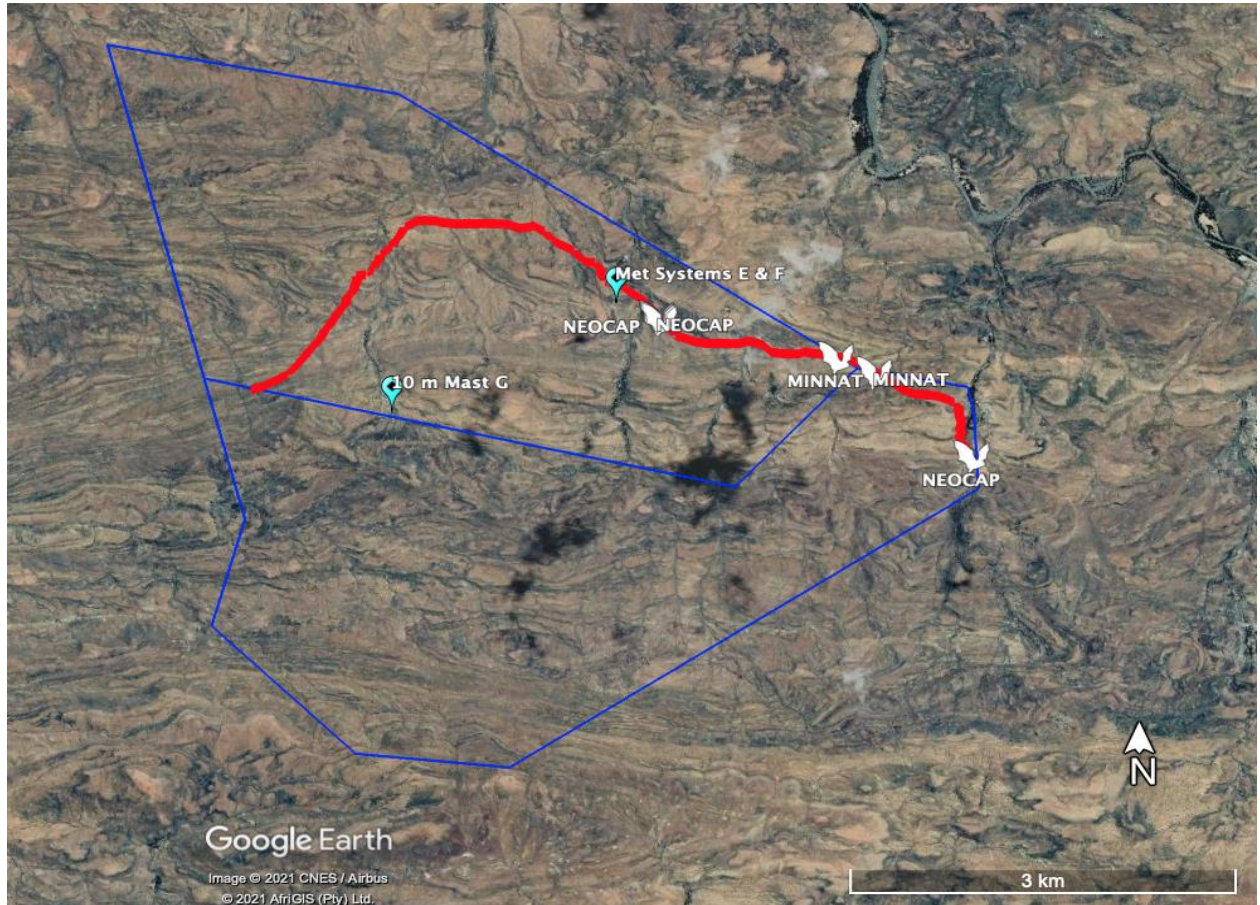


**Figure 20: Cumulative distribution function heat maps for the combined 10 m masts showing bat activity with wind speed, temperature and humidity**



## 7. TRANSECTS

Transects are just a snapshot in time but does confirm species present at site. In the image below (Figure 21), the transect route at the Koup 2 WEF, with the stationary monitoring points, can be observed.



**Figure 21: Koup 2 transect route with the stationary monitoring points.**

As can be seen in

Table 5, no bats were recorded during the transects in winter, spring and summer, while seven bat passes were recorded during autumn, on 25 April 2021 - three calls similar to *M. natalensis* and four calls like *N. capensis*. This is an unexpected high number of bat passes if compared to the other transects at Koup 2. Strangely, no calls of *T.aegyptiaca*, which is the predominant species on site, have been recorded. Although this is a high-flying species, we usually encounter them during transects. One would suspect that *T.aegyptiaca* was present on site during some of the transects, but as no calls of this species have been recorded, it is speculated that they must have flown out of the reach of the transect microphone, thus higher than 20m to 30m altitude.

**Table 5: Koup 2 WEF winter and spring transect data**

Date	Temperature	Wind	Cloud cover	Results
<b>Winter</b>				
10 June 2020	Approx. 9°C	Approx. 4 m/s	Partly cloudy	No bat calls
11 June 2020	Approx. 7°C	Approx. 3 m/s	Partly cloudy	No bat calls
<b>Spring</b>				
25 Sept. 2020	Approx. 13°C	Approx. 3 m/s	Partly cloudy	No bats calls
26 Sept. 2020	Approx. 16°C	Approx. 3 m/s	Partly cloudy	No bats calls
<b>Summer</b>				
21 Jan 2021	Approx. 38 °C	Approx. 3 m/s	Partly cloudy	No bat calls
22 Jan 2021	Approx. 43 °C	Approx. 1 m/s	Partly cloudy	No bat calls
<b>Autumn</b>				
24 April 2021	Constant around 27°C	Between 0 m/s to 0,6 m/s	Clear	No bat calls
25 April 2021	Constant around 27,7°C	No wind	Clear	3 X <i>M. natalensis</i> 4 X <i>N. capensis</i>

## 8. SENSITIVITY MAP

Sensitivity zones are based on buffer zones as indicated by the South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments – Pre-construction (Sowler, et al., 2017). These zones are refined through field visits and physically visiting the bat conducive environments occurring at the development site, as well as static and active monitoring data.

The minimum buffer recommendation prescribed by SABAA is a 200 m buffer around all potentially bat important features.

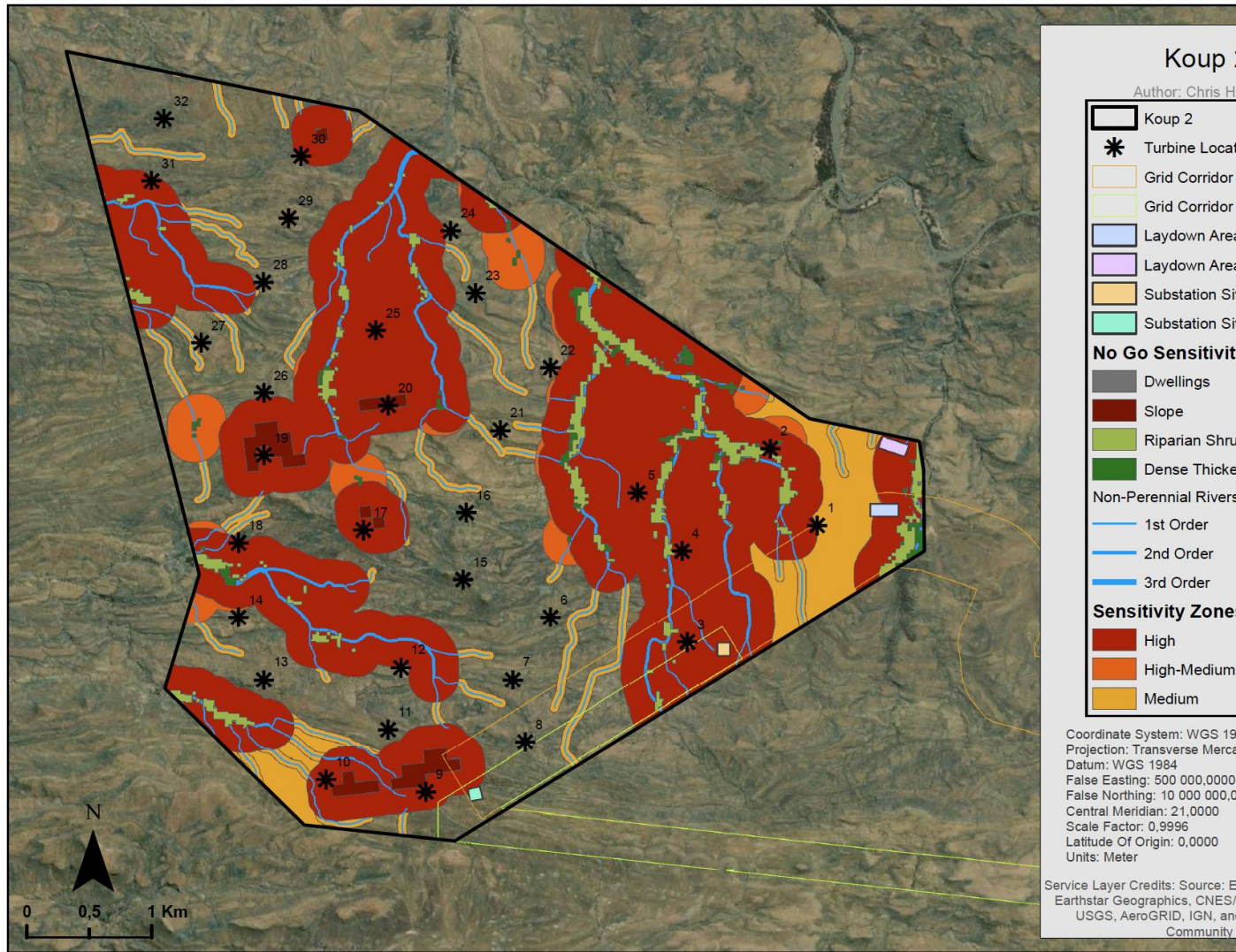


Figure 22 has therefore incorporated 200 m buffers as a minimum and for higher sensitivity zones, larger buffers are incorporated around bat sensitive areas at the proposed Koup 2 WEF site.

If two or more points of interest are in close vicinity of each other, they are linked to form one sensitivity zone.

**It is recommended that no turbines or turbine components are allowed in the No Go and High Sensitivity areas.** High-medium sensitivity zones should preferably be avoided, but due to the general low

bat activity in certain areas, could be developed with strict mitigation measures. Medium sensitivity zones could be developed, but with mitigation.

Powerlines, laydown areas and substations, are allowed to encroach on sensitivity zones, but should avoid the No Go areas, which include riverine vegetation and vegetation thicket areas, rocky outcrops, or any potential bat roosts as far as possible. As indicated in the EMPR, roost searches should be conducted before the construction of these components commence.

It should be noted that due to the inaccessibility of the southern section of Reynardtskraal farm, the precautionary approach must be applied.

## 8.1 High sensitivity zones

It is recommended that all turbine components, including the tips of the turbine blades, should be placed out of these zones. The high sensitivity zones are motivated as follow:

- 500 m buffer around farm dwellings. *Nycteris thebaica* is roosting at the Glen farm dwelling.
- 200 m buffer around the higher, fourth and third order sections of the rivers and river valleys.
- 200 m buffer around open permanent water sources, such as cement dams and livestock troughs.
- 200 m buffer around riparian shrub and dense thicket.
- 200 m buffer around rocky outcrops and ridges, which are sensitive bat areas.

Substations and power lines are allowed in these areas, with the following mitigation measures:

- Careful investigation of the presence of any bat roosts before clearance commences.
- The destruction of any trees should be avoided, if possible. Where these trees are to be removed, care should be taken not to destroy any bat roosts.

## 8.2 High-medium sensitivity zones

The High-medium Sensitivity zone mainly comprises some thicket bordering or buffer areas bordering the high sensitivity zones. Due to the low bat activity, these areas do not justify high sensitivity classification, but should be carefully monitored would the client decide to develop within these areas. Strict mitigation measures are recommended as indicated in Table 7.

Substations and power lines are allowed in these areas, with the following mitigation measures:

- Careful investigation of the presence of any bat roosts before clearance commences.
- The destruction of any trees should be avoided, if possible. Where these trees are to be removed, care should be taken not to destroy any bat roosts.

### **8.3 Medium sensitivity zones**

A 35 m buffer is installed around the first and second order gullies. At this site, these gullies mostly contain water when there is run-off during periods of rain. The vegetation is mostly similar to the Gamka Karoo of the surrounding areas and in general does not support thicket or riparian vegetation.

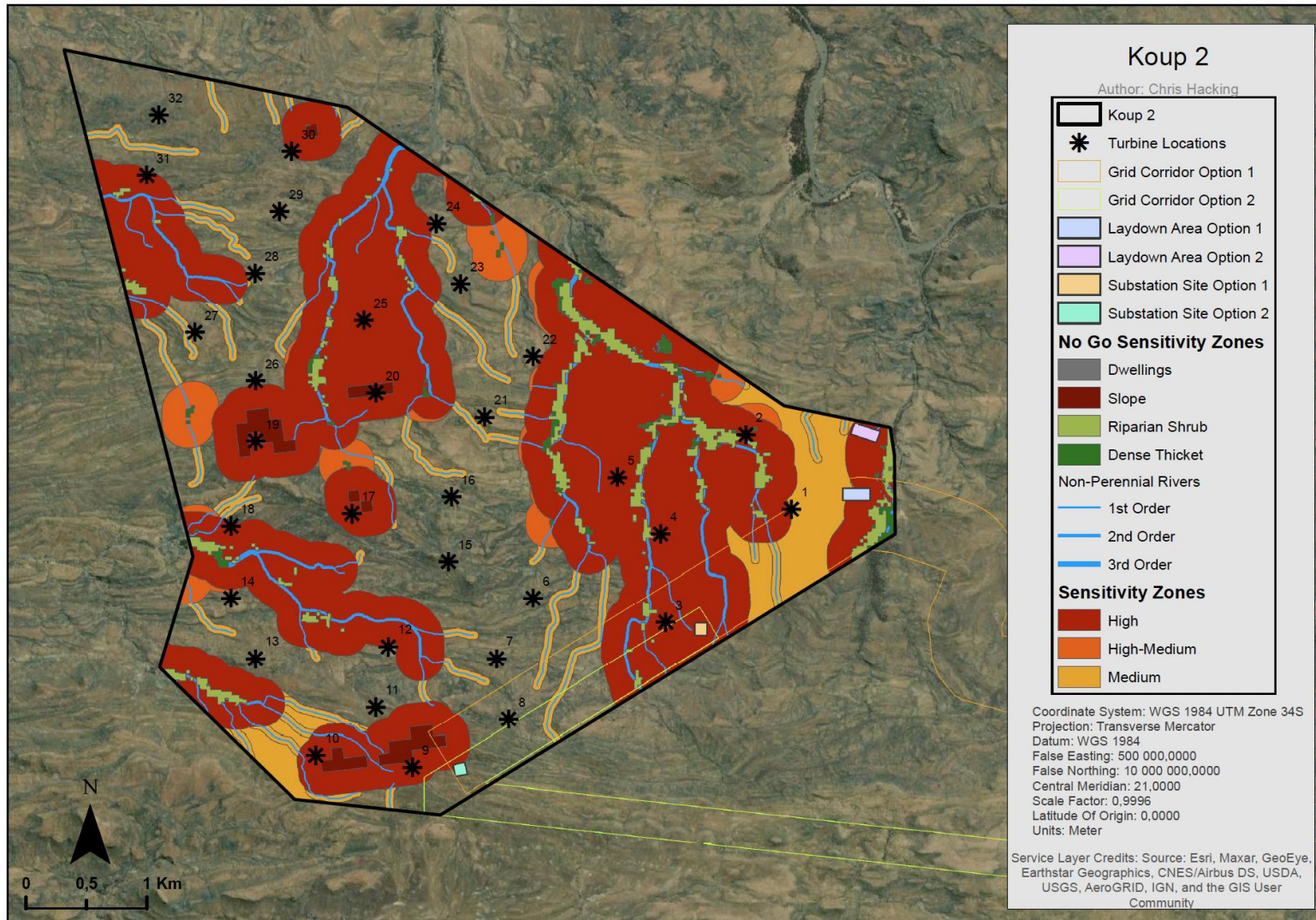


Figure 22: Bat Sensitivity Map - Koup 2 WEF.

## 9. MITIGATION MEASURES

### 9.1 Turbine positions

The first step in mitigating the potential negative impacts of a proposed WEF on bats is to site turbines outside sensitive areas. Several turbines were originally situated within the High bat sensitivity zone, but a new layout, received on 6 April 2022, indicate that all turbines were shifted out of the high sensitivity zone. Only two turbines still remain in the sensitivity zones, turbine number 18, in the High-medium sensitivity zone and turbine number 10, in the Medium sensitivity zone, see Table 6.

**Table 6: Turbine numbers situated in High-medium and Medium sensitivity zones.**

High-medium Sensitivity	Medium Sensitivity
18	10

### 9.2 Curtailment at specific turbines

Currently, the most reliable and effective mitigation is curtailment (Arnett and Alay, 2016; Hayes, 2019). Curtailment entails locking or feathering the turbine blades during high bat activity periods to reduce the risk of bat mortality via collision with blades and barotrauma. This results in a reduction of the power generation during conditions when electricity would usually be supplied. Curtailment regimes are developed by examining the relationship between relative bat activity levels and weather conditions.

Bat activity is typically reduced at higher wind speeds and lower temperatures, although experience and unpublished data in South Africa indicate that *Molossidæ* bats fly at higher wind speeds than originally expected. Lower wind speeds and warmer temperatures typically correlate with higher bat activity levels. This relationship is used to inform curtailment schedules that should be applied when bat activity is high to try to reduce potential encounters of bats with wind turbine blades. A summary of weather conditions and bat activity is presented in Section 6.7 of this report and was used, amongst others, to compile the below curtailment schedule.

The monitoring systems indicated low bat activity for the Nama Karoo during the monitoring period. Interviews with landowners and people staying on the property of Koup 1 and Koup 2, as well as people neighbouring the proposed sites, indicate that they frequently experience bat presence along the riverbeds. The monitoring system which was placed at the Platdoringsrivier riverbed of Koup 1 also indicates high bat presence; Therefore, following the precautionary principle, one cannot ignore the possibility that there will be periods when higher bat activity might occur on the terrain, especially after periods of good rainfall.

It is recommended that curtailment is applied to the turbines situated in the High-medium sensitivity zone as well as the Medium sensitivity if turbines cannot be moved out of these zones. Close observation during the bat monitoring to be conducted during the post-construction phase, should inform the curtailment schedule



and apply it to more turbines, or less turbines, as necessary. Should curtailed turbines show consistent low activity through static recordings, as well as mortality in the low threshold range, the bat specialist could adapt curtailment again.

It is recommended that curtailment be applied during the specified time periods when the relevant temperatures and wind speeds prevail (Table 7 and 8) for the turbines situated in the High-medium sensitivity zone and Medium sensitivity zones. If the developer decides to reduce the number of turbines, the first option, after the wind regime has been considered, should be to reduce turbines in the High-medium sensitivity zone.

Due to a very weak relationship shown between humidity and bat activity, wind and temperature have mainly been used to develop the mitigation scheme. If shown otherwise during post construction, when more data is available, the mitigation could be adapted so that humidity is also incorporated. The following curtailment is recommended:

### 9.2.1 High-medium Sensitivity zones

Fatality risk at the high mast indicate curtailment is required under the following conditions for the High-medium sensitivity zone:

- February, March, April, May, September, October;
- From two hours after sunset, between approximately 18:00 and 19:00, up to eight hours after sunset, between approximately 1:00 and 02:00;
- Temperatures above 12°C;
- Wind speed below 11 m/s;
- Humidity above 40%;
- No freewheeling of turbines when power is not generated.

**Table 7: Time periods and weather conditions (as measured at approximately 114m height) at the proposed Koup 2 WEF site. Turbines situated in High-medium sensitivity zones must be curtailed immediately after installation, thus when turbines start to turn.**

CURTAILMENT FOR TURBINES IN HIGH-MEDIUM SENSITIVITY ZONES			
Months	Time periods	Temperature (°C)	Wind speed (m/s)
Feb., March, April, May, Sept., Oct.	Two hours after sunset up to 8 hours after sunset	Above 12 °C	Below 11m/s

### 9.2.2 Medium Sensitivity zones

The bat monitoring undertaken at the proposed Koup 2 indicates, apart from the above mentioned Sensitivity zones, a low bat activity. Therefore, curtailment, except when turbines are not turning when no electricity is generated, (Section 9.3), is not necessary for Medium Sensitivity zones at the onset of the project. It is recommended, that turbines are moved out of Medium Sensitivity zones. The operational bat monitoring should inform the approach and confirm if further mitigation is required. If medium to high estimated true bat mortality be experienced during operational monitoring, curtailment needs to be applied immediately to those turbines situated within the Medium Sensitivity zone, as indicated during the periods and weather conditions specified in Table 8. This curtailment plan must be updated based on additional bat data collected during the operational monitoring programme to be undertaken at the proposed Koup 2 WEF.

**Table 8: Time periods and weather conditions (as measured at approximately 114m m height) at the proposed Koup 2 WEF site. The first column indicates periods when turbines situated in Medium sensitivity zones must be curtailed immediately after installation, if deemed necessary by the operational bat specialist.**

CURTAILMENT FOR TURBINES IN MEDIUM SENSITIVITY ZONE			
Months	Time periods	Temperature (°C)	Wind speed (m/s)
March, April, May, Sept., Oct.	One hour after sunset up to 8 hours after sunset	Above 12°C	Below 11m/s

**Any curtailment plan should be continuously refined and adapted based on incoming bat fatality data and the applicant must budget beforehand for the possibility of increasing the curtailment period or installing bat deterrents, as required.**

### 9.3 Feathering of all turbines below cut-in speed.

Normally operating turbine blades are at right angles to the wind. To avoid bat fatality at areas highly sensitive to bat activity, feathering as a mitigation measure is applied and the angle of the blades is pitched parallel with the wind direction so that the blades only spin at very low rotation and that there is no risk to bats. The turbines will not come to a complete standstill, but the movement of the turbines would be minimal to prevent bat fatalities during conditions when power is not generated.

The cut-in speed is the lowest wind speed at which turbines generate power. Freewheeling occurs when turbine blades are allowed to rotate below the cut-in speed and thereby increase the risk of collision at areas already highly sensitive to bat activity. Freewheeling should be prevented as much as possible, and to an extent that bat mortality is avoided below cut-in speed and should commence immediately after installation for the duration of the project, to prevent bat mortality. Feathering of turbines blades are usually around 90 degrees to prevent freewheeling, but the angle will depend on the turbine make and model.

#### **9.4 Bat deterrents**

Bat deterrent suppliers indicate that *Molossidae* bats react well to deterrents. This could be an option for mitigation and must be discussed with a bat specialist and the applicant. Deterrents are now deployed at two operational wind farms in South Africa and the current bat specialist, Stephanie Dippenaar, is managing one of these WEFs. They are awaiting bat monitoring information to determine the effectiveness of deterrents.



Threshold calculations add natural population dynamics and bat losses due to anthropogenic pressures such as human disturbance and extreme climatic events to the sum to gauge the number of bat fatalities that may lead to population decline. The table includes features such as project size, Bat Index, fatality threshold figures (MacEwan et al., 2018) and risk levels (Sowler, et al., 2017). The approximate electricity output generated by the approved WEFs is 280 MW. With the 140 MW output from the proposed Koup 2 WEF added to this, the combined electricity output will be approximately 420 MW. Together with Koup 1, the total combined electricity generation will be 560 MW.

Although only approved wind farms have been considered in the calculations mentioned above, Koup 1 WEF, from the same developer and adjacent to Koup 2 WEF, was included in a separate section in Table 9. The reason being that the proposed Koup 1 and Koup 2 WEFs are neighbouring farms and from the same ecological unit. From an ecological perspective, these two sites should be treated as one unit when looking at cumulative effects. Furthermore, the energy output and project size of solar and wind facilities within a 35km radius of Koup 2 was also added in the separate section of Table 9. The data of the Bat Indexes, Fatality Thresholds or Risk Levels for these projects is not available to complete the table, therefore it does not affect the total cumulative risk level for Nama Karoo bats. Only the energy output and project size are recorded in the table and show the impact of the combined area size of all the surrounding projects of 61768 ha and the combined 1414 MW energy output.

Table 9 presents the individual and cumulative features of the WEFs, with Bat Indexes (annual average bat passes per hour per monitoring period) based on bat recordings and risk levels as indicated by the *South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments – Pre-construction* (Sowler, et al. 2017).

**Table 9: Summary of output, project size and risks to bats for REFs within a 35 km radius of Koup 2.**

Approved WEFs within 35km radius of Koup 2	Energy Output MW	Total Project Size (ha)	Bat Index: Average Bat passes/hour/year	SABAA Fatality Threshold for Nama Karoo Bats	Risk Level (Sowler et al., 2017)
Approved Beaufort West Wind	140	4123	0.79	82	Low
Approved Trakas Wind	140	5340	1.30	106	Low
Combined Beaufort West and Trakas WEFs	280	9463	2.09	189	Low
Proposed Koup 2	140	2477	0.41	50	Low
<b>Total Beaufort West, Trakas and Koup 2</b>	<b>420</b>	<b>11940</b>	<b>2.50</b>	<b>238</b>	<b>High</b>
<b>Other Renewable Energy Facilities within 35km radius, which are in progress, but have not been taken into account for the Impact Assessment</b>					
Proposed Koup 1	140	4279	0.48	86	Low
Proposed Lombardskraal Wind and Solar Facility	20	1278	-	-	-
Proposed Leeu Gamka Solar Power Plant	-	19937	-	-	-
Approved Roma Energy Leeu Gamka Solar Plant	10	609	-	-	-
Proposed Kwagga 1 Wind Energy	278	5136	-	-	*
Proposed Kwagga 2 Wind Energy	341	9204	-	-	*
Proposed Kwagga 3 Wind Energy	205	9385	-	-	*
<b>Combined Total</b>	<b>1414</b>	<b>61768</b>	<b>2.98</b>	<b>324</b>	<b>High</b>

\* According to the Kwagga 1, 2 and 3 Final Scoping Reports, the impact of the Kwagga projects on bats is estimated to be Low after Mitigation. We do not have the data of the Bat indexes, Fatality Thresholds or Risk Levels for the Kwagga projects and other proposed projects mentioned above to complete the table. The total cumulative risk level (Sowler et al., 2017) remains High (>1.15) for Nama Karoo bats.

The cumulative bat impact risk level for Beaufort and Trakas WEFs is high, at a mean of 2.1 bats per hour, while Koup 2 is low at 0.41 bats per hour and Koup 1 is low at 0.48 bats per hour, indicating low activity as per the threshold. The combined cumulative annual bat activity per hour for these sites are 2.50 bats per hour. This is then placing the cumulative effect in the high category for Nama-Karoo threshold, see Section 6.6. Adding additional wind and solar energy facilities (approved and proposed) within 35km of Koup 2 increases the total area from 11940 ha to a much larger area or cluster of 61768 ha and the energy output to 1414 MW. Specialist reports from WEFs (Beaufort West and Trakas) considered in this assessment rate the impact high negative (-76 to -82) without mitigation and reduced to low negative (-26 to -32) with proposed mitigation. The effect of cumulative impacts and the (SiVest) significance rating for bats at Koup 2 are high before mitigation and medium after mitigation, see Table 10. It is crucial that operational monitoring and mitigation need to be implemented upon construction of all the WEFs to try to curb the high collected impact.

There is therefore potential for mass loss of locally active and migratory bats due to these WEFs creating a large zone of wind turbine development that bats in the wider area will have to negotiate. A decline in bat populations could potentially elevate insect numbers across these sites. Where site specific and regional thresholds are exceeded, mitigation and other conservation efforts should be applied in practice and reduce fatality impacts (Arnett & Alay, 2016 in MacEwan, et al., 2018). Application of mitigation measures at all the proposed wind farms, as well as post construction monitoring could reduce the risk of bat population disturbance from high to a lower impact, but as this project is adjacent to the Beaufort West REDZ 11, it is expected that the cumulative effect will increase as more wind farms are added.

Stephanie Dippenaar has completed three two-year post construction monitoring projects on other wind farms in the Nama-Karoo. These wind farms have a combined output of 360 MW. The combined average general estimated true fatality of these three wind farms is approximately 232 bats per year. Should this approach be applied to Koup 2 WEF over a 20-year life span, the total estimated true fatality could amount to approximately 4 640 bats during the lifespan of the wind farm. Although this is only speculation and not a scientific way of calculating fatality over the lifespan of a wind farm, as the different wind farms are situated in different areas and there are many variables, this does give one a slight indication of fatality over the lifespan of a wind farm. Would Beaufort and Trakas be added to this, as well as several other wind farms that are expected to be developed in the Beaufort West REDZ 11, the severity of the cumulative impact over decades of wind energy generation could be severe.

Recommendations in previous reports relating to Beaufort West and Trakas WEFs include mitigating measures restricting the number of turbines, excluding turbines and all components from buffer areas and recommend that those turbines located near Medium-to-high bat sensitivity buffers be prioritised during operational monitoring. It was also noted that the increased turbine height and rotor dimension of up to 200m could reduce the probability of bat mortality as (most) bats are active close to the ground, although *Tadarida aegyptiaca* are frequently active at height. Operational monitoring needs to be implemented upon construction of the WEF and turbines need to be controlled below cut in speed and freewheeling not be allowed from onset of operations (Dippenaar, 2019; Van Rooyen & Froneman, 2019; Animalia 2016).

## 11. SPECIALIST FINDINGS / IDENTIFICATION AND ASSESSMENT OF IMPACTS

No pre-construction impacts are anticipated. However, the following potential impacts could occur during the lifespan of the proposed Koup 2 WEF:

### Construction Phase

- Roost disturbance, destruction, and fragmentation due to construction activities.
- Creating new habitat amongst the turbines, such as buildings, excavations, or quarries.
- Disturbance to bats during the construction activities during night-time.

### Operational Phase

- Mortality due to direct collision or barotrauma of resident bats.
- Mortality due to direct collision or barotrauma of migrating bats.
- Loss of bats of conservation value.
- Attraction of bats to wind turbines.
- Loss of habitat and foraging space.
- Reduction in the size, genetic diversity, resilience, and persistence of bat populations.

### Decommissioning Phase

- Disturbance due to decommissioning activities.

### Cumulative impacts of wind farms within 35 km radius

- Cumulative effect of construction activities of several WEFs within 35 km from the proposed Koup 2 WEF site.
- Cumulative resident bat mortality of all the WEFs.
- Cumulative bat mortality due to direct collisions with the blades or barotrauma during foraging of migrating bats.
- Cumulative effect of habitat loss over several thousand hectares of all WEFs.
- Cumulative reduction in the size, genetic diversity, resilience, and persistence of bat populations.



## 11.1 Construction

Table 10: Rating of impacts that could potentially occur during the construction phase.

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation									Environmental Significance After Mitigation								
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>CONSTRUCTION PHASE</b>																			
Clearing and excavation of natural habitat	The destruction of active bat roosts and/or features that could serve as potential roosts, such as rock formations situated at the southern area and the removal of the limited number of trees on site. The destruction of derelict holes, such as aardvark holes and any fragmentation of woody habitat which include dense bushes. The removal of limited trees and bushes would have an impact on the clutter and clutter-edge foraging groups.	1	3	3	3	4	2	28	-	Medium	1	2	2	2	2	1	9	-	Low
<p><b>MITIGATION MEASURES:</b></p> <ul style="list-style-type: none"> <li>Construction activities to be kept out of all No-go and High bat sensitive areas.</li> <li>Rock formations occurring along the ridge lines be avoided during construction, as these serve as roosting space for bats.</li> <li>Destruction of limited trees should be avoided during construction as far as possible, and where destruction of trees are unavoidable, careful investigation for any bat roost should be conducted before the tree is removed.</li> </ul>																			

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation							Environmental Significance After Mitigation										
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>CONSTRUCTION PHASE</b>																			
<ul style="list-style-type: none"> <li>Where possible, dense bushes should not be destroyed, but if unavoidable, careful investigation for any bat roost should be conducted before the destruction of any bushes.</li> <li>Aardvark holes or any large derelict holes or excavations should not be destroyed before careful examination for bats. The Environmental Control Officer (ECO) or a responsible appointed person or site manager should contact a bat specialist before construction commences so that they know what to look out for during construction.</li> </ul>																			
Excavation and building new structures	Creating new habitat amongst the turbines which might attract bats. This includes buildings with roofs that could serve as roosting space or open water sources from quarries or excavation where water could accumulate.	1	3	2	2	3	2	22	-	Low	1	2	1	1	3	1	8	-	Low
<b>MITIGATION MEASURES:</b>																			
<ul style="list-style-type: none"> <li>Completely seal off roofs of new buildings (e.g., substations and site buildings). Buildings that currently do not contain roosts, should also be sealed off, with the agreement of the landowner. Note that a small bat species could enter a hole the size of 1 cm<sup>2</sup>.</li> <li>Roofs need to be regularly inspected during the lifetime of the wind farm and any new holes need to be sealed.</li> <li>Excavation areas or artificial depressions should be filled and rehabilitated to avoid creating new areas of open water sources which could attract bats during rainy spells.</li> </ul>																			

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation							Environmental Significance After Mitigation										
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>CONSTRUCTION PHASE</b>																			
Noise and light disturbance	Construction noise, especially during night-time, as well as lightening disturbance and lights that attract insects to the site.	1	3	2	2	1	2	18	-	Low	1	2	1	1	1	1	6	-	Low
<b>MITIGATION MEASURES:</b> <ul style="list-style-type: none"> <li>▪ Nightly construction activities should be avoided, or if necessary, minimised to the shortest period possible.</li> <li>▪ With the exception of compulsory civil aviation lightning, artificial lightening during construction should be minimised, especially bright lights or spotlights.</li> <li>▪ Lights should avoid skyward illumination. Turbine tower lights should be switched off when not in operation, where possible.</li> </ul>																			

## 11.2 Operation

Table 11: Rating of impacts that could potentially occur during the operational phase.

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation									Environmental Significance After Mitigation								
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>OPERATIONAL PHASE</b>																			
Direct collision or barotrauma	Fatality through direct collision or barotrauma of resident bats occupying the airspace amongst the turbines. The turning blades of the turbines during operation are the most important aspect of the project that would impact negatively on bats. High flying <i>Molossidae</i> specie, which are high-risk species, have predominantly been confirmed at the proposed Koup 2 WEF site.	2	4	3	4	3	3	48	-	High	2	2	2	3	3	2	24	-	Medium
<p><b>MITIGATION MEASURES:</b></p> <ul style="list-style-type: none"> <li>All turbines and turbine components, including the rotor swept zone, should be kept out of all No-go and high bat sensitivity areas, Section 8 and Section 9.1.</li> <li>Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site as a whole.</li> <li>Mitigation as proposed for High-medium sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start operating. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase.</li> <li>Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions.</li> </ul>																			

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation									Environmental Significance After Mitigation								
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>OPERATIONAL PHASE</b>																			
<ul style="list-style-type: none"> <li>Freewheeling should be avoided, to a point where the turbines are not a threat to bats, when turbines do not generate power.</li> <li>Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible, depending on civil aviation laws.</li> <li>At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.</li> <li>Prolonger post construction mitigation, beyond the prescribed two years, might be necessary if advised by the operational bat specialist.</li> <li>It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines, but having more refined static data from sampling points at height would aid in interpreting future bat fatality records of the Koup 2 WEF; therefore, the installation of more than one monitoring system at height, especially if there is high mortality, is recommended.</li> <li>The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 2 WEF site.</li> </ul>																			
Bat migrations	Bat fatality during migration. A limited number of calls similar to <i>Miniopterus natalensis</i> (Natal Long-fingered bat), a migration species, have been recorded.	1	3	2	3	3	2	24	-	Medium	1	2	1	2	3	1	9	-	Low
<b>MITIGATION MEASURES:</b>																			
<ul style="list-style-type: none"> <li>Care should be taken during post construction monitoring to verify the numbers of this species, especially within the rotor swept area of the turbine blades.</li> </ul>																			

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation									Environmental Significance After Mitigation								
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>OPERATIONAL PHASE</b>																			
<ul style="list-style-type: none"> <li>▪ All turbines and turbine components, including the rotor swept zone, should be kept out of all high bat sensitivity areas.</li> <li>▪ Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site as a whole.</li> <li>▪ Mitigation as proposed for High-medium sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start turning. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase.</li> <li>▪ Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions.</li> <li>▪ Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible.</li> <li>▪ At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.</li> <li>▪ Prolonger post construction mitigation, beyond the prescribed two years, might be necessary if advised by the operational bat specialist.</li> <li>▪ It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines, but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 2 WEF; therefore, the installation of more than one monitoring system at height, will be recommended.</li> <li>▪ The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 2 WEF site.</li> </ul>																			

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation									Environmental Significance After Mitigation								
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>OPERATIONAL PHASE</b>																			
Loss of bats of conservation value	Loss of bats of conservation value. A limited number of calls similar to the red <i>data Miniopterus natalensis</i> have been recorded, as well as the endemic <i>Sauromys petrophilus</i> .	1	3	2	3	3	2	24	-	Medium	1	2	1	2	3	1	9	-	Low
<b>MITIGATION MEASURES:</b>																			
<ul style="list-style-type: none"> <li>Proven mitigation measures, such as curtailment, should be applied if high numbers of bat passes concerned with bats of conservation value is recorded during post-construction.</li> <li>All turbines and turbine components, including the rotor swept zone, should be kept out of all No-go and High bat sensitivity areas.</li> <li>Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site as a whole.</li> <li>Mitigation as proposed for High-medium sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start operating. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase.</li> <li>Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions.</li> <li>Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible.</li> </ul>																			

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation									Environmental Significance After Mitigation								
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>OPERATIONAL PHASE</b>																			
<ul style="list-style-type: none"> <li>At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.</li> <li>It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines, but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 2 WEF; therefore, the installation of more than one monitoring system at height, will be recommended.</li> <li>The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 2 WEF site.</li> </ul>																			
Fatal curiosity	Bat mortality due to the attraction of bats to wind turbines (Horn, et al. 2008). Bats have been shown to sometimes be attracted to wind turbines out of curiosity or reasons still under investigation.	1	3	2	3	3	2	24	-	Medium	1	2	1	2	3	1	9	-	Low
<b>MITIGATION MEASURES:</b>																			
<ul style="list-style-type: none"> <li>Mitigation measures such as ultrasonic deterrents might be a viable option, especially for bats of the Molossidae family which are the most active on site.</li> </ul>																			
Turning of the turbine blades	Loss of habitat and foraging space during operation of the wind turbines.	2	4	3	4	3	3	48	-	High	2	2	2	3	3	2	24	-	Medium
<b>MITIGATION MEASURES:</b>																			



Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation									Environmental Significance After Mitigation								
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>OPERATIONAL PHASE</b>																			
<ul style="list-style-type: none"> <li>All turbines and turbine components, including the rotor swept zone, should be kept out of all No Go and High bat sensitivity areas.</li> <li>Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site as a whole.</li> <li>Mitigation as proposed for High-medium sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start operating. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase.</li> <li>Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions.</li> <li>Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible.</li> <li>At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.</li> <li>Prolonger post construction mitigation, beyond the prescribed two years, might be necessary if advised by the operational bat specialist.</li> <li>It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines, but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 2 WEF; therefore, the installation of more than one monitoring system at height, will be recommended.</li> <li>The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 2 WEF site.</li> </ul>																			

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation									Environmental Significance After Mitigation								
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>OPERATIONAL PHASE</b>																			
Smaller genetic pool	Reduction in the size, genetic diversity, resilience and persistence of bat populations. Bats have low reproductive rates and populations are susceptible to reduction by fatalities other than natural death. Furthermore, smaller bat populations are more susceptible to genetic inbreeding.	2	3	3	3	3	4	56	-	High	2	2	2	3	4	3	39	-	Medium
<p><b>MITIGATION MEASURES:</b></p> <ul style="list-style-type: none"> <li>All turbines and turbine components, including the rotor swept zone, should be kept out of all No Go and high bat sensitivity areas, Section 8, Figure 22 and Section 9.1.</li> <li>Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site as a whole.</li> <li>Mitigation as proposed for High-medium sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start operating. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase.</li> <li>Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions.</li> <li>Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible.</li> <li>At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.</li> </ul>																			

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Significance Before Mitigation							Environmental Significance After Mitigation									
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)
<b>OPERATIONAL PHASE</b>																		
<ul style="list-style-type: none"> <li>▪ Prolonger post construction mitigation, beyond the prescribed two years, might be necessary if advised by the operational bat specialist.</li> <li>▪ It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 2 WEF; therefore, the installation of more than one monitoring system at height, will be recommended.</li> <li>▪ The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 2 WEF site.</li> </ul>																		

### 11.3 Decommissioning

Table 12: Rating of impacts that could potentially occur during the decommissioning phase.

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION									
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)
<b>DECOMMISSIONING PHASE</b>																		

Removal of turbines	Bat disturbance due to decommissioning activities and associated noise, especially during night-time.	1	3	1	2	1	1	8	-	Low	1	1	1	1	1	1	5	-	Low
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**MITIGATION MEASURES:**

- Nightly decommissioning activities should be avoided, or if necessary, minimised to the shortest period possible. Except for compulsory lightening required in terms of civil aviation, artificial lightening during construction should be minimised, especially bright lights or spotlights. Lights should avoid skyward illumination.

## **11.4 No-go Impact**

The 'no-go' alternative is the option of not undertaking the proposed WEF and / or grid connection infrastructure projects. Hence, if the 'no-go' option is implemented, there would be no development. This alternative would result in no environmental impacts from the proposed project on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report. Should the proposed WEF development not go ahead, none of the identified potential impacts would occur and the status quo would be maintained.

## 11.5 Cumulative Impacts

Table 13: Rating of potential cumulative impacts.

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
<b>CUMULATIVE IMPACTS</b>																			
Destruction of active roosts	The Cumulative effect of destruction of active roosts of several wind farms as well as features that could serve as potential roosts.	3	3	3	3	2	2	28	-	Medium	3	2	2	2	2	1	11	-	Low
<b>MITIGATION MEASURES:</b>																			
<ul style="list-style-type: none"> <li>Project specific mitigation as included in the BA or EIA or in the respective Bat Impact Assessments of the projects in the surrounding area should be adhered to for each renewable energy project. Especially adhering to buffer zones and sensitivity areas and recommended mitigation for each renewable energy project.</li> <li>Post construction monitoring as per the relevant South African guidelines is also of crucial importance. i.e., keeping all construction activities out of high bat sensitive areas such as the area around the farm dwelling.</li> </ul>																			
Direct collision and barotrauma	Cumulative bat mortality due to direct collision with the blades or barotrauma during	3	3	3	2	3	2	28	-	High	3	2	3	3	3	3	42	-	High



ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
Several wind farms stretching over thousands of hectares.	Habitat loss over several wind farms.	3	3	2	3	3	2	28	-	Medium	3	2	2	2	3	2	24	-	Medium
<b>MITIGATION MEASURES:</b>																			
<ul style="list-style-type: none"> <li>Although not enforceable on the Koup 2 applicant, all REFs must adhere to their project specific mitigation measures, especially buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project.</li> <li>Post construction monitoring as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.</li> </ul>																			
Several wind farms with associated bat mortality over the period of the lifespan of all the WEFS within a 35km radius of Koup 2.	Cumulative reduction in the size, genetic diversity, resilience and persistence of bat populations	3	3	3	3	3	4	60	-	High	3	2	3	3	4	3	45	-	High
<b>MITIGATION MEASURES:</b>																			
<ul style="list-style-type: none"> <li>Although not enforceable on the Koup 2 applicant, all REFs must adhere to their project specific mitigation measures, especially buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project.</li> <li>Post construction monitoring as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.</li> </ul>																			



## 11.6 Overall Impact Rating

A matrix is attached in Appendix E which summarise the impact as per SiVest methodology and rating.

Table 14: Summary table of expected impacts associated with Koup 2 WEF

Phase	Impact before mitigation (negative)	Impact after mitigation (negative)
Construction	23 (5-23) Low	7 (5-23) Low
Operation	35 (24-42) Medium	25 (24-42) Medium
Decommissioning	8 (5-23) Low	5 (5-23) Low
Cumulative	47 (43-61) High	32 (24-42) Medium
Combined for the site	28 (24-42) Medium	17 (5-23) Low

**Figure 24** provides a map showing all sensitive feature and buffers that must be excluded from the development/ disturbance footprint of the WEF. Mitigation measures that need to be included in the Environmental Management Program (EMPr) are provided in

Table 15 with monitoring requirements.

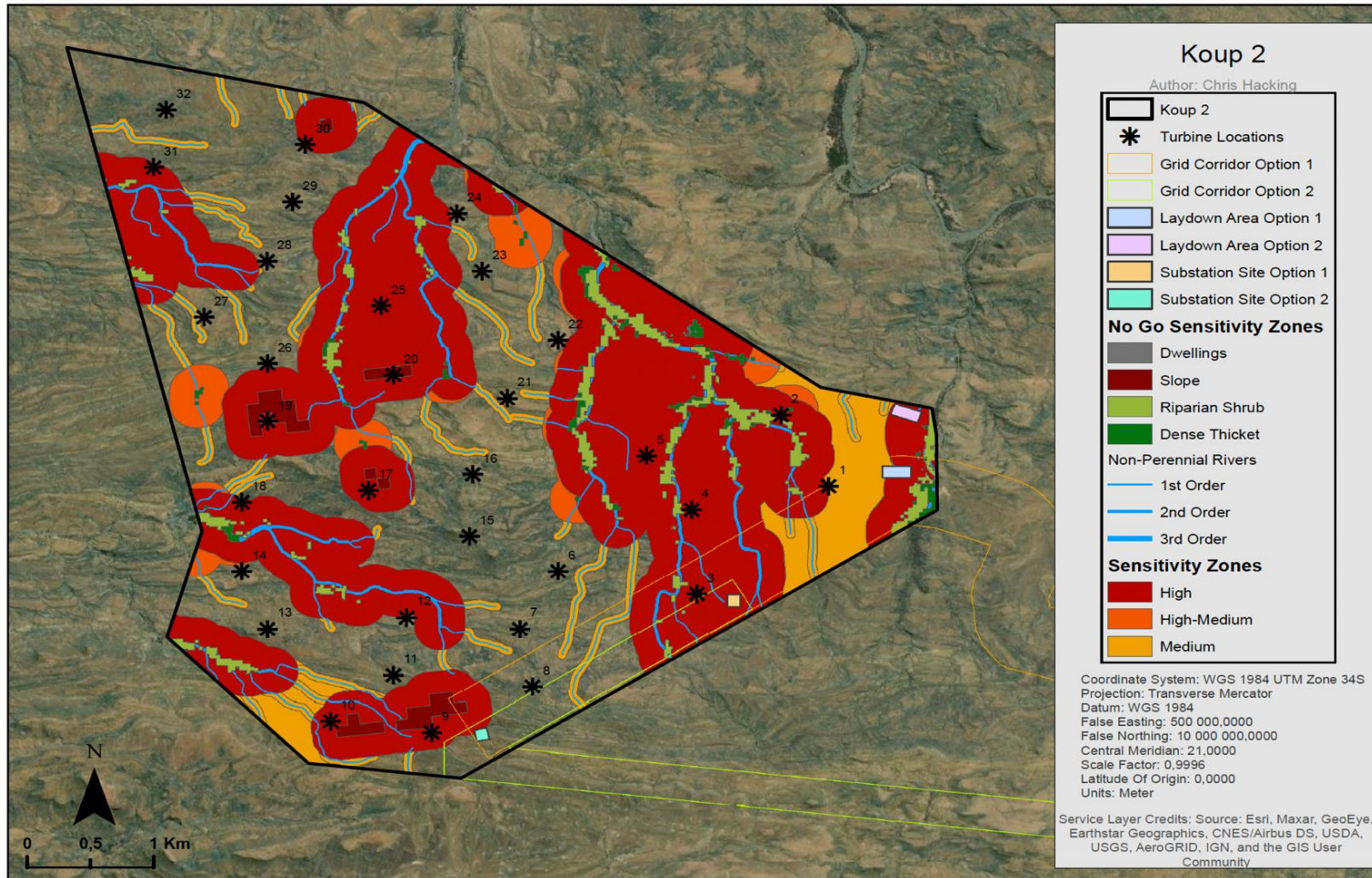


Figure 24: Bat Sensitivity Map - Koup 2 WEF.

Table 15: Input to the environmental management programme (EMPR)

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>DESIGN PHASE</b>					
<b>Future impacts on Bats</b>	Mitigate impacts on Bat Habitat caused by destruction, disturbance, and displacement.	Ensure the design of the WEF takes the sensitivity mapping of the bat specialist into account to avoid and reduce impacts on bat species and bat important features. Maintain buffers around these sensitive areas	Ensure that No Go and high sensitivity areas are identified and excluded from turbine placement during the planning and design phase.	Prior to construction during design and planning phase.	Project Developer
	Mitigate impacts leading to bat population decline in future project phases	Conduct one year of bat monitoring at height.	Relevant SABAA bat guidelines (Sowler, et al, 2017)	Prior to construction	Project Developer
	Minimize footprint of the construction to an acceptable level i.e., no placement of turbines in sensitive areas as well as spacing of turbines.	Turbines need to be approximately 250 m apart from blade tip to blade tip.	Final layout design	During design and prior to construction.	Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
	Avoid attracting bats to sensitive areas.	Plan to minimise artificial light at night.	Choice and light placement on turbines.	Final design	Project Developer
<b>CONSTRUCTION PHASE</b>					
<b>Avoid disturbance of foraging bats</b>	Avoid Habitat loss and destruction caused by clearing vegetation for the working areas, construction and landscape modifications.	<ul style="list-style-type: none"> <li>▪ Construction activities to be kept out of all No-go and High bat sensitive areas.</li> <li>▪ Rock formations occurring along the ridge lines be avoided during construction, as these serve as roosting space for bats.</li> <li>▪ Destruction of limited trees should be avoided during construction as far as possible, and where destruction of trees is unavoidable, careful investigation for any bat roost should be conducted before the tree is removed.</li> <li>▪ Where possible, dense bushes should not be destroyed, but if unavoidable, careful investigation for any bat roost should be conducted before the destruction of any bushes.</li> </ul> <p>Aardvark holes or any large derelict holes or excavations should not be destroyed before careful examination for bats. The</p>	<ul style="list-style-type: none"> <li>▪ Monitor the efficiency of the EMPR.</li> <li>▪ Monitor whether proposed measures are adhered to.</li> <li>▪ ECO should be trained to recognize bat species and roost locations before construction starts.</li> </ul>	<ul style="list-style-type: none"> <li>▪ During construction phase.</li> <li>▪ ECO should be trained before construction commences.</li> <li>▪ Erosion and pollution monitoring during construction phase.</li> <li>▪ Monitoring of off-road driving during construction phase.</li> <li>▪ Monitor before anything is removed that could contain a bat roost.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Project Developer</li> <li>▪ Bat specialist and ECO.</li> </ul>

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		Environmental Control Officer (ECO) or a responsible appointed person or site manager should contact a bat specialist before construction commences so that they know what to look out for during construction.			
<b>Active roost destruction and potential roost destruction and habitat loss</b>	<ul style="list-style-type: none"> <li>▪ Minimise impacts on bats during construction activities</li> <li>▪ Keep construction out of high bat sensitive areas</li> <li>▪ Try to avoid destruction of rock formations, trees,</li> </ul>	<ul style="list-style-type: none"> <li>▪ Adhere to No-go areas incorporated into the Final Layout.</li> <li>▪ Appoint an independent ECO to oversee that the EMPR is being adhered to.</li> <li>▪ Bat specialist to train ECO, if necessary, to identify possible bat roosts or signs of bat presence.</li> <li>▪ Avoid destruction of trees or dense bushes, where possible.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Visual inspection and continuous monitoring of high sensitivity areas, erosion prevention, chemical pollution and vehicle activity to prevent habitat destruction.</li> <li>▪ If buildings, trees or structures providing potential roosts need to be</li> </ul>	<ul style="list-style-type: none"> <li>▪ Throughout construction</li> <li>▪ ECO to be present during all site clearance activities</li> <li>▪ Access to bat specialist if ECO needs information or confirmation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Project Developer.</li> <li>▪ Holder of EA to appoint ECO.</li> <li>▪ Appointed bat specialist to train the ECO, if necessary.</li> </ul>

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
	aardvark holes, derelict holes, excavations investigated for bat roosts before destruction.	<ul style="list-style-type: none"> <li>▪ All aardvark holes, derelict holes or excavations should be carefully investigated for roosts before any destruction.</li> <li>▪ Careful investigation of old telephone poles, before destroying them, if there are any on site.</li> <li>▪ Avoid pollution of water courses.</li> <li>▪ No off-road driving.</li> </ul>	demolished, the ECO is required to investigate the features before commencement of the works.	concerning bat presence	
<b>Creating new habitat amongst the turbines that might attract bats.</b>	<ul style="list-style-type: none"> <li>▪ Prevent bats from roosting in high-risk areas close to turbines and infrastructure, such as new roofs.</li> <li>▪ Prevent the creation of features that could attract bats to the terrain.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Existing roosts in roofs should be left as such and treated with caution.</li> <li>▪ All roofs of new buildings should be closed off during construction, before bat roosts could move in.</li> <li>▪ Rehabilitate and close excavation holes and quarries where water could accumulate.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continues inspection of sealed roofs – bats can move into holes as small as 1 X 1 cm.</li> <li>▪ Oversee the rehabilitation of any excavation areas.</li> </ul>	Throughout construction phase	Project Developer, construction site manager and ECO.
<b>Construction noise, especially</b>	Prevent disturbance to bat activity and behaviour.	<ul style="list-style-type: none"> <li>▪ Nightly construction activities should be avoided, or if necessary, minimised to the shortest period possible.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Monitor construction to reduce noise and</li> </ul>	Throughout construction phase.	Project Developer and

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
during night-time.		<ul style="list-style-type: none"> <li>Except for compulsory civil aviation lightning, artificial lightening during construction should be minimised, especially bright lights or spotlights. Lights should avoid skyward illumination. Turbine tower lights should be switched off when not in operation, where possible.</li> </ul>	<ul style="list-style-type: none"> <li>minimise disturbance in bat sensitive areas.</li> <li>Avoid construction activities at night, as far as possible.</li> </ul>		construction site manager.
<b>OPERATIONAL PHASE</b>					
<b>Fatality of resident bats through direct collision or barotrauma.</b>	<ul style="list-style-type: none"> <li>Mitigate potential impacts on bats during operation of wind farm.</li> <li>Reduce bat mortality during the operational lifetime of the wind farm.</li> <li>Supervise all bat monitoring activities.</li> <li>Stay aware of bat mortality.</li> </ul>	<ul style="list-style-type: none"> <li>All turbines and turbine components, including the rotor swept zone, should be kept out of all No-go and high bat sensitivity areas, Section 8 and Section 9.1.</li> <li>Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site as a whole.</li> <li>Mitigation as proposed for High-medium sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start turning. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase.</li> </ul>	<ul style="list-style-type: none"> <li>Regular bat monitoring reports, informed by the relevant SABAA operational bat monitoring guidelines.</li> <li>Adhere to the mitigation measures as indicated by the EA and Section 9 of the Bat Monitoring report.</li> <li>Maintain a register of bat mortality/injury.</li> </ul>	Throughout operation and during operational bat monitoring period.	Site manager, Project developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<ul style="list-style-type: none"> <li>▪ Where high bat mortality occurs, mitigation should be implemented without delay. Specific turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions.</li> <li>▪ Freewheeling should be avoided, to a point where the turbines are not a threat to bats, when turbines do not generate power.</li> <li>▪ Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards.</li> <li>▪ Turbine tower lights should be switched off when not in operation, if possible, depending on civil aviation laws.</li> <li>▪ At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular communication between bat specialist and site manager.</li> </ul>		



Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>the guidelines valid at the time of monitoring.</p> <ul style="list-style-type: none"> <li>▪ Prolonged post construction mitigation, beyond the prescribed two years, might be necessary if advised by the operational bat specialist.</li> <li>▪ The use of ultrasound as a mitigation measure to deter bats should be investigated if necessary and as advised by a bat specialist.</li> </ul>			
<b>Bat fatality of migratory species.</b>	<ul style="list-style-type: none"> <li>▪ Mitigate potential impacts on bats during operation of wind farm.</li> <li>▪ Reduce bat mortality during the operational lifetime of the wind farm.</li> <li>▪ Supervise all bat monitoring activities.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Care should be taken during post construction monitoring to verify the numbers of this species, especially within the rotor swept area of the turbine blades.</li> <li>▪ All turbines and turbine components, including the rotor swept zone, should be kept out of all No-go and high bat sensitivity areas, Section 8 and Section 9.1.</li> <li>▪ Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site as a whole.</li> </ul>	<ul style="list-style-type: none"> <li>▪ . Regular bat monitoring reports, informed by the relevant SABAA operational bat monitoring guidelines.</li> <li>▪ Adhere to the mitigation measures as indicated by the EA and Section 9 of the Bat Monitoring report.</li> <li>▪ Maintain a register of bat mortality/injury.</li> </ul>	Throughout operation and during operational bat monitoring period.	Site manager, Project developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<ul style="list-style-type: none"> <li>▪ Mitigation as proposed for High-medium sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start turning. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase.</li> <li>▪ Where high bat mortality occurs, mitigation should be implemented without delay. Specific turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions.</li> <li>▪ Freewheeling should be avoided, to a point where the turbines are not a threat to bats, when turbines do not generate power.</li> <li>▪ Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards.</li> <li>▪ Turbine tower lights should be switched off when not in operation, if possible, depending on civil aviation laws.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular communication between bat specialist and site manager</li> </ul>		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<ul style="list-style-type: none"> <li>▪ At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring.</li> <li>▪ Prolonged post construction mitigation, beyond the prescribed two years, might be necessary if advised by the operational bat specialist.</li> <li>▪ The use of ultrasound as a mitigation measure to deter bats should be investigated if necessary and as advised by a bat specialist.</li> </ul>			
<b>Loss of bats of conservation value.</b>	<ul style="list-style-type: none"> <li>▪ Mitigate potential impacts on bats during operation of wind farm.</li> <li>▪ Reduce bat mortality during the operational</li> </ul>	<ul style="list-style-type: none"> <li>▪ Care should be taken during post construction monitoring to verify the numbers of this species, especially within the rotor swept area of the turbine blades.</li> <li>▪ All turbines and turbine components, including the rotor swept zone, should be</li> </ul>	<ul style="list-style-type: none"> <li>▪ . Regular bat monitoring reports, informed by the relevant SABAA operational bat monitoring guidelines.</li> </ul>	Throughout operation and during operational bat monitoring period.	Site manager, Project developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
	<p>lifetime of the wind farm.</p> <ul style="list-style-type: none"> <li>Supervise all bat monitoring activities.</li> </ul>	<p>kept out of all No-go and high bat sensitivity areas, Section 8 and Section 9.1.</p> <ul style="list-style-type: none"> <li>Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site as a whole.</li> <li>Mitigation as proposed for High-medium sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start turning. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase.</li> <li>Where high bat mortality occurs, mitigation should be implemented without delay. Specific turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions.</li> <li>Freewheeling should be avoided, to a point where the turbines are not a threat to bats, when turbines do not generate power.</li> <li>Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright</li> </ul>	<ul style="list-style-type: none"> <li>Adhere to the mitigation measures as indicated by the EA and Section 9 of the Bat Monitoring report</li> </ul> <p>Regular communication between bat specialist and site manager</p>		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>lights. Lights should rather be turned downwards.</p> <ul style="list-style-type: none"> <li>▪ Turbine tower lights should be switched off when not in operation, if possible, depending on civil aviation laws.</li> <li>▪ At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring.</li> <li>▪ Prolonged post construction mitigation, beyond the prescribed two years, might be necessary if advised by the operational bat specialist.</li> </ul> <p>The use of ultrasound as a mitigation measure to deter bats should be investigated if necessary and as advised by a bat specialist.</p>			

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>Bat fatality due to the attraction of bats to turbine blades.</b>	Avoid activities that will attract bats to turbines.	<ul style="list-style-type: none"> <li>Minimise artificial light at night as far as possible, at the turbines as well as the site management offices.</li> <li>Where possible, lights should shine downwards.</li> <li>Avoid any activities that might attract flying insects to the areas amongst the turbines.</li> </ul>	Reduce lights as far as possible.	Ongoing	Site manager/Project Developer
<b>Loss of habitat and foraging space during operation of the wind turbines.</b>	<ul style="list-style-type: none"> <li>Mitigate the loss of habitat and foraging space to avoid bat mortality.</li> <li>Reduce bat mortality during the operational lifetime of the wind farm.</li> </ul>	<ul style="list-style-type: none"> <li>Adhere to the sensitivity zones as indicated in the bat monitoring report and bat sensitivity map.</li> <li>No off-road driving on site.</li> </ul>	Adaptive mitigation plan.	During operations.	Site manager/Project Developer and ECO
<b>Reduction in size, genetic diversity, resilience, and persistence of</b>	Monitor potential impacts on bats during operation of wind farm. Prevent activities that will attract bats to high-risk areas on site.	<ul style="list-style-type: none"> <li>All turbines and turbine components, including the rotor swept zone, should be kept out of all No-go and high bat sensitivity areas, Section 8 and Section 9.1.</li> </ul>	Adaptive mitigation plan.	During operations.	Project Developer/Site manager and ECO.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
bat populations.		<ul style="list-style-type: none"> <li>▪ Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site.</li> <li>▪ Mitigation as proposed for High-medium sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start turning. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase.</li> <li>▪ Where high bat mortality occurs, mitigation should be implemented without delay. Specific turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions.</li> <li>▪ Freewheeling should be avoided, to a point where the turbines are not a threat to bats, when turbines do not generate power.</li> <li>▪ Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Lights should rather be turned downwards.</li> </ul>			

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		<ul style="list-style-type: none"> <li>▪ Turbine tower lights should be switched off when not in operation, if possible, depending on civil aviation laws.</li> <li>▪ At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the guidelines valid at the time of monitoring.</li> <li>▪ Prolonged post construction mitigation, beyond the prescribed two years, might be necessary if advised by the operational bat specialist.</li> </ul>			
<b>DECOMMISSIONING PHASE</b>					
<b>Decommissioning activities and noise, especially at night- time.</b>	Mitigate disturbance due to decommissioning activities.	Develop a decommissioning and remedial rehabilitation plan and adhere to compliance monitoring plan.	Implement a de-commissioning and rehabilitation plan to reduce the development footprint.	During decommissioning phase.	Site manager/ECO



## 12. COMPARATIVE ASSESSMENT OF ALTERNATIVES

None of the proposed alternatives are expected to change the impact ratings identified in this document, but in terms of bat habitat, Table 16 provides the preferred options for the substation and construction laydown areas.

**Table 16: Comparative Assessment for the Substation and construction laydown area.**

Alternative	Preference	Reasons (incl. potential issues)
<b>UPDATED SUBSTATION SITE ALTERNATIVES (AS PER FIGURE 26)</b>		
Substation Option 1	<b>No Preference</b>	<ul style="list-style-type: none"> <li>The area is situated outside the high sensitivity zone</li> <li>It is expected that less trees or bush cover will have to be removed</li> </ul>
Substation Option 2	<b>No Preference</b>	<ul style="list-style-type: none"> <li>The area is situated outside the high sensitivity zone</li> <li>It is expected that less trees or bush cover will have to be removed</li> </ul>
<b>CONSTRUCTION LAYDOWN AREA SITE ALTERNATIVES</b>		
Construction Laydown Area Option 1	<b>No Preference</b>	<ul style="list-style-type: none"> <li>The area is situated partly within the high sensitivity zone</li> <li>The area is overlapping with Karoo thicket, which might provide roosting opportunities for bats</li> <li>Some riverine vegetation, which might provide roosting opportunity to bats, might be destroyed</li> </ul>
Construction Laydown Area Option 2	<b>No Preference</b>	<ul style="list-style-type: none"> <li>The area is situated partly within the high sensitivity zone</li> <li>The area is overlapping with Karoo thicket, which might provide roosting opportunities for bats</li> <li>Some riverine vegetation, which might provide roosting opportunity to bats, might be destroyed</li> </ul>

### 12.1 No-Go Alternative

The landowners indicated that would the development not take place, the same land-use activities would prevail; thus, the status quo would be maintained. No negative or positive impact is expected on bats would the development not take place.

### **13. UPDATED LAYOUT**

On 6 April 2022, an adapted layout was provided to the specialist, see Figures 25 and 26. A considerable number of turbine positions were removed from bat sensitivity zones so that only two turbines, as mentioned in Section 9, are still situated within bat sensitive areas. Turbine number 18, is situated in a High-medium sensitivity zone and turbine number 10 is situated in a Medium sensitivity zone. The findings of the impact assessment, as well as the impact ratings, remain the same for the updated turbine layout as well as grid connection.

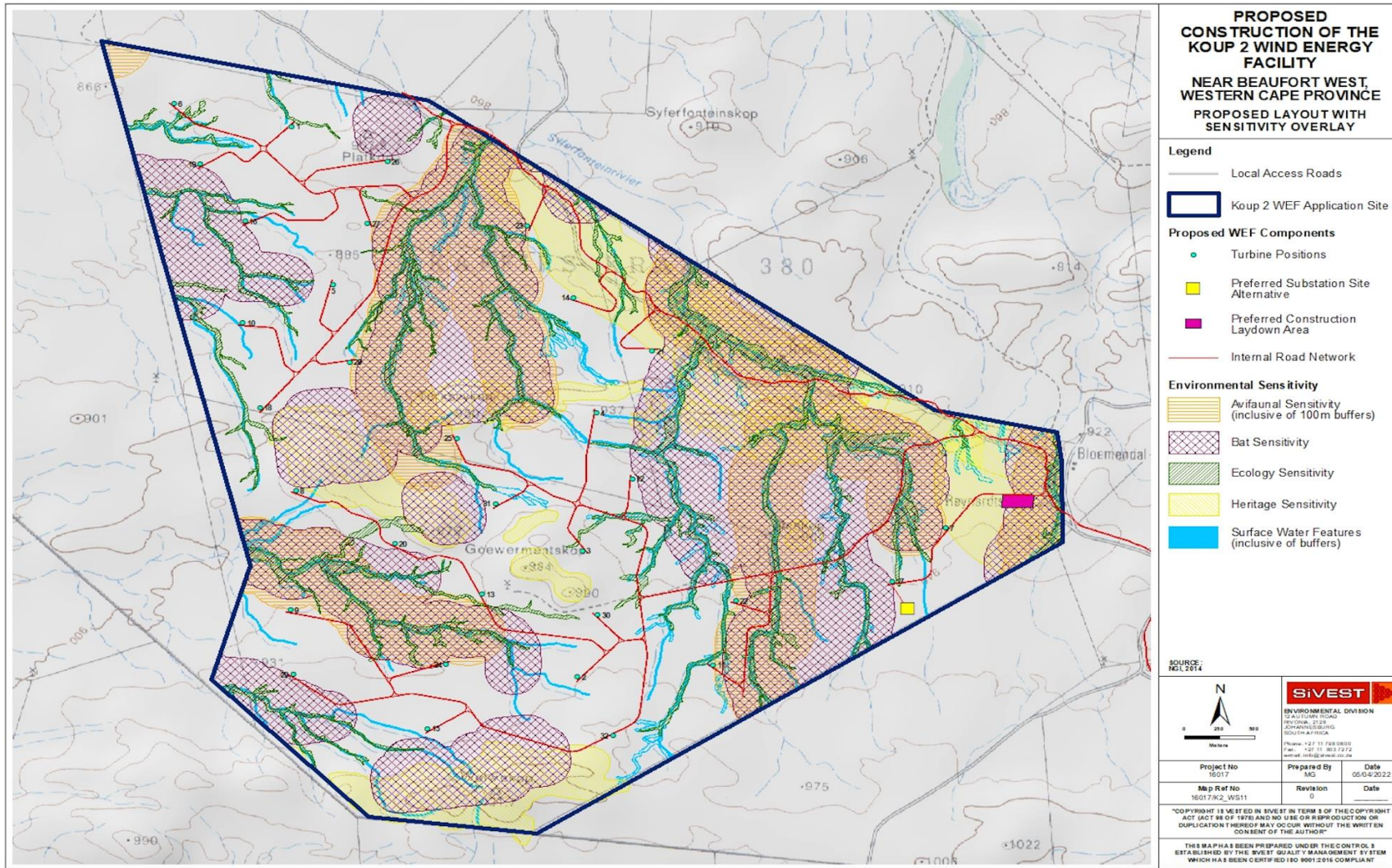


Figure 25: Updated layout with the environmental sensitivity zones.

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 Version No. 1

Date: 9 September 2021

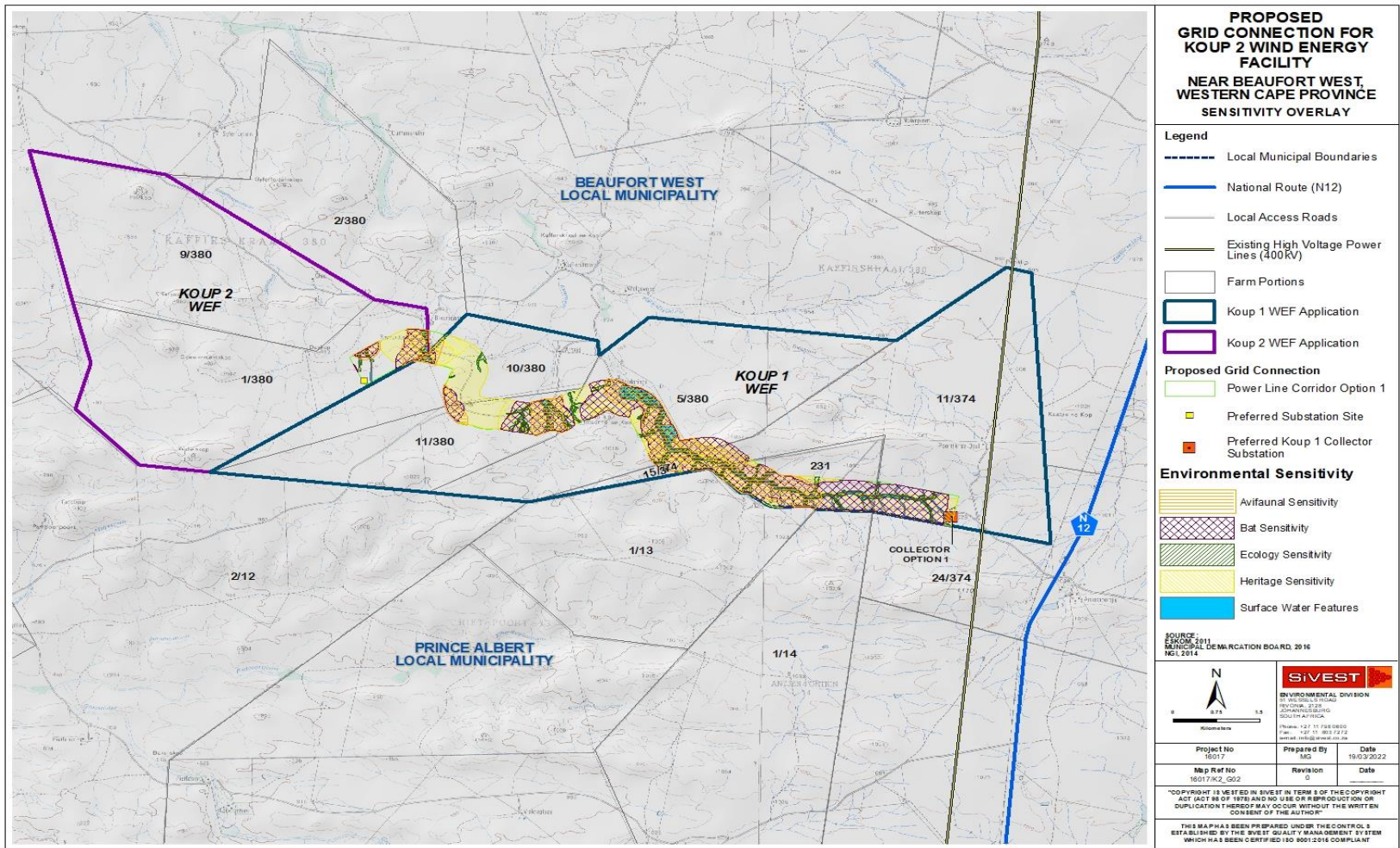


Figure 26: Updated layout of the proposed grid connection and substation site, with the environmental sensitivity zones.

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## 14. CONCLUSION AND SUMMARY

### 14.1 Summary of Findings

The most important aspect of the project that would affect bat populations adversely is the wind turbines themselves, through direct collisions and barotrauma. Other potential impacts to bats due to WEF developments include loss of existing and potential roosts. Derelict buildings, koppies with rocky ridges, low trees with associated denser vegetation along the riverbeds and livestock water points, could potentially attract bats to the study area. The sporadic rainfall seasons that sometimes occur in arid areas like the Karoo reflect on periods of insect emergence and accompanying higher bat activity. One should bear in mind that we are in a dry spell at present and that this could change during higher precipitation in future. These changes could result in changes in the bat activity which have not been accounted for in this report.

During the monitoring period five species were recorded, with 95% of the calls representing the *Molossidae* family, mostly calls like *Tadarida aegyptiaca*, which is the dominant species on site. *T. aegyptiaca* has a high risk of collision and barotrauma. The rest of the species recorded are represented by relatively low numbers, with 11% of the calls like *Sauromy petrophilus*, also from the family *Molossidae*, and 4% *Neoromicia capensis*. 1% of the calls were like the endangered *Miniopterus Natalensis*.

The annual average bat activity is 0.41 bats per hour for the monitoring period at the proposed Koup 2 WEF site, which is within the range of low risk for the Nama Karoo terrestrial ecoregion (Sowler et al., 2017). The systems at all the masts fall within the category of low risk. Bat activity at the 110m Met mast (E), which was situated within the sweep of the proposed turbine blades, was 0.35 bat passes per hour. The 20m Met mast (F) recorded the highest activity and the 10m mast (G) recorded the lowest bat activity

System F, the lower Met mast system, recorded the same bat diversity if compared to System E, situated at 110 m on the Met mast. Although the latter portrayed lower activity, this is an indication that although activity is lower at height, the species diversity is comparable. System G, on the temporary 10 m mast, situated towards the centre of the terrain, displayed substantially lower activity than the two other systems. The data recorded at this mast should be observed with caution as bat activity might increase if water collects in the nearby riverbed after spells of rain. Although the activity is lower, there is a relative higher occurrence of the Near Threatened *Miniopterus natalensis* at Mast G. As little variation has been shown between the low and high-altitude systems, and due to the foraging behaviour of *M. natalensis*, this endangered species might also be active within the sweep of the turbine blades.

An expected increase in activity was recorded one to two hours after sunset, until a peak in activity was observed around 22:00. Thereafter, bat activity declined gradually up to approximately an three to two hours before sunrise.

No bats passes were recorded during the seasonal transects in winter, spring and summer, while seven bat passes were recorded during autumn, on 25 April 2021. This is surprisingly high activity if compared to the other transects at Koup 2, as well those as Koup 1, the neighbouring proposed wind farm and coincide with

the relative higher bat activity during autumn. Three calls like *Miniopterus natalensis* and four calls like *Neoromicia capensis* were recorded, but no calls of *T. aegyptiaca*.

The table below summarises the overall significance rating of the impacts of the Koup 2 WEF on bats.

Phase	Impact before mitigation (negative)	Impact after mitigation (negative)
Construction	23 (5-23) Low	7 (5-23) Low
Operation	35 (24-42) Medium	25 (24-42) Medium
Decommissioning	8 (5-23) Low	5 (5-23) Low
Cumulative	47 (43-61) High	32 (24-42) Medium
Combined for the site	28 (24-42) Medium	17 (5-23) Low

Although the overall significance rating for Construction is rated as low before mitigation, the impact of clearing and excavation of natural habitat is rated medium, whereas the other two impacts rate low. The overall significance rating for Operation is medium, although three impacts rate high before mitigation. These impacts are direct collision and barotrauma, loss of airspace due to the turning of turbine blades and the impact on the genetic pool.

Cumulative impacts before mitigation rates high due to the cumulative impact on bat mortality due to direct collision and barotrauma and the impact on bat populations. After mitigation, the impact decreases to a medium cumulative impact. For the cumulative effect, the total output of approximately 560 MW for approved WEFs within a 35km radius of (and including) Koup 2 and Koup 1 WEFs, was considered. The collective Bat Index, thus the mean number of bats per hour per year, using Beaufort West and Trakas WEFs, is calculated at 2.1 bats per hour, which is High for Nama-Karoo. The cumulative impact significance rating at Koup 2 fall into the same category as the surrounding WEFs with a high negative (47) before mitigation and medium negative (32) after mitigation.

During April 2022, an updated layout was provided. After the layout changes, only two turbines are still situated within sensitivity zones, one in the High-medium and one in the Medium sensitivity zones.

It is recommended that operational monitoring and mitigation are implemented upon construction of the WEFs to try to curb the high collected negative impact. At the least, turbines need to be controlled below cut in speed and freewheeling not be allowed when no power is generated.

It is recommended that the following is included in the Environmental Authorisation:

- The final layout should adhere to the sensitivity map, as provided in Section 8.
- A mitigation scheme, as per Section 9.2 should apply to operational turbines in High-medium sensitivity zones, right from the start, when turbines start to turn, see the table below.

- No freewheeling of turbines is allowed when power is not generated. Turbines do not need to be at a standstill, but there should be minimum movement so that bats are not at risk when turbines are not generating power.
- Mitigation measures apply as per the EMPR.
- A minimum of two years operational bat monitoring as per the latest guidelines should be conducted. If the operational bat specialist is of the opinion that an extended period of operational monitoring is needed, the client should adhere to this.
- Would high mortality be experienced during the operational monitoring, additional mitigation measures should be discussed, using Section 9.2, table 7, of this document, as a starting point.

CURTAILMENT FOR TURBINES IN MEDIUM SENSITIVITY ZONE			
Months	Time periods	Temperature (°C)	Wind speed (m/s)
March, April, May, Sept., Oct.	One hour after sunset up to 8 hours after sunset	Above 12 °C	Below 11 m/s

Bat deterrents could be an option for mitigation but will have to be investigated, but operational monitoring should refine the mitigation protocol.

Alternatives have been provided, with option 2 the preferred alternative for the proposed on-site substation and no preference for the Battery (BESS) complex laydown areas.

## 14.2 Conclusion and Impact Statement

According to the SiVest significance rating, the construction phase is rated as medium before mitigation and low after mitigation. The highest rating before mitigation is the impact of clearing and excavation of bat habitat. The operational phase is rated as medium before and after mitigation. Three significant ratings are high before mitigation and are reduced to medium after mitigation. These include direct collision and barotrauma, the foraging space occupied by turbine blades and the impact on bat populations.

More research is needed concerning fatal curiosity due to bats being attracted to turbines, so this component has a low significant rating before and after mitigation during operations. The impact of the decommissioning phase where turbines are removed after the lifespan of the WEF, rates low before and after mitigation. The cumulative impact rating before mitigation is high before mitigation and medium after mitigation. **The overall significance rating before mitigation is Medium and Low after mitigation.**

If the applicant adheres to the proposed mitigation measures, the potential impact on bats from the proposed Koup 2 Wind Farm is predicted to be Negative and of Low significance after mitigation. **Considering the findings of the one-year pre-construction monitoring undertaken at the proposed Koup 2 WEF site, this specialist is of the opinion that no fatal flaws exist, and environmental authorisation may be granted.**

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***APPENDIX A***  
***SPECIALISTS DECLARATION***



**environmental affairs**

Department  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

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

File Reference Number:	(For official use only)
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 construction of the Koup 2 wind energy facility and associated grid infrastructure, near Beaufort West, 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**

**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](mailto:EIAAdmin@environment.gov.za)

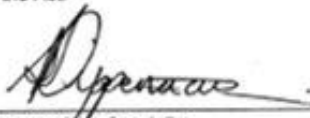
## 1. SPECIALIST INFORMATION

Specialist Company Name:	Stephanie Dippenaar Consulting trading as EkoVler			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	5	Percentage Procurement recognition	80%
Specialist name:	Stephanie Dippenaar Consulting			
Specialist Qualifications:	MEM			
Professional affiliation/registration:	Professional Member of SAIIES			
Physical address:	8 Florida Street			
Postal address:	8 Florida Street			
Postal code:	7600	Cell:	0822005244	
Telephone:	0822005244	Fax:		
E-mail:	sdippenaar@snowisp.com			

## 2. DECLARATION BY THE SPECIALIST

I, Stephanie C. Dippenaar, 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

Stephanie Dippenaar Consulting trading as EkoVler

Name of Company:

2 July 2021

Date

Details of Specialist, Declaration and Undertaking Under Oath

Page 2 of 3


3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Stephanie C. Dippenaar , 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

Stephanie Dippenaar Consulting trading as EkoVLer  
Name of Company

2 July 2021  
Date

  
Signature of the Commissioner of Oaths

2021-07-04  
Date



***APPENDIX B***

***CV: STEPHANIE DIPPENAAR***

# *ABBREVIATED CURRICULUM VITAE:*

## **STEPHANIE CHRISTIA DIPPENAAR**

### **PROFESSION: ENVIRONMENTAL MANAGEMENT, SPECIALISING IN BAT IMPACT ASSESSMENTS**

**Nationality:** South African  
**ID number:** 6402040117089

#### **CONTACT DETAILS**

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**Postal Address:** 8 Florida Street, Stellenbosch, 7600  
**Telephone Number:** 021-8801653  
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**e-mail:** sdippenaar@snowisp.com

#### **EDUCATION**

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1986 BA University of Stellenbosch  
1987 BA Hon (Geography) University of Stellenbosch  
1999 MEM (Masters in Environmental Management) University of the Free State

#### **PROFESSIONAL MEMBERSHIP and COMMITTEES**

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Member of the Southern African Institute of Ecologists and Environmental Scientists (SAIEES), since 2002.  
SACNASP registration in process.  
Steering committee of the South African Bat Assessment Association (SABAA)

#### **EMPLOYMENT RECORD**

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- 1989: The Academy: University of Namibia. One-year contract as a lecturer in the Department of Geography.

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**SiVEST Environmental** Prepared by: **Stephanie Dippenaar Consulting**  
Bat Specialist Study  
Version No. 1

**Date:** 9 September 2021

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- 1990: Windhoek College of Education. One-year contract as a lecturer in the Department of Geography.
  - Research assistant, Namibian Institute for Social and Economic Research, working on, amongst others, a situation analyses on women and children in Namibia, contracted by UNICEF.
  - Media officer for Earth life African, Namibian Branch.
- 1991: University of Limpopo. One-year contract as a lecturer in the Department of Environmental Sciences.
- 1992: Max Planck Institute (Radolfzell-Germany). Mainly involved in handling birds and assisting with aviary studies.
- Swiss Ornithological Institute. Working in the Arava valley, Negev – Israel, as a radar operator on a project, involved in an Impact Assessment Study concerning shortwave towers on bird migration patterns.
- 1993 - 2004: University of Limpopo. Lecturer in the sub-discipline Geography, School of Agriculture and Environmental Sciences. Teaching post- and pre-graduate courses in environment related subjects in the Faculty of Mathematics and Natural Sciences, Faculty of Law, Faculty of Health and the Water and Sanitation Institute.
  - 2002-2004: Member of the Faculty Board of the Faculty of Natural Sciences and Mathematics.
  - 2002: Principal investigator of the Blue Swallow project, Northern Province, Birdlife SA.
  - 2002: Evaluating committee for the EMEM awards (award system for environmental practice at mines in South Africa)
  - 2001-2004: Private consultancy work, focussing on environmental management plans for game reserves.
- 2004-2011: CSIR, South Africa, doing environmental strategy and management plans and environmental impact assessments, mainly on renewable energy projects.
- From 2015 to 2017: Teaching a part-time course in Environmental Management to Post-graduate students at the Department of Geography and Environmental Studies, University of Stellenbosch.
- 2011 onwards: Sole proprietor, Stephanie Dippenaar Consulting, trading as EkoVler.

## PROJECT EXPERIENCE RECORD

The following table presents an abridged list of project involvement, as well as the role played in each project:

Completion	Project description	Role
In progress	Preconstruction bat monitoring at Kraaltjies WEF, Beaufort-West	Bat specialist
In progress	Preconstruction bat monitoring at Heuweltjies WEF, Beaufort-West	Bat specialist
In progress	Preconstruction bat monitoring at Patatskloof WEF, Ceres	Bat specialist
In progress	Preconstruction bat monitoring at Kareerivier WEF, Ceres	Bat specialist
In progress	Operational bat monitoring at Excelsior wind energy facility	Bat specialist
In progress	Preconstruction bat monitoring at Koup 2 WEF, Beaufort-West	Bat specialist



<b>Completion</b>	<b>Project description</b>	<b>Role</b>
In progress	Preconstruction bat monitoring at Koup 1 WEF, Beaufort-West	Bat specialist
In progress	Preconstruction bat monitoring for two wind energy facilities at Kleinzee	Bat specialist
In progress	Preconstruction bat monitoring at Latrodex WEF, Haga	Bat specialist
In progress	Operational bat monitoring at Kangnas Wind Farm, Springbok	Bat specialist
2021	Preconstruction bat monitoring at Gromis WEF, Kleinzee	Bat specialist
2021	Preconstruction bat monitoring at Komas WEF, Kleinzee	Bat specialist
In progress	Preconstruction bat monitoring at Kappa 2 Wind Farm, Touwsrivier	Bat specialist
In progress	Preconstruction bat monitoring at Kappa 1 Wind Farm, Touwsrivier	Bat specialist
2020	Operational bat monitoring at Khobab Wind Farm, Loeriesfontein	Bat specialist
2020	Operational bat monitoring at Loeriesfontein 2 Wind Farm, Loeriesfontein	Bat specialist
In progress (year 5)	Operational bat monitoring at the Noupoot Wind Farm	Bat specialist
2019	Paalfontein bat screening study, Matjiesfontein	Bat specialist
2019	12 Amendment reports for a wind energy client	Bat specialist
2019	Preconstruction bat impact assessment for the Bosjesmansberg WEF, Copperton	Bat specialist
2018	Preconstruction Bat Monitoring at the Tooverberg Wind Energy Facility, Touwsrivier	Bat specialist
2016	Bat “walk through” for the Hopefield Powerline associated with the Hopefield Community WEF	Bat specialist
2016	Environmental Management Plan for Elephants in Captivity at the Elephant Section, Camp Jabulani, Kapama Private Game Reserve.	Project Manager
2016	Environmental Management Plan for Hoedspruit Endangered Species Centre, Kapama Game Reserve.	Project Manager
2012-2013	Bat impact assessment for the Karookop Wind Energy Project EIA.	Bat specialist

<b>Completion</b>	<b>Project description</b>	<b>Role</b>
2012	Bat specialist study for Vredendal Wind Farm EIA.	Bat specialist
2011-2012	Bat monitoring and bat impact assessment for the Ubuntu Wind Project EIA, Jeffreys Bay.	Bat specialist
2011	Bat specialist study for the Banna Ba Pifhu Wind Energy Development, Jeffrey's Bay .	Bat specialist
2011(project cancelled)	Basic Assessment for the development of an air strip outside Betty's Bay.	Project Manager
2011	Bat specialist study for the wind energy facility EIA at zone 12, Coega IDZ, Port Elizabeth.	Bat specialist
2010-2011	Bat specialist study for the Wind Energy Facility EIA at Langefontein, Darling.	Bat specialist
2010-2011	Bat specialist study for the EIA concerning four wind energy development sites in the Western Cape.	Bat specialist
2010	Bat specialist study for Electrawinds Wind Project EIA, Port Elizabeth.	Bat specialist
2010	Environmental Management Plan for the Goukou Estuary.	Project Manager
2010	EIA for the 180MW Jeffrey's Bay Wind Project, Eastern Cape (Authorisation received).	Project Manager
2010	EIA for 9 Wind Monitoring Masts for the Jeffrey's Bay Wind Project (Authorisation received).	Project Manager
2009-2010	EIA for the NamWater Desalination Plant, Swakopmund (Authorisation received).	Project Manager
2007 -2011	EIA for the proposed Jacobsbaai Tortoise reserve, Western Cape(Left CSIR before completion of project, Authorisation rejected).	Project Manager
2007-2008	Environmental Impact Assessment for the Kouga Wind Farm, Jeffrey's Bay, Eastern Cape (Authorisation received).	Project Manager
2006-2008	Site Selection Criteria for Nuclear Power Stations in South Africa.	Co-author

Completion	Project description	Role
2005	Auditing the Environmental Impact Assessment process for the Department of Environment and Agriculture, KwaZulu Natal, South Africa	Project Manager
2005	Background paper on Water Issues for discussions between OECD countries and Developing Countries.	Author
2005	Integrated Environmental Education Strategy for the City of Tshwane.	Co- author
2005	Developing a ranking system prioritizing derelict mines in South Africa, steering the biodiversity section.	Contributor
2005	Policy and Legislative Section for a Strategy to improve the contribution of Granite Mining to Sustainable Development in the Brits-Rustenburg Region, North-West Province, South Africa.	Author
2005	Environmental Management Plan for the purpose of Leopard permits: Dinaka Game Reserve.	Project Manager in collaboration with Flip Schoeman†
2004	Environmental Management Plan for the introduction of lion: Pride of Africa.	Project Manager in collaboration with Flip Schoeman†
2004	Environmental Management Plan for the establishment of a Conservancy: Greater Kudu Safaris	Project Manager in collaboration with Flip Schoeman†

## MEMBERSHIPS, CONFERENCES, WORKSHOPS AND COURSES

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- Committee Member of the South African Bat Assessment Association (SABAA).
- Member of the KZN Bat Rescue Group.
- Updated Basic Fall Arrest certification.

- Presenting a paper at the South African Bat Assessment Association conference, October 2017: Ackerman, C and S.C Dippenaar, 2017: Friend or Foe? The Perception of Stellenbosch Residents Towards Bats, 2017.
- Attend Snake Awareness, Identification and Handling course by Cape Reptile Institute, 2016.
- Attend a course in the management and care of bats injured by wind turbines by Dr. Eleanor Richardson, Kirstenbosch, 27 August 2014
- Mist netting and bat handling course by Dr. Sandie Sowler, Swellendam, 5 November 2013.
- Attendance and fieldwork to identify bat species and look at new Analoow software with Chris Corben, the writer of the Analoow bat identification software package and the Anabat Detector, during 10 and 11 October 2013.
- Attend yearly Bats and Wind Energy workshops.
- A four-day training course on Bat Surveys at proposed Wind Energy Facilities in South Africa, hosted by The Endangered Wildlife Trust, Greyton, between 22 and 26 January 2012.
- Presentation as a plenary speaker at the 4th Wind Power Africa Conference and Renewable Energy Exhibition, at the Cape Town International Convention Centre, on 28 May 2012. Title: *Bat Impact Assessments in South Africa: An advantage or disadvantage to wind development EIAs.*
- Anabat course by Dr. Sandy Sowler, Greyton, 13 February 2011.
- Attending a Biodiversity Course for Environmental Impact Assessments presented by the University of the Free State, Mei 2010.

## LANGUAGE CAPABILITY

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Fluent in Afrikaans and English

## PEER REVIEWED PUBLICATIONS

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Dippenaar, S, and Lochner, P (2010): EIA for a proposed Wind Energy Project, Jeffrey's Bay in SEA/EIA Case Studies for Renewable Energy.

Dippenaar, S. and Kotze, N. (2005): People with disabilities and nature tourism: A South African case study. Social work, 41(1), p96-108.

Kotze, N.J. and Dippenaar, S.C. (2004): Accessibility for tourists with disabilities in the Limpopo Province, South Africa. In: Rodgerson, CM & G Visser (Eds.), Tourism and Development: Issues in contemporary South Africa. Institute of South Africa.

## REFERENCES

<b><u>Minnelise Levendal</u></b> EIA Practitioner: CSIR	<b><u>Brent Johnson</u></b>
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*APPENDIX C*  
*SITE VERIFICATION REPORT*

# Site Sensitivity Verification: Koup 2 Wind Energy Facility

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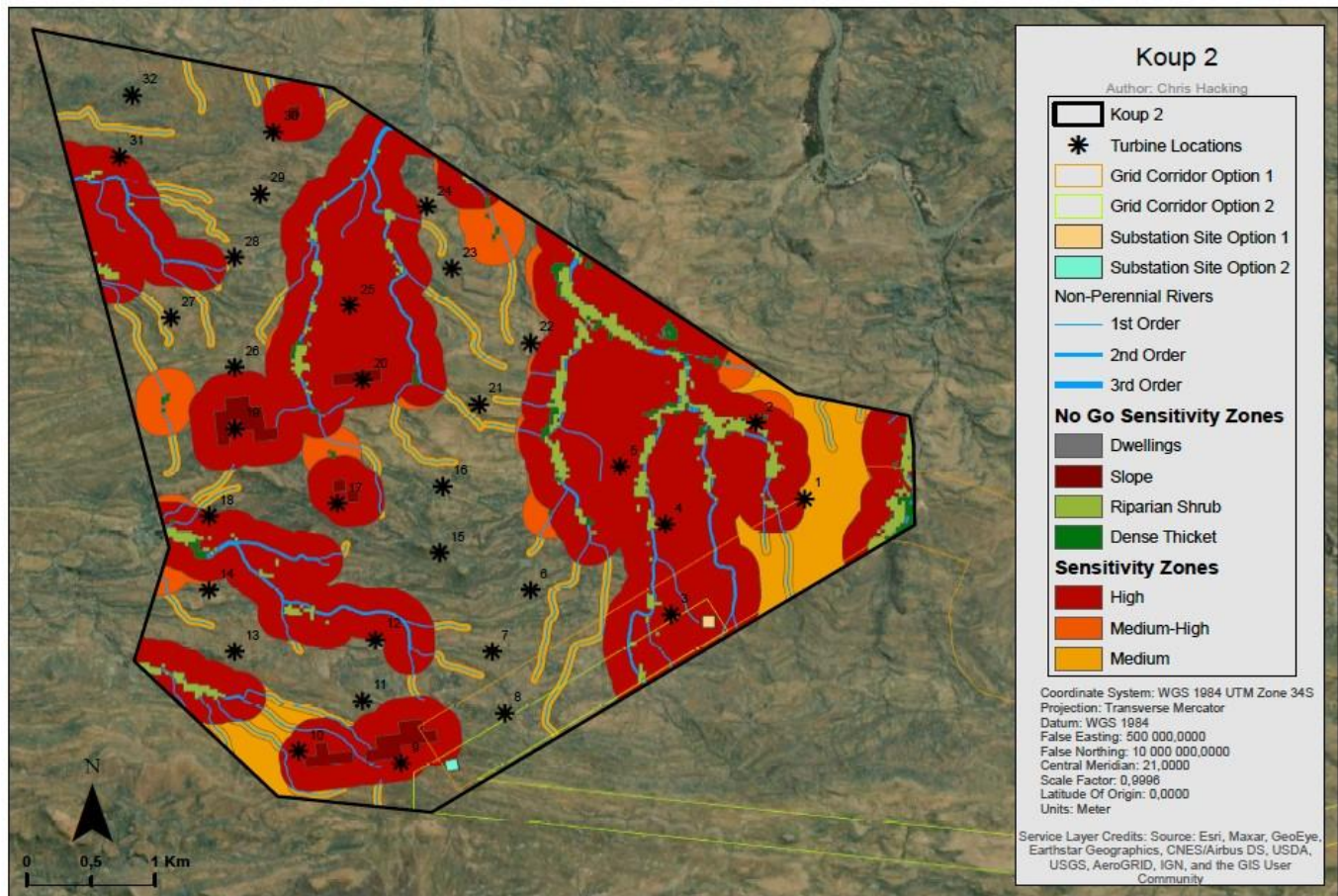
**In terms of Part A of the Assessment Protocols published in GN 320 on 20 March 2020**

## **1 INTRODUCTION**

Stephanie Dippenaar Consulting has been appointed by Genesis Koup 2 Wind (Pty) Ltd, to conduct a 12-month bat study for the proposed Koup 2 Wind Energy Facility (WEF) east of Leeu Gamka in the Western Cape. The project proposes a 140 MW Wind Energy Facility, with associated infrastructure, covering a study area of approximately 2477.408 ha, and is situated just outside the Beaufort West Renewable Energy Development Zone (REDZ).

In accordance with Appendix 6 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, a site sensitivity verification has been undertaken to confirm the current land use and environmental sensitivity of the proposed project area as identified by the national web-based environmental screening tool (Screening Tool).

## 2 SITE SENSITIVITY VERIFICATION



**Figure A: Site Sensitivity Map showing No-Go Zones and Sensitivity Zones on Koup 2.**

To verify this classification, the following methods were applied during the 12-months preconstruction bat monitoring exercise:




- A desktop analysis was undertaken using available national and provincial databases as well as digital satellite imagery (Google Earth Pro and ArcGis 10.4).
- Onsite inspections and roost searches were conducted by a bat specialist during field work sessions.
- Data, consisting of nightly bat activity, was recorded for 14 months from four static monitoring points, which were positioned amongst the proposed turbine blades at heights of 10 m, 20 m and 110 m respectively. The latter was positioned in all the different biotopes.
- Interviews with landowners and investigations of farm buildings were conducted.



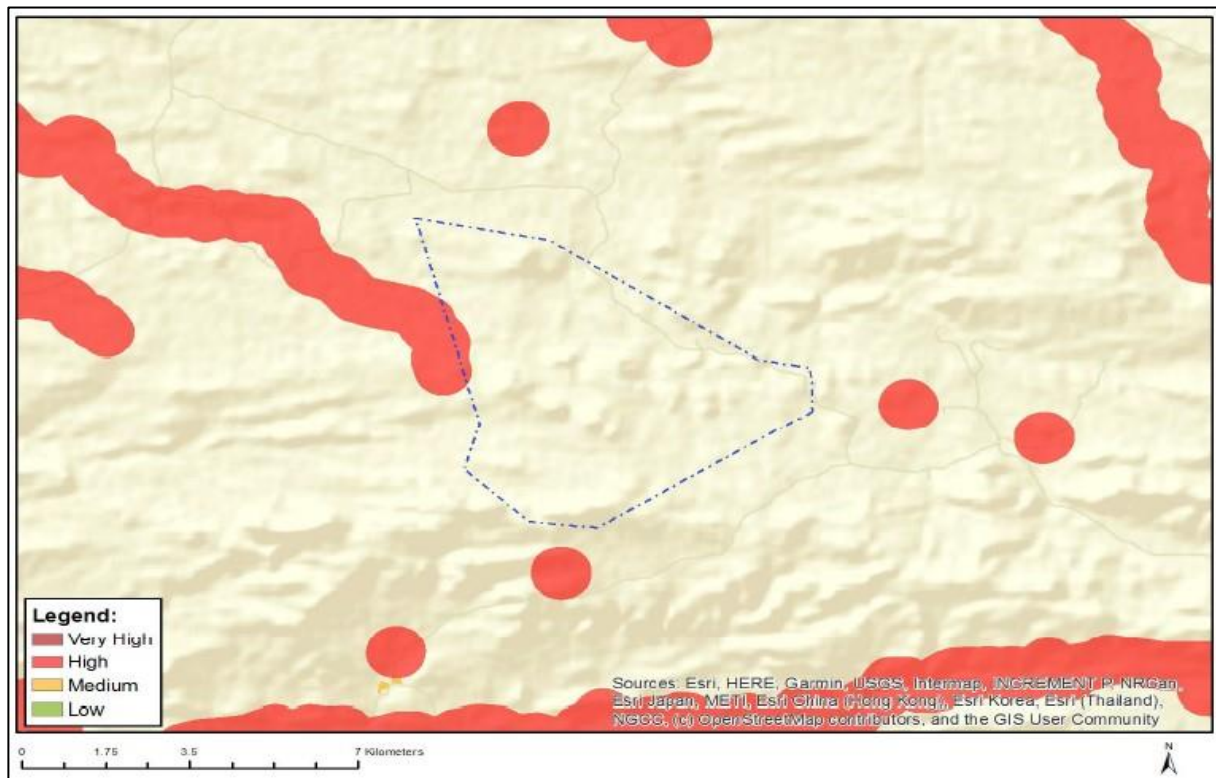
### 3 OUTCOME OF SITE SENSITIVITY VERIFICATION

See Table A below for photos indicating bat conducive features and bat presence.

**Table A: Environmental features that may be favourable to bats.**

	<p><b>Vegetation</b></p> <p>Although most of the site is covered in the typical Karoo vegetation of the area, for those bats that might prefer roosting in vegetation or under the bark of trees, trees situated in the dry riverbeds could provide roosting opportunity</p>
	<p><b>Rock formations and rock faces</b></p> <p>Rock formations along the hill tops and along the river valleys provide ample roosting opportunities for bats. An example is the dry river valley at the southwestern side of the farm, Glen, bordering Reynardtskraal, which provides ample roosting opportunities (see adjacent photo).</p>
	<p><b>Human dwellings</b></p> <p>Human dwellings could provide roosting space for some bat species. The garage at Glen has a small roost of Egyptian slit-faced bats (<i>Nycteris thebaica</i>). The landowner said that the roost was there as long as he can remember, although their numbers often vary (during the site visit, 12 bats were counted). <i>N. thebaica</i> has a conservation status of Least Concern and has a low potential risk of collusion by wind turbines, as they tend to be a clutter forager. The author of this report has encountered this species at other prospecting wind farms in the Karoo, where they often roost in derelict buildings.</p>

## 4 NATIONAL ENVIRONMENTAL SCREENING TOOL



**Figure B: Expected bat sensitive features at the Koup 2 WEF site (Screening Tool Report, 2021).**

The screening tool was applied to the study area and it was determined that areas of high bat sensitivity is expected to occur along the western boundary of the site due to the proximity of a river within 500m. The land use capability is rated as very low and the greater part of the site is classified as low bat sensitivity.

Environmental features that may be favoured by bats are described in paragraph 3 above and confirmed with photographs taken during a site visit. These have been identified as vegetation, rock formations and human dwellings that may provide roosting opportunities.

## 5 CONCLUSION

The Screening sensitivity is correct for the site if bat activity data for the Koup 2 pre-construction bat monitoring, between March 2020 and April 2021, is considered. The greater part of the site is rated as Low according to the Threshold categories provided in the relevant bat guidelines (Sowler et al., 2017). A more in-depth discussion supporting this conclusion is presented in Section 8 of the present report.

## ***APPENDIX D***

### ***WEATHER SUMMARY FOR BAT ANALYSIS – JUNE 2021***

## Weather Summary Statistics: KOUP 2

Total of 406 days between 06/03/2020 and 24/04/2021

	Mean (Average)	Min	Max	Median
Wind_120m	8.07 m/s	1.46 m/s	18.18 m/s	8.1 m/s
Wind_60m	6.95 m/s	1.46 m/s	15.64 m/s	7.06 m/s
Temp_114m	15.71 Deg C	1.95 Deg C	26.73 Deg C	16.34 Deg C
Temp_10m	15.54 Deg C	2.8 Deg C	27.57 Deg C	15.98 Deg C
Humidity_ 114m	52.11 %	12.67 %	89.37 %	54.2 %

## *APPENDIX E*

### *SIGNIFICANCE RATING MATRIX FOR BATS AT KOUP 2*

KOUP 2 WEF FACILITY																				
ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION										
		E	P	R	L	D	I / M	TOTAL STATUS (+ OR -)		S	E	P	R	L	D	I / M	TOTAL STATUS (+ OR -)	S		
<b>Construction Phase</b>																				
Clearing vegetation, landscape modifications and excavation for working areas and construction causing destruction of natural bat habitat.	The destruction of active bat roost and features that could serve as bat roosts, such as rock formations, removal of trees or dense bushes on site, destruction of derelict aardvark or other holes and fragmentation of habitat. Removal of trees would impact bats that roost in trees and on foraging of clutter and clutter-edge species.	1	3	3	3	4	2	28	-	Medium	Construction activities to be kept out of all No-go and high bat sensitive areas. Visual inspection and continuous monitoring of high sensitivity areas, erosion prevention, chemical pollution and vehicle activity to prevent habitat destruction. Rock formations occurring along the ridge should be avoided during construction as these serve as roosting space for bats. Destruction of trees and dense bushes should be avoided. Where destruction of trees or dense bushes are unavoidable, careful investigation for any bat roost should be conducted before the tree is removed. Aardvark holes, derelict holes or excavations should not be destroyed before careful examination for bats. Careful investigation of old telephone poles for roosts before any destruction. Appoint and ECO to oversee that the EMPR is adhered to. Bat specialist to train ECO, if necessary to identify possible bat roosts or signs of bat presence. The ECO/site manager should contact a bat specialist before construction commences because they know what to look out for during construction. No off-road driving.	1	2	2	2	2	1	9	-	Low
Excavation and building of new structures.	Creating a new habitat amongst turbines which might attract bats. This includes areas close to turbines and infrastructure such as new roofs that could attract bats to the terrain and serve as roosting space and open water sources from quarries or excavation where water could accumulate.	1	3	2	2	3	2	22	-	Low	Completely seal off roofs of buildings (sub-stations/site buildings). Note a small bat could enter a hole the size of 1 square cm. Roofs need to be regularly inspected during the lifetime of the WEF and any new holes need to be sealed. Excavation areas or artificial depressions and excavation holes should be filled and rehabilitated to avoid creating areas of open water sources that could attract bats during rainy spells. If buildings, trees or structures providing potential roosts need to be demolished, the ECO is required to investigate the features before commencement of the work.	1	1	1	1	3	1	7	-	Low
Impact of noise and light especially during night time.	Construction noise, especially at night as well as light that may disturb bat activity and behaviour.	1	3	2	2	3	2	18	-	Low	Nightly construction activities should be avoided, or if necessary, minimised to the shortest period possible. With the exception of civil aviation lighting, artificial lighting during construction should be minimised, especially bright lights or spot lights. Lights should avoid skyward illumination. Turbine tower lights should be switched off when not in operation where possible. Construction should be monitored to reduce noise and minimise disturbance in bat sensitive areas.	1	2	1	1	1	1	6	-	Low

Operational Phase																				
Fatality of bats due to direct collision or barotrauma.	Fatality of resident bats occupying the airspace amongst the turbines through direct collision or barotrauma caused by the turning blades during operation of the wind farm would negatively impact on bats. High flying Molossidae species have predominately been confirmed at the proposed Koup 2 site.	2	4	3	4	3	3	48	—	High	Operational bat monitoring should start immediately when turbines start to turn. A bat specialist should be appointed before the the turbines start to turn and operational bat monitoring should immediately when the turbines start to turn. Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be applied and implemented without delay to reduce bat mortality during the operational lifetime of the wind farm. All bat monitoring activities should be supervised. All turbines and components including rotor swept zone, should be kept out of all No-go areas and preferably high sensitive zones. Mitigation as proposed for high bat sensitivity in Section 8, 9.1, 9.2 and 9.3 should be applied as soon as the turbines start operating for the site as a whole. Mitigation as proposed for high medium sensitivity zones in Section 9.2, Table 7 must be adhered to when turbines start operating. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase. A register should be maintained of bat mortality/injury as well as regular communication between the bat specialist and the site manager. Close operational monitoring of specific turbines where high bat mortality occurs should implement mitigation of these specific turbines without delay, using Section 9, Table 8, as a starting point for discussions. Freewheeling should be avoided, to a point where the turbines are not a threat to bats, when turbines do not generate power. Except for compulsory lighting, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine lights should be switched off when not in operation, if possible, depending on civil aviation laws. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at WEFs (Aronson, et al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines applicable during the monitoring period. Prolonged post construction mitigation beyond the prescribed two years might be necessary, if advised by the operational bat specialist. It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines, but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 2 WEF; therefore, the installation of more than one monitoring system at height, will be recommended. The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 2 WEF site.	2	3	2	3	3	2	26	—	Medium
Bat fatality of migratory species.	Bat fatality of migratory species during the operational lifetime of the wind farm.	2	3	3	3	3	2	28	—	Medium	Care should be taken during post construction monitoring to verify the activity and number of migratory species such as <i>M. natalensis</i> , especially within the rotor swept area of the turbine blades. Carcasses should be identify to establish the fatality of the species. All turbines and components (including rotor swept zone, should be kept out of all No-go areas and preferably high sensitive zones. Mitigation as proposed in Section 8, 9.1, 9.2 and 9.3 should be applied as soon as the turbines start operating for the site as a whole. Mitigation as proposed for High-medium sensitivity zones in Section 9, Table 7 must be adhered to when turbines start operating. Close operational monitoring should inform whether mitigation for specific turbines should be implemented using Section 9, Table 8 as a starting point for discussions. Operational bat monitoring should start immediately when turbines start to turn. A bat specialist should be appointed before the the turbines start to turn and operational bat monitoring should immediately when the turbines start to turn. Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be applied and implemented without delay. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at WEFs (Aronson, et al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines applicable during the monitoring period. It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines, but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 2 WEF; therefore, the installation of more than one monitoring system at height, will be recommended. The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 2 WEF site.	2	2	1	2	2	2	18	—	Low

Loss of bats of conservation value.	Fatality of bats of conservation value on the site during operations should be avoided.	2	3	3	3	3	2	28	—	Medium	Proven mitigation measures such as curtailment, should be applied if high activity of bats of conservation value is recorded, or if high numbers of carcasses are collected, during post-construction. All turbines and components (including rotor swept zone, should be kept out of all No-go areas and preferably high sensitive zones. Mitigation as proposed in Section 9 should be applied as soon as the turbines start operating for the site as a whole. Mitigation is proposed for high sensitivity zones in Section 9, Table 7 must be adhered to when turbines start operating. Close operational monitoring should inform whether mitigation for specific turbines should be implemented, using Section 9, Table 8, as a starting point for discussions. Operational bat monitoring should start immediately when turbines start to turn. A bat specialist should be appointed before the the turbines start to turn and operational bat monitoring should immediately when the turbines start to turn. Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be applied and implemented without delay. Freewheeling should be avoided, to a point where the turbines are not a threat to bats, when turbines do not generate power. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at WEFs (Aronson, et al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines applicable during the monitoring period. It is understood that static bat monitoring equipment on turbines has a cost implication. Prolonged post construction mitigation beyond the prescribed two years might be necessary if advised by the operationa bat specialist. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines, but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 2 WEF; therefore, the installation of more than one monitoring system at height, will be recommended. The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 2 WEF site.	2	2	1	2	2	2	18	—	Low
Bat fatality due to the attraction of bats to the turbine blades (Fatal curiosity).	Bat mortality due to the attraction of bats to wind turbines (Horn, et al., 2008). Bats have shown to sometimes be attracted to wind turbines out of curiosity or reasons still to under investigation.	1	2	2	2	2	2	18	—	Low	Little is known about the impact and mitigation could be adapted if more research becomes available. The loss of habitat and foraging space should be mitigated to avoid bat mortality. Operational activities on the wind farm should adhere to the sensitivity zones as indicated in the bat monitoring report and bat sensitivity map. No off-road driving on site should be allowed. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should rather be switched off when not in operation, if possible.	1	2	2	2	2	1	9	—	Low
Loss of habitat and foraging space	Loss of habitat and foraging space during operation of the wind turbines.	2	4	3	3	3	3	45	—	High	Recommended buffer zones and sensitive areas identified by the specialist must be avoided, see Section 8 and Figure 22. All turbines and components (including rotor swept zone, should be kept out of all No-go areas and preferably high sensitive zones. Mitigation as proposed in Section 9 should be applied as soon as the turbines start operating for the site as a whole. Mitigation is proposed for high sensitivity zones in Section 9, Table 7 must be adhered to when turbines start operating. Close operational monitoring should inform whether mitigation for medium sensitivity zones, as described in Section 9, Table 8, should be applied. Operational bat monitoring should start immediately when turbines start to turn. A bat specialist should be appointed before the the turbines start to turn and operational bat monitoring should immediately when the turbines start to turn. Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be applied and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9 as a starting point for discussions. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at WEFs (Aronson, et al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines applicable during the monitoring period. It is understood that static bat monitoring equipment on turbines has a cost implication. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines, but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 2 WEF; therefore, the installation of more than one monitoring system at height, will be recommended. The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 2 WEF site.	2	4	2	2	3	3	39	—	Medium



Reduction in the size, genetic diversity, resilience and persistence of bat populations.	Operational activities on the wind farm that will attract bats to high risk areas on site has to be prevented as bats have low reproductive rates and populations are susceptible to reduction by fatalities other than natural death. Furthermore, smaller bat populations are more susceptible to genetic inbreeding.	2	4	3	3	3	3	3	45	—	High	All turbines and components (including rotor swept zone, should be kept out of all No-go areas and preferably high sensitive zones as described in Section 8 and 9.1. Mitigation as proposed in Section 9.2 and 9.3 should be applied as soon as the turbines start operating for the site as a whole. Mitigation is proposed for high and high medium sensitivity zones in Section 9, Table 7 must be adhered to when turbines start operating. Close operational monitoring of specific turbines in sensitivity zones should be mitigated using Section 9, Table 8, as a starting point for discussions. Operational bat monitoring should start immediately when turbines start to turn. A bat specialist should be appointed before the turbines start to turn and operational bat monitoring should immediately when the turbines start to turn. Careful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be applied and implemented without delay. Freewheeling should be avoided, to a point where turbines do not generate power. Except for compulsory lighting required in terms of civil aviation, artificial lighting should be minimised, especially bright lights. Lights should rather be turned downwards. Turbine tower lights should be switched off when not in operation, if possible. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South Africa Good Practice Guidelines for Operational Monitoring for Bats at WEFs (Aronson, et al., 2020) or later versions of the guidelines valid at the time of monitoring, as well as other relevant South African guidelines applicable during the monitoring period. It is understood that static bat monitoring equipment on turbines has a cost implication. Prolonged post-construction mitigation, beyond the prescribed two years might be necessary if advised by the operational bat specialist. Although it is not a requirement at this stage, as it depends on whether the Met mast will be deployed for the life span of the turbines, but having more refined static data from sampling points at height, would aid in interpreting future bat fatality records of the Koup 1 WEF: therefore, the installation of more than one monitoring system at height, will be recommended. The use of ultrasound as a mitigation measure to deter bats is now being used at two WEFs in South Africa. This should be investigated for use at turbines displaying high mortality at the Koup 1 WEF site.	2	3	2	3	3	3	39	—	Medium
<b>Decommissioning Phase</b>																					
Removal of turbines	Bat disturbance due to decommissioning activities and associated noise, especially during night-time.	1	3	1	2	1	1	8	—	—	Low	Develop a decommissioning and remedial rehabilitation plan and adhere to compliance monitoring plan to reduce the development footprint. Nightly decommissioning activities should be avoided, or if necessary, minimised to the shortest period possible. Except for compulsory lightening required in terms of civil aviation, artificial lighting during construction should be minimised, especially bright lights or spotlights. Lights should avoid skyward illumination.	1	1	1	1	1	1	5	—	Low
<b>Cumulative</b>																					
Destruction of active roosts.	Cumulative effect of destruction of active roosts and features that could serve as potential roosts of several WEFs covering a greater area.	3	3	3	3	2	2	28	—	—	Medium	Although Genesis Eco-Energy do not have any control over other WEFs, project specific mitigation as included in the BA or EIA or in the respective Bat Index Assessments of the projects in the surrounding area should be adhered to for each renewable energy project. Post construction monitoring compliance is required as per the relevant South African guidelines.	3	2	2	2	2	1	11	—	Low

Direct collision or barotrauma.	Cumulative bat mortality due to direct collision with the blades of large numbers of turbines or barotrauma during foraging of resident bats at several WEF sites.	3	4	4	3	3	3	51	-	High	Although not enforceable on the Koup 2 applicant, all REFs must adhere to their project specific mitigation measures, especially buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project. Post construction monitoring as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.	3	2	3	3	3	3	42	-	High
Migrating bats.	Cumulative bat mortality due to direct collision with the blades or barotrauma during foraging of migrating bats at several WEF sites covering a greater and potentially back-to-back area .	3	3	3	3	3	3	45	-	High	Although not enforceable on the Koup 2 applicant, all REFs must adhere to their project specific mitigation measures, especially buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project. Post construction monitoring compliance as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.	3	2	2	2	3	2	24	-	Medium
Several wind farms stretching over thousands of hectares.	Habitat loss over several wind farms impacts the natural behaviour of bats negatively.	3	4	2	3	3	3	45	-	High	Although not enforceable on the Koup 2 applicant, all REFs must adhere to their project specific mitigation measures, especially buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project. Post construction monitoring compliance as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.	3	4	2	3	3	2	30	-	Medium
Several bat farms with associated bat mortality over the lifespan of WEFs.	Cumulative reduction in size, genetic diversity, resilience and persistence of bat populations.	3	4	3	3	3	4	64	-	High	Although not enforceable on the Koup 2 applicant, all REFs must adhere to their project specific mitigation measures, especially buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project. Post construction monitoring as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.	3	4	3	3	3	3	54	-	High



## environmental affairs

Department  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

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

File Reference Number:	(For official use only)
NEAS Reference Number:	CEA/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 construction of the Koup 2 wind energy facility and associated grid infrastructure, near Beaufort West, 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

**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](mailto:EIAAdmin@environment.gov.za)

## 1. SPECIALIST INFORMATION

Specialist Company Name:	Stephanie Dippenaar Consulting trading as EkoVler			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	5	Percentage Procurement recognition	80%
Specialist name:	Stephanie Dippenaar Consulting			
Specialist Qualifications:	MEM			
Professional affiliation/registration:	Professional Member of SAIEES			
Physical address:	8 Florida Street			
Postal address:	8 Florida Street			
Postal code:	7600	Cell:	0822005244	
Telephone:	0822005244	Fax:		
E-mail:	sdippenaar@snowisp.com			

## 2. DECLARATION BY THE SPECIALIST

I, Stephanie C. Dippenaar, 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

Stephanie Dippenaar Consulting trading as EkoVler  
Name of Company:

2 July 2021  
Date

Details of Specialist, Declaration and Undertaking Under Oath

Page 2 of 3


3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Stephanie C. Dippenaar , 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

Stephanie Dippenaar Consulting trading as EkoVLer  
Name of Company

2 July 2021  
Date

  
Signature of the Commissioner of Oaths

2021-07-04  
Date

