Appendix 6C
Bat

SiVEST SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE KOUP 1 WIND ENERGY FACILITY AND ASSOCIATED GRID INFRASTRUCTURE, NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE, SOUTH AFRICA

Bat Specialist Study

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KOUP 1 WIND:
PRE-CONSTRUCTION BAT MONITORING
DRAFT FINAL REPORT

JUNE 2021

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

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SiVEST SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE KOUP 1 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 1 Wind (Pty) Ltd, to conduct a 12-month bat study for the proposed Koup 1 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 mainly guided by the relevant South African bat monitoring guidelines (Sowler, et al, 2017) concerned with bat monitoring and wind energy development. The proposed Koup 1 project is situated just outside the Beaufort West Renewable Energy Development Zone for wind and solar projects (REDZ 11) and proposes 28 wind turbine generators with a hub height and rotor diameter of 200m and associated infrastructure with a maximum generation capacity of up to 140 MW. The exact turbine specifications that will be deployed are not yet known. With the larger turbine model, less turbines will be constructed to reach the overall export capacity of 140 MW. The study area was approximately 2445,6 ha, but the project area identified through preliminary suitability assessment by Genesis is approximately 4 279,4ha.

The proposed Koup 1 project will be developed on portions of the original Rietpoort, Brits Eigendom and Farm 380 approximately 50 km south of Beaufort west in the arid Great Karoo region in the Western Cape. Strong north-westerly winds occur in winter. Rainfall occurs mainly in summer and autumn with a peak in March, while temperatures range from maximum 38◦C in summer to a minimum of 1◦C in winter. The Koup 1 site is part of the Gamka Karoo vegetation unit in the arid Nama Karoo biome that is of the Least concern conservation categories. Shrubland on plains provide ample foraging opportunity for high flying bats, while the denser vegetation along the riverbeds contains suitable habitat for some clutter- and clutter edge foraging bats as well as roosting opportunities.

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 1. 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 negatively is the wind turbines themselves, through direct collisions and barotrauma. Other potential negative impacts to bats due to WEF developments include loss of existing and potential roosts and foraging area.

Bat droppings of insectivorous bats were found at most of the farm dwellings and one small roost with less than 20 bats was identified. 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 periods of higher precipitation in future. These changes could result in changes in the bat activity which have not been accounted for in this report.

Calls like five (5) of the 12 species that have distribution maps overlaying the proposed development site had been recorded by the static recorders. 51% of the calls represent the clutter-edge forager *Neoromicia capensis*, which is the dominant species on site. The second highest percentage of calls (48%) represents the Molossidae family, namely 44% calls like *Tadarida aegyptiaca* and 4% *Sauromy petrophilus*. Both these are high-risk species, physiologically adapted to fly at medium or high altitudes, in the vicinity of the turbine blades, so that the risk of collision and barotrauma is high. The endangered *Miniopterus natalensis* comprises 1% of the activity. The species diversity is generally higher at lower altitudes.

Mast D, the 10 m mast situated towards the western centre of the terrain, recorded the highest bat activity, with an exceptionally high activity of *N. capensis*. System A, at 110 m on the Met mast, recorded 89% Molossidae, the high-flying *T. aegyptiaca*, true to its narrow wing morphology adapted for open air.

Peak activity is experienced in March, with a gradual decline in activity as winter sets in. Activity increases again in September, when there is a raise in temperature during spring. Apart from a dip in activity during November, activity stays relatively high during summer.

Relative higher activity is portrayed three to four hours following sunset, while a gradual decline of activity is shown from 2:00 to sunrise. There is a difference in nightly activity between the monitoring system at Mast D and the two monitoring systems at the Met mast (A and B), with activity at Mast D showing high activity right through the night up to sunrise. This is an interesting pattern which the bat specialist has not encountered in the Nama-Karoo before.

The annual average bat activity for the site is 0,48 bats per hour for the monitoring period at the proposed Koup 1 WEF site, which is within the range of low risk for the Nama Karoo terrestrial ecoregion. Although the average hourly bat passes the whole terrain indicate a general low activity, the system at Mast D, situated in the middle of the site, falls within the category of high risk, with 1,18 bats per hour.

General linear regression shows a moderate positive relationship between temperature and bat passes, while weak negative relationships between wind speed and bat activity and humidity and bat activity is experienced. Cumulative Distribution Functions of the bat activity with weather conditions were plotted and System A, at 110 m, was, amongst others, used to inform a mitigation schedule.

During the seasonal transects one bat was recorded on 22 January 2021 and two on 25 April 2021. All these bats were recorded on the central to western part of the wind farm.

The table below summarises the overall significance rating of impacts on bats by Koup 1 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 1 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 1, namely 0,48 bats per hour, is categorised as Low. The collective Bat Index, thus the mean number of bats per hour per year, including Beaufort West and Trakas WEFs, is calculated at 2.1 bats per hour, which is categorised as High for the Nama-Karoo. Specialist reports from WEFs considered in this assessment rate the impact on bats in this ecoregion as high negative (-76 to -82) without mitigation and reduced to low negative (-26 to -32) with proposed mitigation. The cumulative impact significance at Koup 1 fall into the same category as the surrounding WEFs with a high negative (47) before mitigation and medium negative (32) after mitigation.

Cumulative impacts and significance rating for bats at Koup 1 include the cumulative effect of the destruction of active roosts and features that could serve as roosts (28 = medium before mitigation and 11=low after); cumulative bat mortality due to direct collision or barotrauma during foraging of resident bats (51=high before mitigation and 42=medium after) and migrating bats (45=high before mitigation and 24=medium after mitigation) as well as bat habitat loss over several farms (45=high before mitigation and 30=medium after). Furthermore, the cumulative reduction in size, genetic diversity, resilience, and persistence of bat populations (64=high before mitigation and 54=high after). Operational monitoring and mitigation need to be implemented upon construction of 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 mitigation. It is therefore recommended that turbines will be shifted from High sensitivity areas and that curtailment is applied 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 inform the curtailment schedule and apply it to more 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 for the turbines situated in the High-medium sensitivity zone and Medium sensitivity zones, if the latter deemed necessary during operation, see the table below. If the developer decides to reduce the number of turbines, the first option, after the wind regime has been considered, should be to reduce the turbines in the High-medium sensitivity zones. Operational monitoring and carcass searches will have to inform this decision.

CURTAILMENT FOR TURBINES IN HIGH-MEDIUM SENSITIVITY ZONES			
Months	**Time periods**	**Temperature (°C)**	**Wind speed (m/s)**
September to May	One hour after sunset up to 7 hours after sunset	Between 10 ºC and 25 ºC	Between 0 m/s and 10 m/s
CURTAILMENT FOR TURBINES IN MEDIUM SENSITIVITY ZONE			
Months	**Time periods**	**Temperature (°C)**	**Wind speed (m/s)**
September to December, April to May	One hour after sunset up to 7 hours after sunset	Between 12ºC and 20 ºC	Between 0 m/s and 7 m/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 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.

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. These changes usually result in changes in the bat situation which have not been accounted for in this report.

Before mitigation, the potential Negative impact of the site is predicted to be Medium, but if the applicant adheres to the proposed mitigation measures, the potential impact on bats from the proposed Koup 1 Wind Farm is predicted to be Negative and of Low significance. **Considering the findings of the one-year pre-construction monitoring undertaken at the proposed Koup 1 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)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
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 B.
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 8
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 8, Figure 22

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 13.2.
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	See Table 15.
n) a reasoned opinion- i. (As to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and 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;	Section 13.2.
o) a description of any consultation process that was undertaken during the course of 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	**N/A**. 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.	**N/A**. No information regarding the bat specialist study has been requested from the competent authority to date.
2) Where a government notice *gazetted* 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**

BAT SPECIALIST STUDY

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List of Abbreviations

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

GLOSSARY

Definitions	
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

BAT SPECIALIST STUDY

1. INTRODUCTION

Genesis Enertrag Koup 1 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 1 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 1 WEF will comprise twenty-eight (28) wind turbines with a maximum total energy generation capacity of up to approximately 140MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV 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 relevant guidelines at the time of the commencement of the bat monitoring, was the *South African Best Practice Guidelines for Pre-construction Monitoring of Bats at Wind Energy Facilities* (Sowler, et al, 2017), which 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; We used the updated information, as indicated in Table 4, p16, of the bat 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 relevant pre-construction guidelines, the following South African guideline documents are also relevant to the study:

- *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 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., 2020).

In addition to the above, this study is required to meet the requirements specified in Appendix 6[1] 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

Stephanie, with 22 years of professional membership of SAIEES, has a history in environmental assessment, veld management and biodiversity, lending her the ability to provide an integrated approach to environmental issues. She was involved in some of the first bat impact assessments related to wind energy in South Africa. Her consultancy career commenced in 2011, and she has been involved in numerous bat impact assessments since 2010, managing pre- as well as post construction bat monitoring programmes. She is also a steering committee member of SABAA. 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

[1] *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.*

energy developments (within a radius of 35 km), particularly wind farms, are noted for the discussion of cumulative effects.

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 the 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 or 128 GB each, are utilized within every 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 on the Met mast represents the biotope associated with the plains of the Gamka Karoo (SANBI, 2012) vegetation type. When considering 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 positions of the 10 m masts are motivated as follow:

- **10 m Mast K1C:** This monitoring system represents areas of sparsely distributed vegetation of Gamka Karoo towards the south-western part of the proposed wind farm. The system was placed close to ridges with some rock formations. Although no signs of bats were found at the rocky outcrops which were investigated, these could provide roosting opportunities for bats. The system was placed to record bats that might fly from these areas to forage at the plains. Numerous problems with this system and mast, resulted in limited data, but other systems in similar biotopes were sufficient to cover for the lost data.
- **10m Mast K1D:** This monitoring station was placed at a permanent open water source, which is an important feature for bats. Towards the western areas, a koppie with rocky ridges could provide roosting space, the riverbed, with relative dense vegetation runs towards the east and the farmhouse with derelict farm buildings, is situated towards the north. With ample roosting opportunity and permanent water, this is an ideal placement to record bat activity.

Table 1: Summary of Passive Detectors deployed at the proposed Koup 1 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 K1A)	Met mast: mic at 110m	29º49'33" S 17º17'31" E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Calibrated when installed by Windhunter
SM4BAT (Met K1B)	Met mast: mic at 20m	29º49'33" S 17º17'31" E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Calibrated when installed by Windhunter
SM4BAT (Mast K1 C)	Temporary mast: mic at 10m	32º52'09,8" S 22º25'06,1" E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Drop to approximately -8,71 dB at the microphone
SM4BAT (Mast D)	Temporary mast: mic at 10m	32º51'23,8" S 22º28'21,4" E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Drop to approximately -8,64 dB at the microphone

1.3.3 Roost Surveys

Roost surveys are conducted when the bat specialist visits the site and any known roosts are inspected. Areas where possible roosts could be situated are investigated, but it is not always possible to have access to all roosts, as they are sometimes in crevices or roofs with limited ceiling space. If day roosts are identified, bat counts are done during sunset and if deemed necessary detectors are installed for short periods at particular 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. The results of roost searches 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 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 at Koup 1 WEF.

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 92% accurate when comparing to individual call analysis. Data sets are from time to time converted to ZC files and verified by Analook software if deemed necessary. In cases where there is uncertainty about a call, but it is clear that it is a bat calling, the call is classified as Unclear.

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, for example, from personal experience on South African wind farms, it has been noted that Tadarida aegyptiaca tend to forage at higher wind speeds than their Northern counter parts.
- 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 when bat carcasses are 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). A bat passing multiple will of course have a higher risk of been negatively impacted upon by the operational wind turbines.
- 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. This is an internationally accepted why of conducting bat monitoring for EIA purposes.
- 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 ‘unclear’. 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 driven through, and where possible, within the time limits of the study, areas that might have bat roosts are inspected. Any roosts or indication of bat presence discovered in this process are incorporated into the study. To account for undiscovered roosts, No-go and/or high-risk areas are identified.
- 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.
- Data loss has been experienced at Koup 1, but at the 110 m system, but as the gaps were not so large, it could be filled by extrapolating data from the same season and system. Numerous misfortunes at system C resulted in too much data loss, so that extrapolation of data is not possible. System B on the Met mast is in the same biotope and together with systems A and D, the site still had enough systems to meet the requirements of the bat guidelines.
- 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.

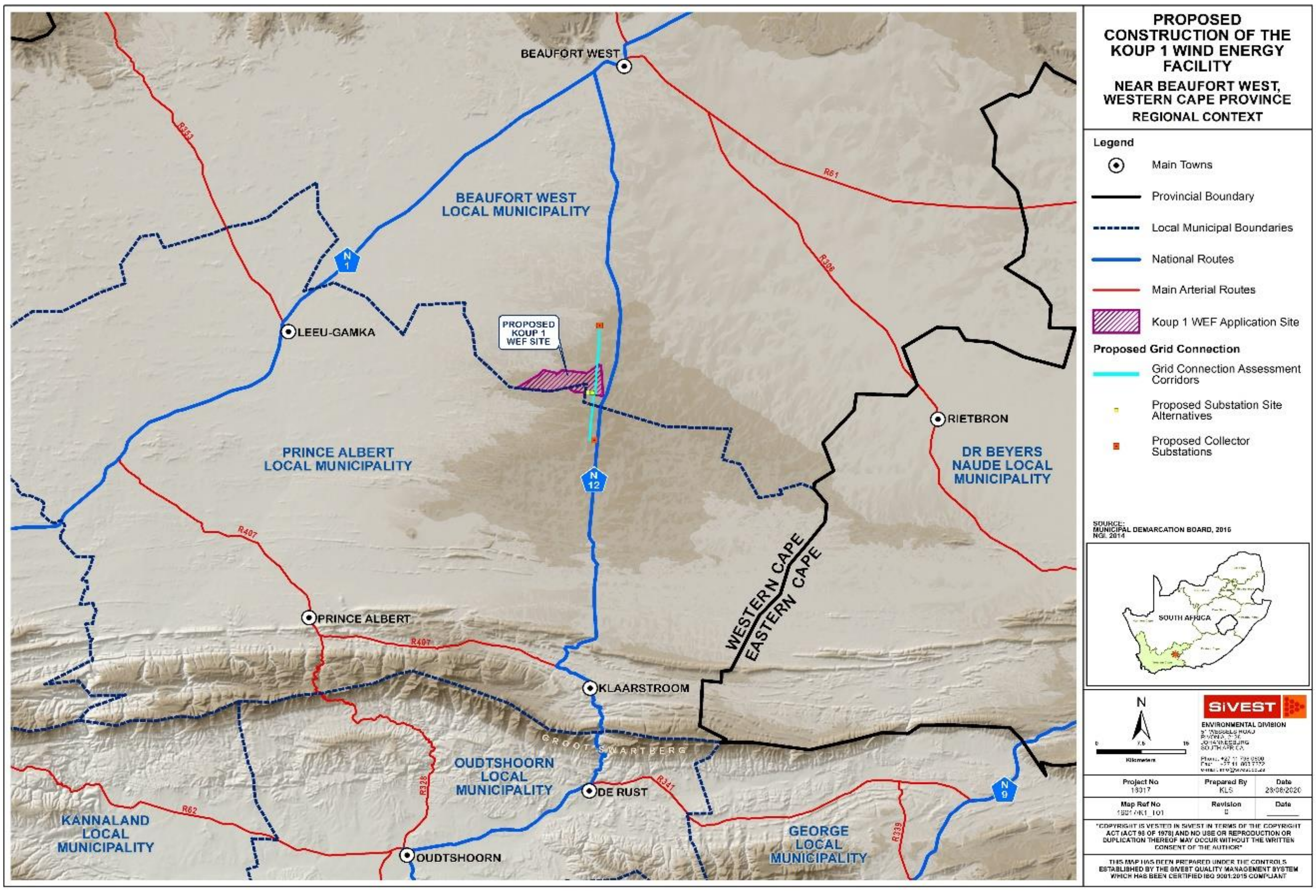


Figure 1: Regional Context Map

3.1.1 WEF

The WEF application site as shown on the locality map below (**Figure *2***) is approximately *4279.398* hectares (ha) in extent and incorporates the following farm portions:

- The Farm Riet Poort No 231
- Portion 11 of the Farm Brits Eigendom No 374
- Portion 15 of the Farm Brits Eigendom No 374
- Portion 5 of Farm 380
- Portion 10 of Farm 380
- Portion 11 of Farm 380

A smaller buildable area (2445.667 ha) has 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.

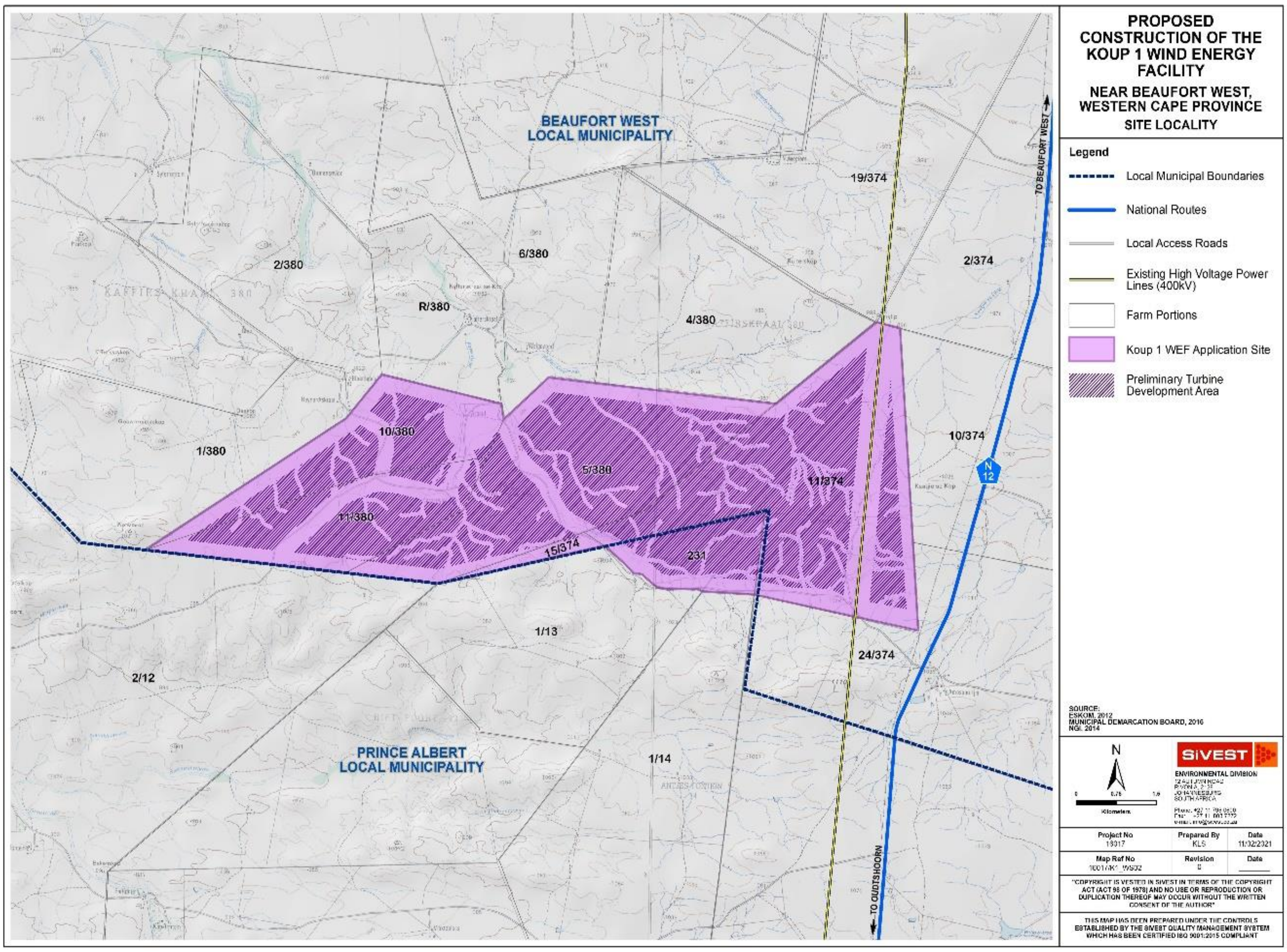


Figure 2: Koup 1 WEF Site Locality

3.1.2 Grid Connection

At this stage, it is proposed that a 132 kV overhead power line will connect the Koup 1 WEF on-site switching substation / collector to the national grid either by way of an off-site collector substation, or via a direct tie-in to existing 400kV transmission lines that traverse the Koup 1 WEF project site (Figure 3).

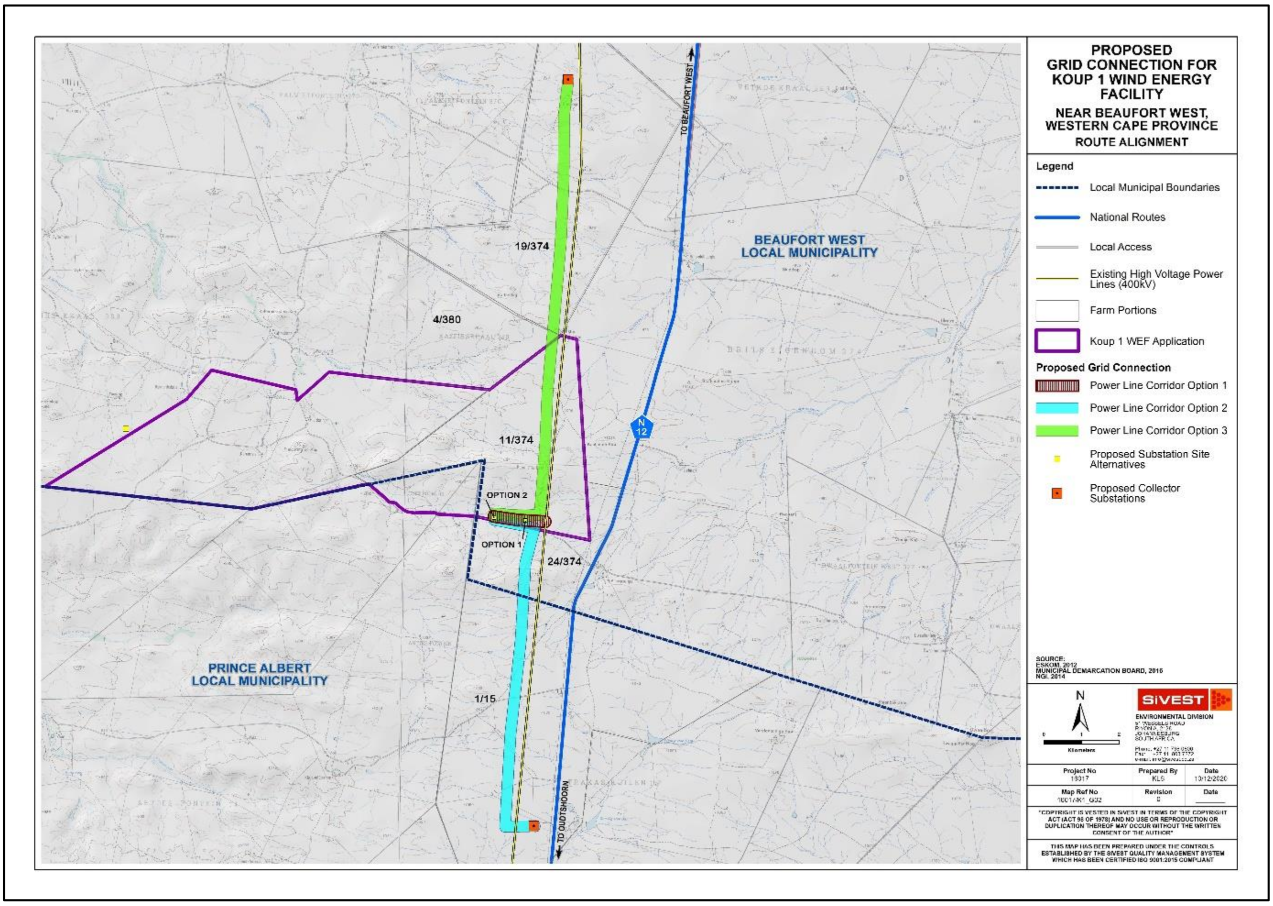


Figure 3: Proposed 132kV Power Line Route Alignment

3.2 Project Description

It is anticipated that the proposed Koup 1 WEF will comprise twenty-eight (28) 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.

3.2.1 Wind Farm Components

- Up to 28 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 hard standing areas / platforms (also known as crane pads) of approximately 90 m x 50 m (total footprint of approx. 4 500 m^2) 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 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 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 2.25 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 1-1.5 m in height. Fencing might be upgraded (if required) to be up to approximately 2 m in height.
- 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 1 WEF will include the following components:

- One (1) new 33/13 2kV on-site substation and/or collector substation, occupying an area of up to approximately 1.5 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 either to an off-site collector substation, or via a direct tie-in to the existing 400 kV overhead power lines 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 three (3) 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.

All three (3) power line route alignments will be assessed within a 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 1.3 km in length, linking either substation / collector Option 1 or Option 2 to the existing 400 kV transmission lines.
- Power Line Corridor Option 2 is approximately 9.9 km in length, linking either substation / collector Option 1 or Option 2 to a proposed Collector Substation to the south, adjacent to the existing 400 kV transmission lines.
- Power Line Corridor Option 3 is approximately 12.9 km in length, linking either substation / collector Option 1 or Option 2 to a proposed Collector Substation to the north, adjacent to the existing 400 kV transmission lines.

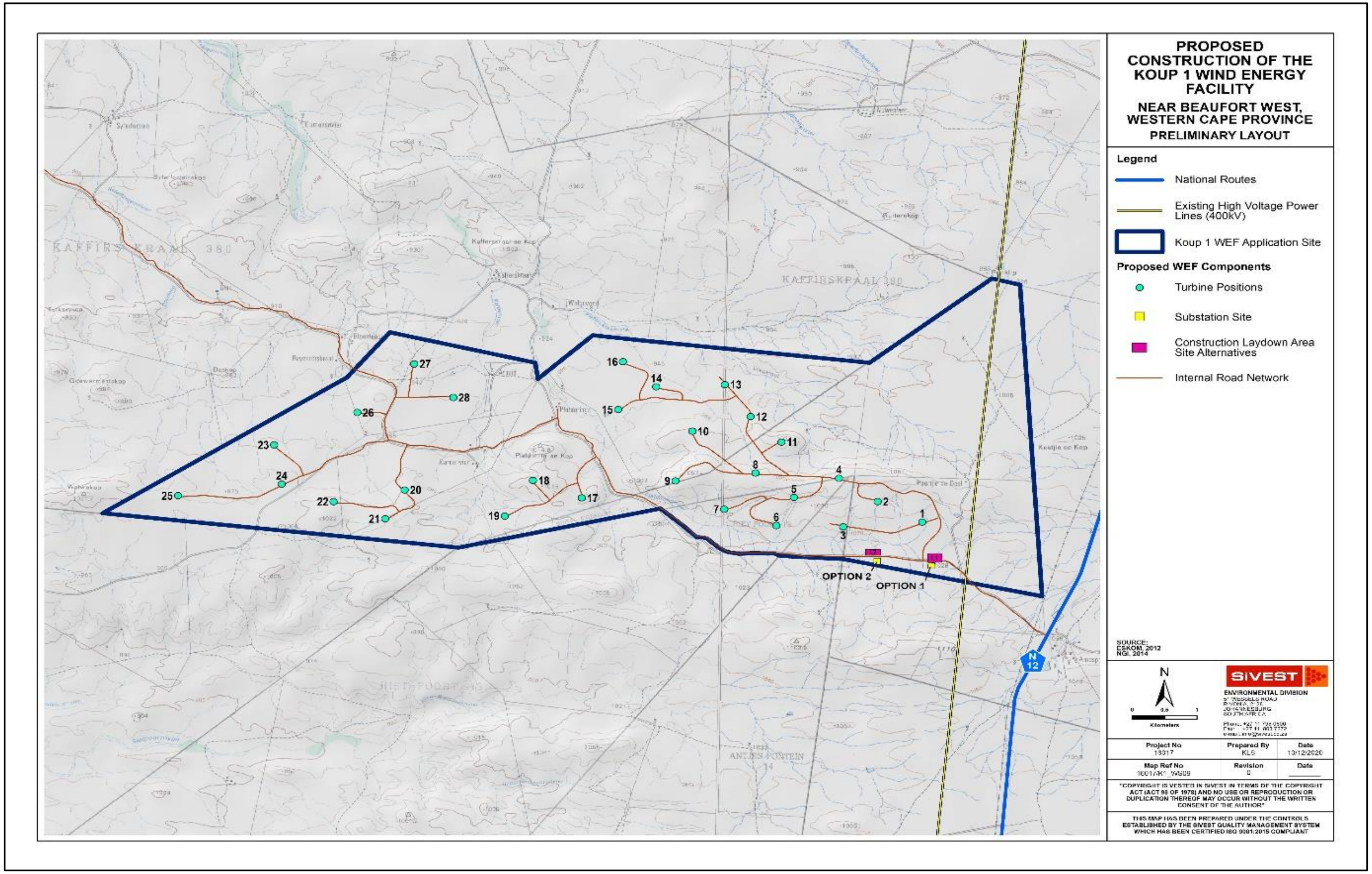


Figure 4: Alternatives proposed as part of the Koup 1 WEF

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.

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, 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

For the wider Leeu Gamka region, July is generally 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 therefore 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 is 38˚C, with 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).

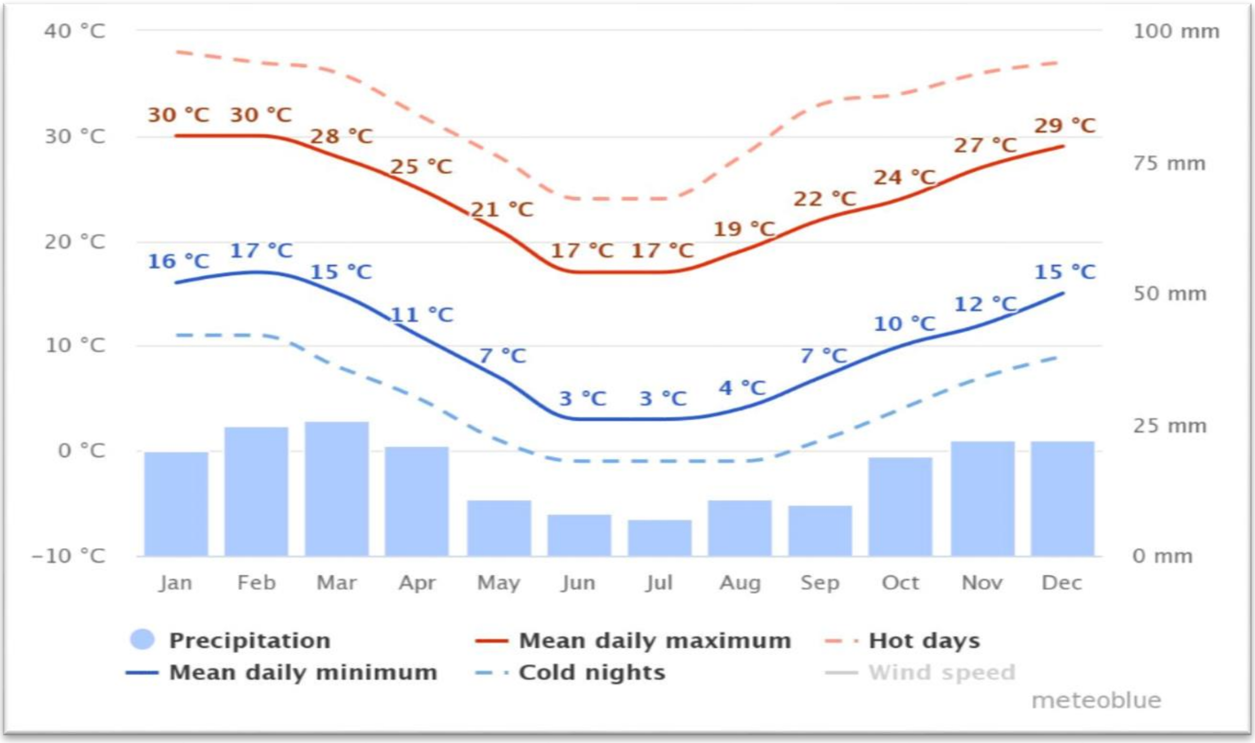


Figure 5: Climate profile of the Leeu Gamka area (Meteoblue, 2020).

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 as classified by SANBI (2012). While 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. Although only 2% of this vegetation type is formally conserved in the Karoo National Park, little 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 1 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 1. 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.

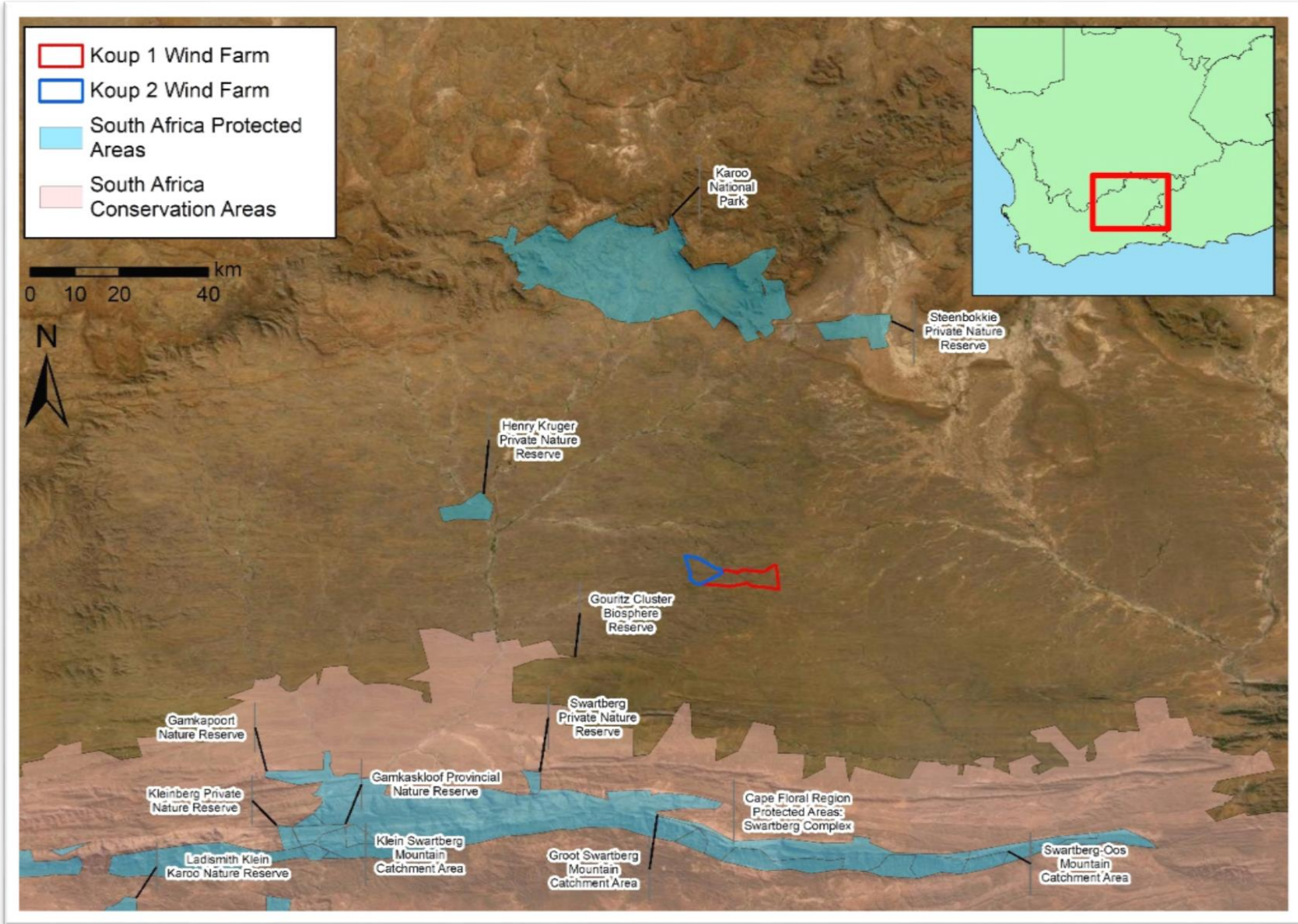


Figure 6: Protected areas in the vicinity of Koup 1 WEF.

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. The western part of Koup 1, namely Kareerivier, is used for grazing of Dorper sheep, but the eastern part, namely Oskloof and Platdorings are more focussed on game.

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:

- 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 mines 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 below.

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

	**Vegetation** 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 and foraging habitat.

	**Rock formations and rock faces** Rock formations along the hill tops and along the river valleys provide ample roosting opportunities for bats. For example, a possible flight route might be found between the water source located behind the met mast and the rocky outcrops of the nearby hills.
	**Human dwellings** Where roofs are not sealed off, human dwellings provide roosting space for some bat species. Evidence of bats were found in more than one derelict building situated within the borders of Koup 1.
	**Open water and food sources** Water troughs for the livestock and associated open cement reservoirs provide permanent, open water sources for bats right throughout the year. During few spells of rain, stagnant water that usually collects in small pans and dry ditches could serve as breeding ground for insects which then serve 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. Even though flies are not nocturnal, they might still be active around sunset or sunrise, especially on warm days.

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 table below have distribution ranges covering the Koup 1 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 and have limited suitable habitat left (Monadjem, 2010).

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) 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 bat) 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.

Table 3: Potential bat species occurrence at the proposed Koup 1 WEF (Monadjem, et al., 2010; IUCN, 2017). Highlighted yellow cells indicate confirmed presence at the development site, or on the neighbouring Koup 2 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	*Eidolon helvum*	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.	High-medium	
	Rousettus aegyptiacus	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.	High-medium	
MINIOPTERIDAE	*Miniopterus natalensis*	Natal long-fingered bat	Near Threatened	Near Threatened	Caves	Clutter-edge, insectivorous	Seasonal, up to 150 km	High-medium	✓
NYCTERIDAE	*Nycteris thebaica*	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	✓
MOLISSIDAE	*Tadarida aegyptiaca*	Egyptian free-tailed bat	Least Concern	Least Concern	Roofs of houses, caves, rock crevices, under exfoliating rocks, hollow trees	Open-air, insectivorous	Not known	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
	Sauromys petrophilus	Robert's Flat-faced bat	Least Concern	Least Concern	Narrow cracks, under exfoliating of rocks, crevices.	Open-air, insectivorous		High	✓
RHINOLOPHIDAE	*Rhinolophus capensis*	Cape horseshoe bat (endemic)	Near Threatened	Near Threatened	Caves, old mines. Night roosts used	Clutter, insectivorous	Not known	Low	
	Rhinolophus clivosus	Geoffroy's horseshoe bat	Near Threatened	Least Concern	Caves, old mines. Night roosts used	Clutter, insectivorous		Low	
VESPERTILIONIDAE	*Neoromicia capensis*	Cape serotine	Least Concern	Least Concern	Roofs of houses, under bark of trees, at basis of aloes	Clutter-edge, insectivorous	Not known	High-medium	✓
	Myotis tricolor	Temminck's myotis	Near Threatened	Least Concern	Roosts in caves, but also in crevices in rock faces, culverts and manmade hollows	Limited information available	Not known	High-medium	
	Eptesicus hottentotus	Long-tailed serotine (endemic)	Least Concern	Least Concern	Caves, rock crevices, rocky outcrops	Clutter-edge, insectivorous	Not known	Medium	✓
	Cistugo seabrae	Angolan wing-gland bat (endemic)	Vulnerable	Near Threatened	Possibly buildings, but no further information	Clutter-edge, insectivorous	Not known	Low	

6. BAT MONITORING RESULTS

Passive monitoring data for the period between 5 March 2020 and 14 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.

Repeated data failures, 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 , as three other systems were deployed on the terrain. The Met mast is situated to a large extent in a similar environment and System B, situated at 20 m, is also representative of this biotope.

Data gaps were also experienced at the high system on the Met mast, which is an important monitoring point as it gathered information within the sweep of the turbine blades. Data from all seasons were gathered though and was filled, where necessary by extrapolating data.

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.

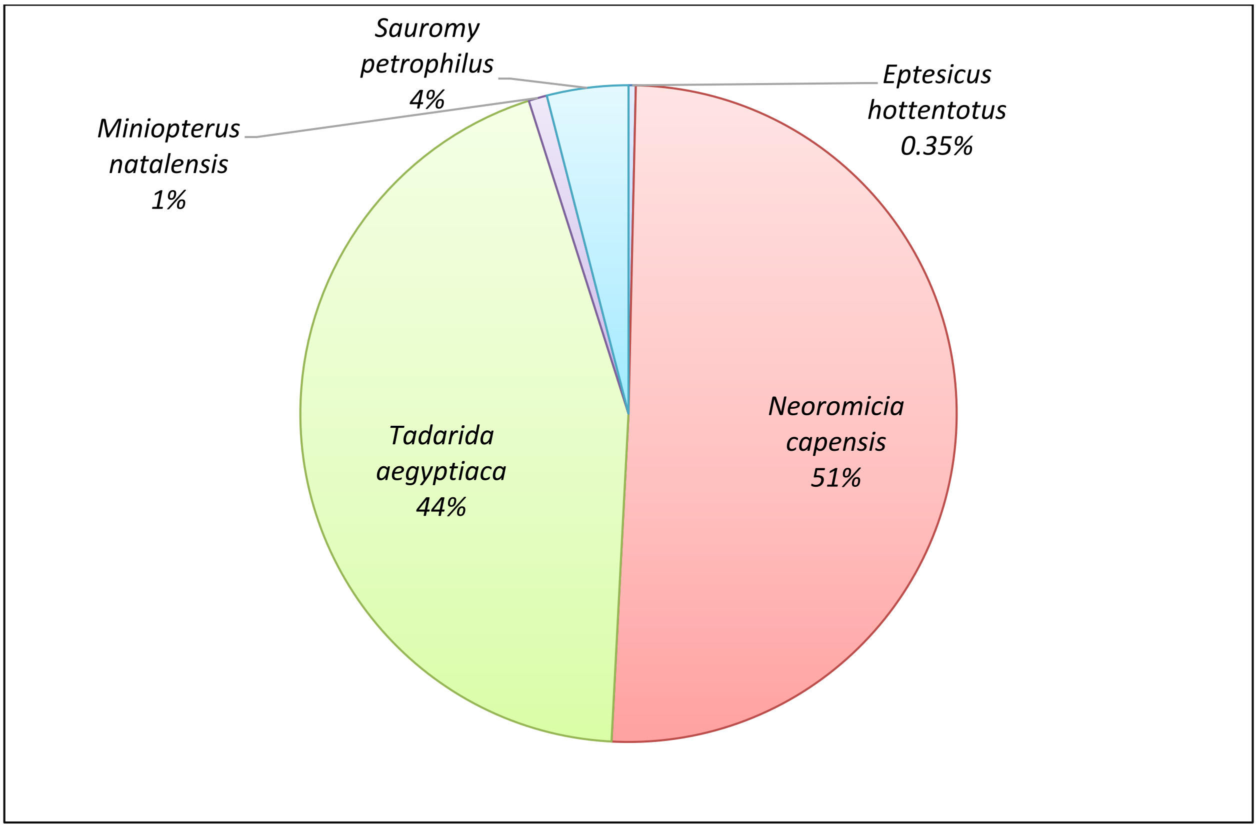


Figure 7: Species diversity at Koup 1 WEF

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).

51% of the calls represent the family Vespertilionidae, namely the clutter-edge forager *Neoromicia capensis* (Figure *7*), which is the dominant species on site. The second highest percentage of calls (44%) represents Molossidae family, with calls similar to *Tadarida aegyptiaca,* an open-air forager and 4% of the calls *Sauromy petrophilus* (Robert's flat-faced bat). These are high-risk species, physiologically adapted to fly high, in the vicinity of the turbine blades, so that the risk of collision and barotrauma is high. 1% of the calls are from the family Miniopteridae and looks similar to the endangered *Miniopterus natalensis* (Natal long-fingered bat), and 0,35% of the calls are that of the endemic *Eptesicus hottentotus* (Long-tailed serotine bat).

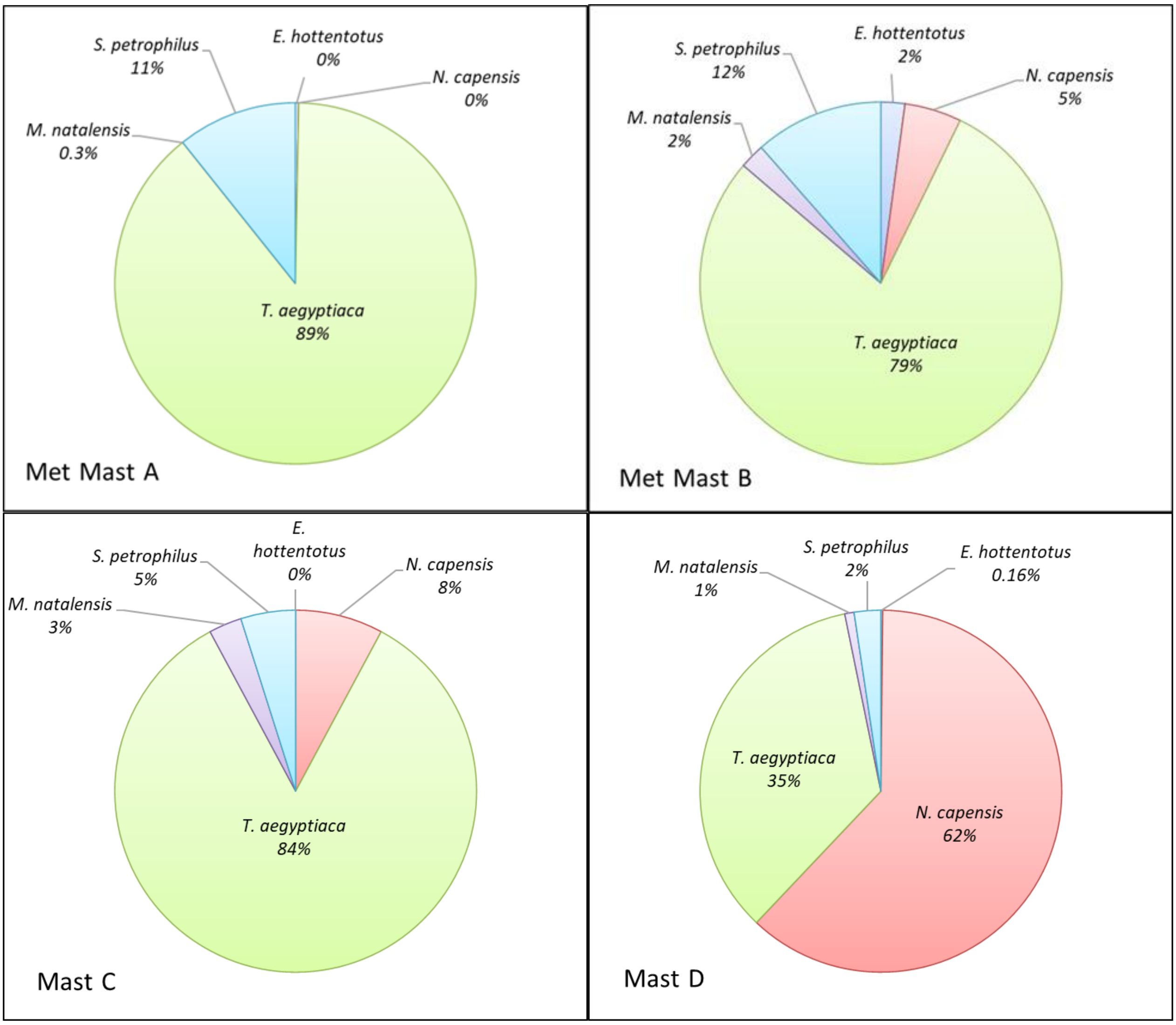


Figure 8: Different species composition at 110 m (Met mast A), 20 m (Met mast B), and 10 m (Met masts C and D).

The species diversity is generally higher at lower altitudes, which is clearly demonstrated Figure 8, depicting the species recorded at all the monitoring points. System A, at 110 m on the Met mast, recorded 89% Molossidae, the high-flying *T. aegyptiaca,* true to its narrow wing morphology adapted for open air. Hardly any bat passes were recorded at this height for *E. hottentotus* and *N. capensis,* but 11% of the activity was that of

Mast D indicates a high percentage of *N. capensis*. Although this species is perceived as a High-medium forager, they tend to occur at various heights on all the recordings in the Karoo, and their mortality is quiet high at operational wind farms in South Africa.

The species diversity recorded at the 20 m Met Mast (B) and 110 m Met Mast (A) indicates only a slight difference between the higher and lower altitude species diversity. *T.aegyptiaca* is by far the most abundant species recorded at the Met mast as well as the limited data from 10 m Mast C. On the other hand, as mentioned above, the 10 m Mast D differs from the other sampling points, with a greater representation of *N. capensis*.

6.2 Species distribution and activity per monitoring station

Figure 9 shows that Mast D, the 10 m mast recorded the highest bat activity, with an exceptionally high activity of *N. capensis*. At an open water point, with indication of a bat roosting area in the human dwellings and roosting and foraging space in the riverbed, as well as the proximity of the hills, this mast was situated at a seemingly optimal position to record bats.

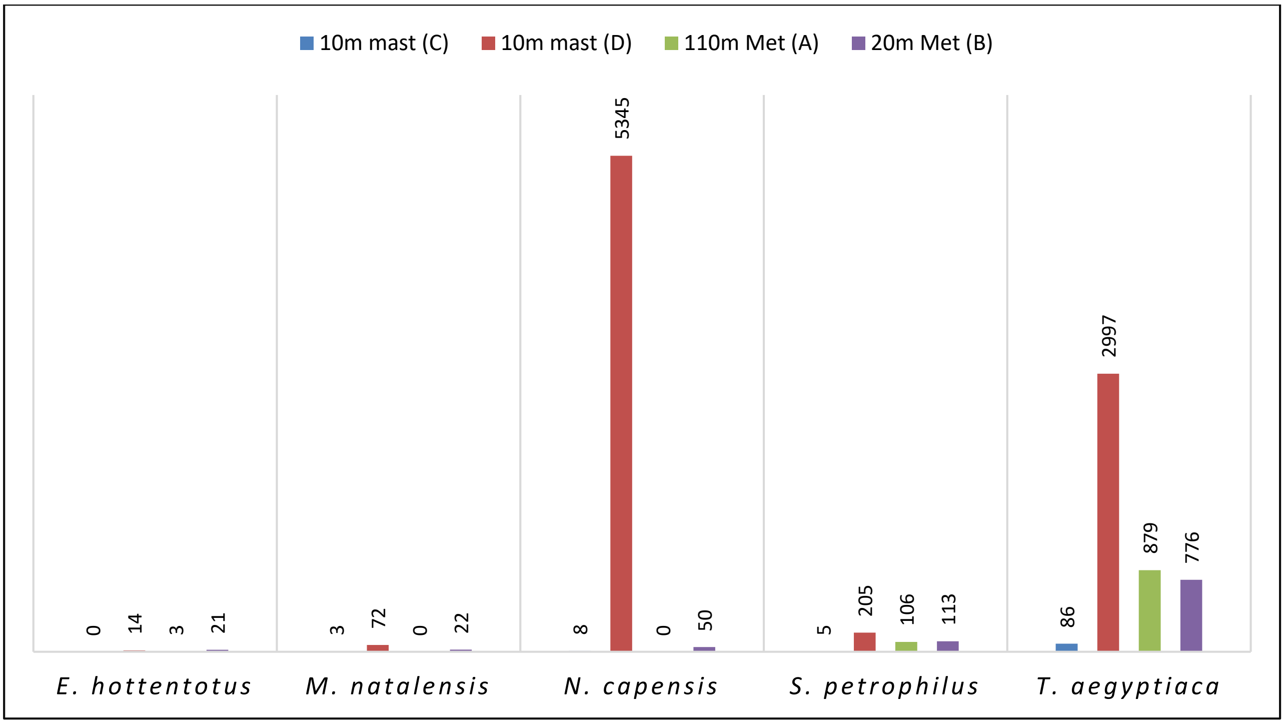


Figure 9: Species and activity per monitoring station

6.3 Temporal distribution over the monitoring period

Figure 10 portrays the weekly temporal distribution of bat passes over the monitoring period. The blue histogram depicts higher activity, indicating the higher occurrence of *T. aegyptiaca*, especially during springtime. Lower activity can be observed as winter approaches. A significant increase in activity is portrayed by *T. aegyptiaca* during spring, while *N. capensis* shows high activity during the summer and autumn months, which a decrease during the winter months.

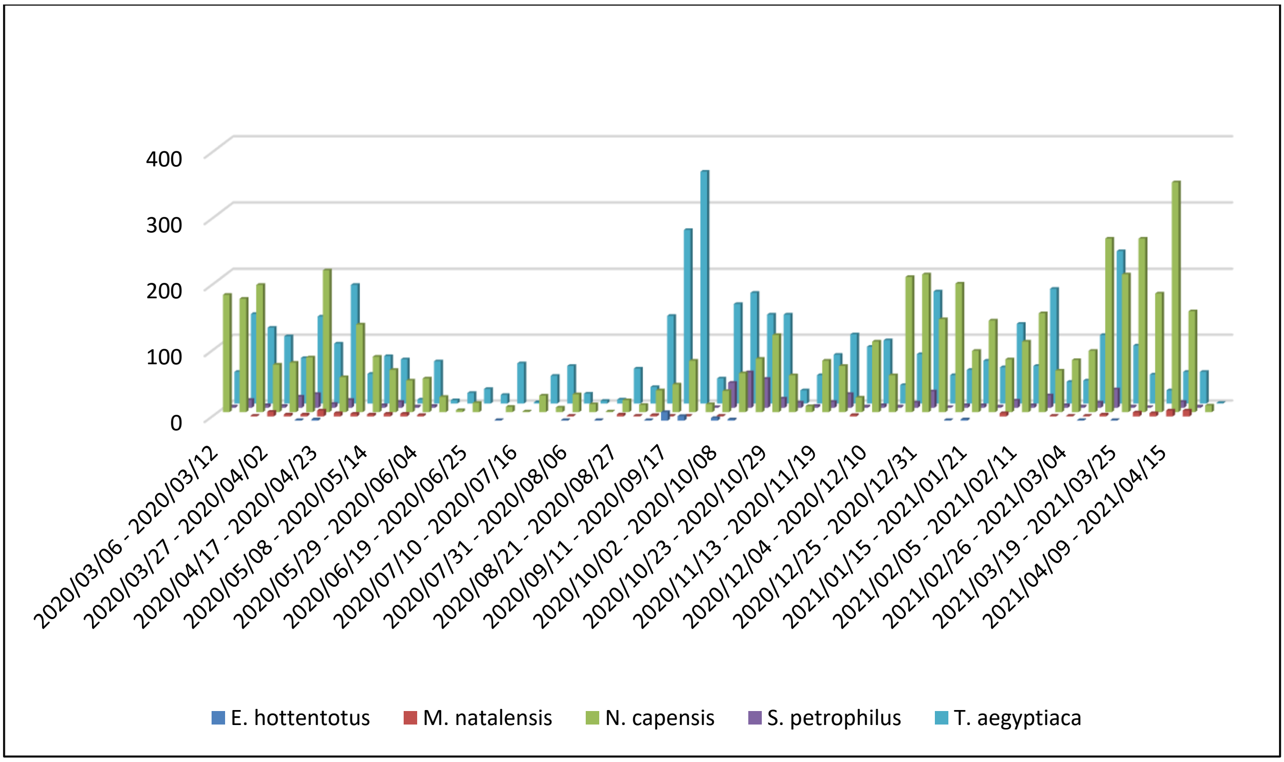


Figure 10: Temporal distribution of bat passes over the monitoring period

6.4 Monthly species activity

From Figure 11, which depicts hourly bat activity per month, where data failures are factored in, one can see that peak activity is experienced in March, with a gradual decline in activity as winter sets in. Activity increases again in September, when there is a raise in temperature during spring. Apart from a dip in activity during November, activity stays relatively high during summer.

There is a clear observation that all the monitoring stations indicate a peak of activity, as discussed in Section 6.3, in early spring, namely September, reduced activity during late spring and early summer and then a second peak during late summer and early autumn, from February to May.

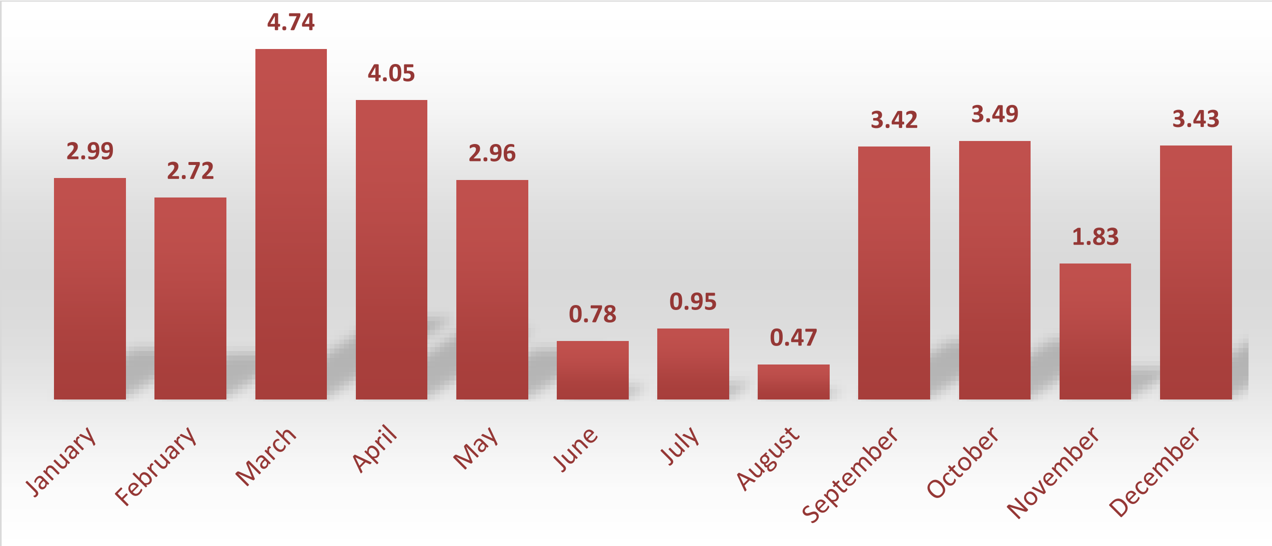


Figure 11: Average hourly bat passes per month

The highest peak in bat activity on the terrain is experienced at the 10 m Mast D, with peak activity portrayed in March, see Figure 12.

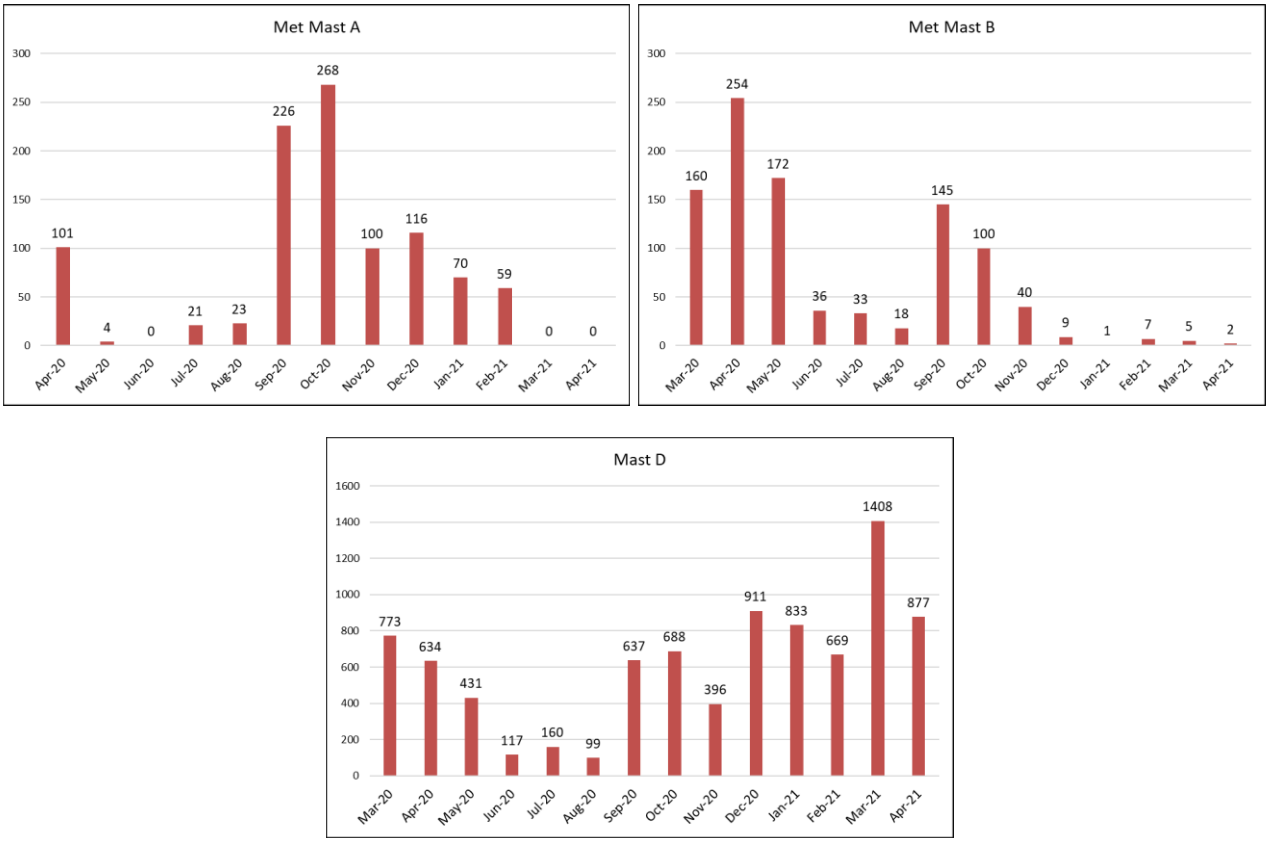


Figure 12: Total monthly bat activity per monitoring station at the proposed Koup 1 WEF site. Mast C is not included as too many data failures were experienced. Mast A also had a data failure during March and April 2021

6.5 Hourly bat passes per night

The total number of nightly bats 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, higher activity is portrayed three to four hours following sunset, while a gradual decline of activity is shown from 2:00 to sunrise. An increase in activity approximately two hours before sunset is shown. If one considers Figure 14, it is clear that this is caused by data from mast D.

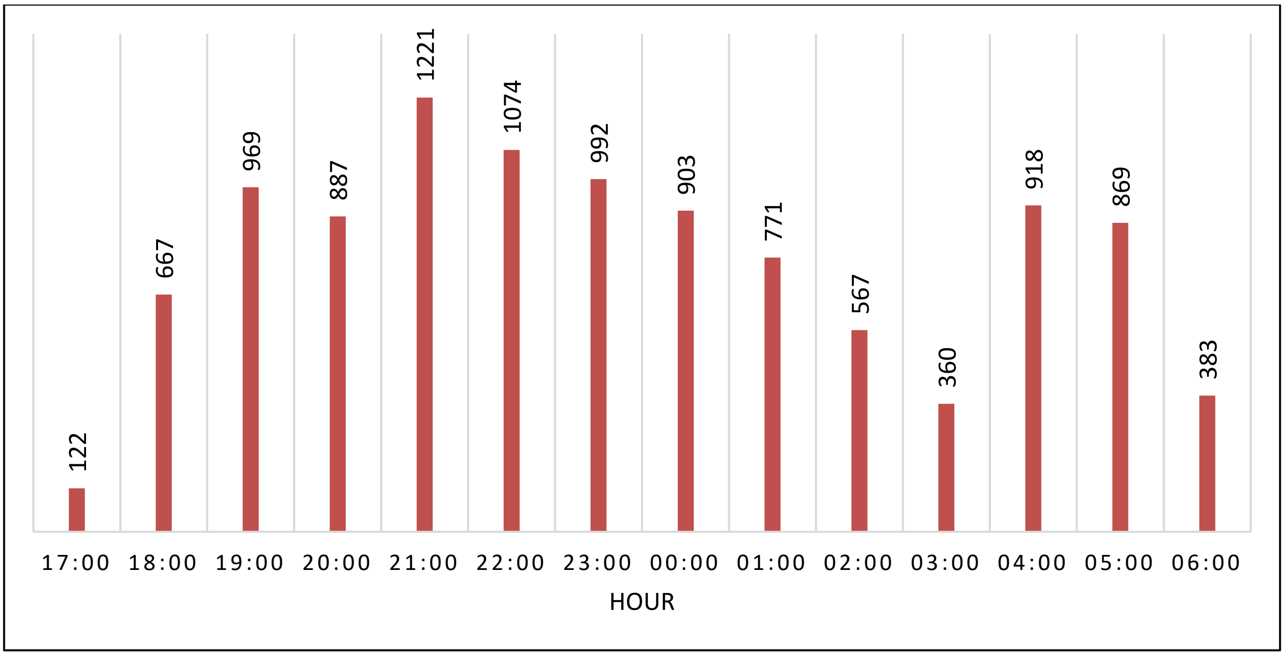


Figure 13: Total combined bat passes per hour

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.

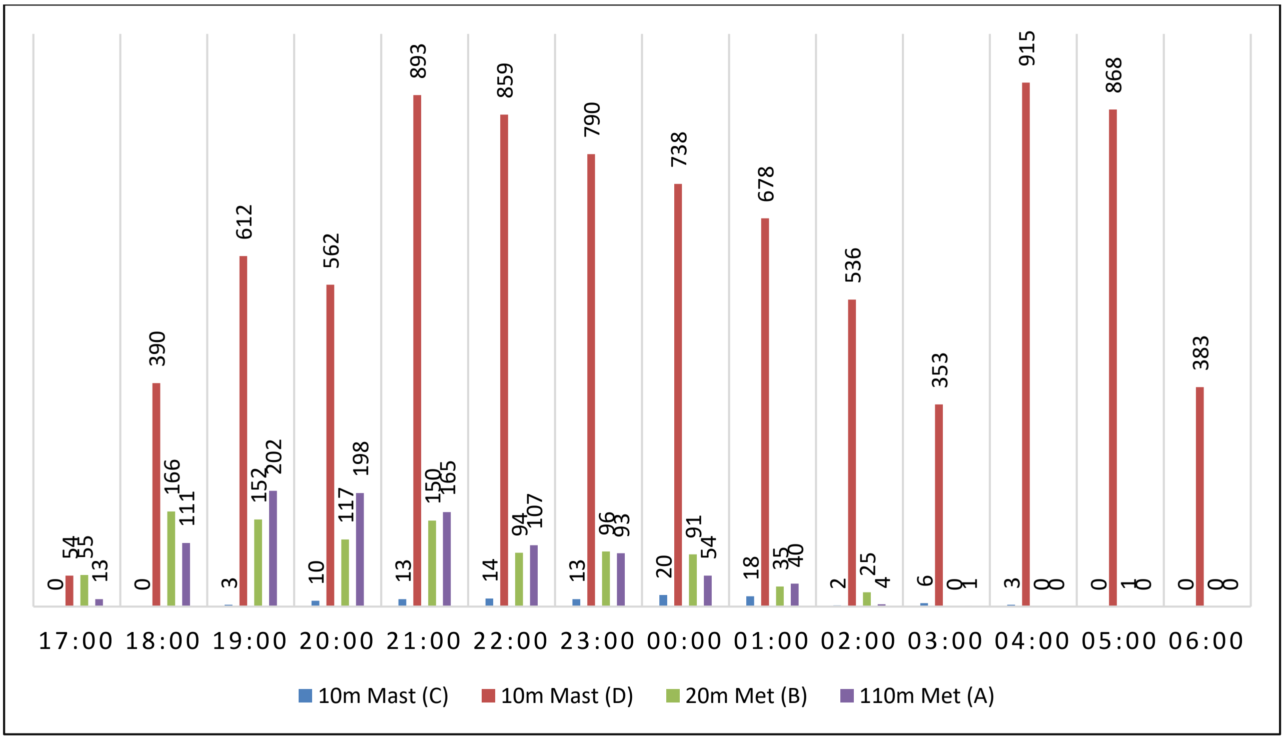


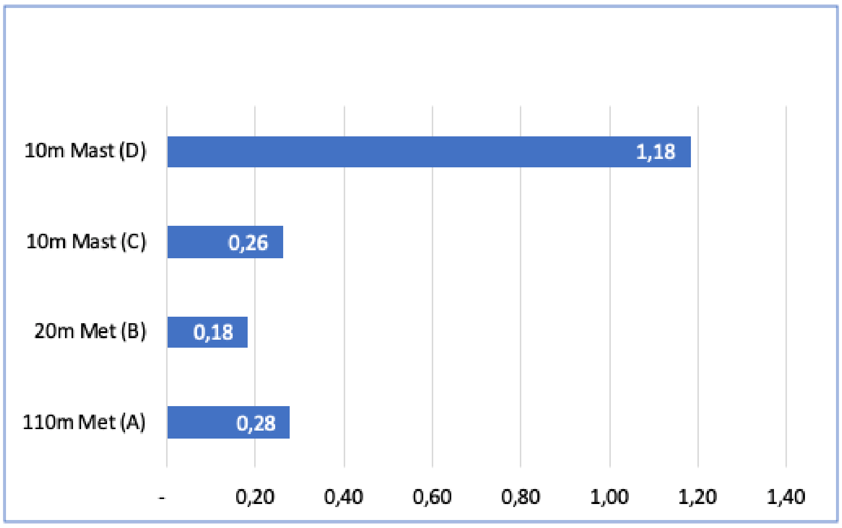
Figure 14: Total nightly bat passes per hour per monitoring station

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 three to four hours after sunset can be seen at all the sampling points, with a significant increase in bat activity after sunset. A general decline in activity is seen from 2:00 towards sunrise at all masts, except for System D, which portrays continuous high activity up to sunrise. Bats are usually more active the first few hours after sunset, as they emerge from their roosts to forage and to drink water. As sunrise approaches, they return to their roost and settle down for the day. One often experiences a slight increase in activity, presumably as bats return to their day roosts before sunrise. It is also evident that System D portrays the highest activity levels with peaks occurring at 21:00 pm and 04:00 am, while the peak in activity at Systems A and B occur earlier in the evening, after sunset.

6.6 Mean hourly bat passes and bat threshold

The relevant South African Bat Fatality Threshold Guidelines (MacEwan, *et al*. 2018) and Bat Best Practice Guidelines (Sowler, *et al*. 2017) reports mention that early operational facilities in South Africa show a linear increase in bat fatalities as more turbines are monitored. Threshold guidelines are calculated based on proportional bat occupancy per hectare for each of South Africa's terrestrial ecoregions to predict and assess impacts on bat fatalities as new WEFs are constructed. These 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 are all part of the Nama Karoo Biome.

Figure 15 indicates the annual mean bat activity per hour for the monitoring systems at the proposed Koup 1 WEF site, showing the Low, Medium, and High thresholds as indicated by the South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Development-Pre-construction. (Sowler, *et al*., 2017). The annual average activity for the site as a whole is 0,48 bats per hour for the monitoring period at the proposed Koup 1 WEF site, which is within the range of low risk for the Nama Karoo terrestrial ecoregion. Although the average hourly bat passes indicate a general low activity, the system at Mast D, situated in the central section of the site, falls within the category of high risk. Careful consideration has been given to this area during the development of mitigation recommendations for the wind energy site.



Nama Karoo	
0,0 – 0,71	Low
0,72 – 1,15	Medium
>1,15	High

Figure 15: Mean hourly nightly bat passes at each monitoring point over the 12-month monitoring period at the proposed Koup 1 WEF site, with the annual average ranges of mean number of bat passes per hour for the Nama Karoo as per the Bat Guidelines (Sowler, et al., 2017)

Figure *16* depicts the mean hourly nightly bat passes per month for the 110 m monitoring system (A) at the proposed Koup 1 WEF site. As mentioned before, the data from this system is deemed important, as it was situated within the sweep of the proposed turbine blades. All the months show data below the threshold for Nama-Karoo. This system indicates that activity is the highest during September and October but activity during these months is still within the lower category of Nama-Karoo bat activity. For this reason, no preliminary mitigation is recommended for Medium sensitivity zones, but only for High and High-medium sensitivity zones. A mitigation scheme is nevertheless included would high bat fatality occur during the operational phase.

Low activity was experienced during winter and mid-summer, but activity increased in autumn, when bats usually "stock up" for the winter months, as well as during September and October, when bats emerge after the colder winter months.

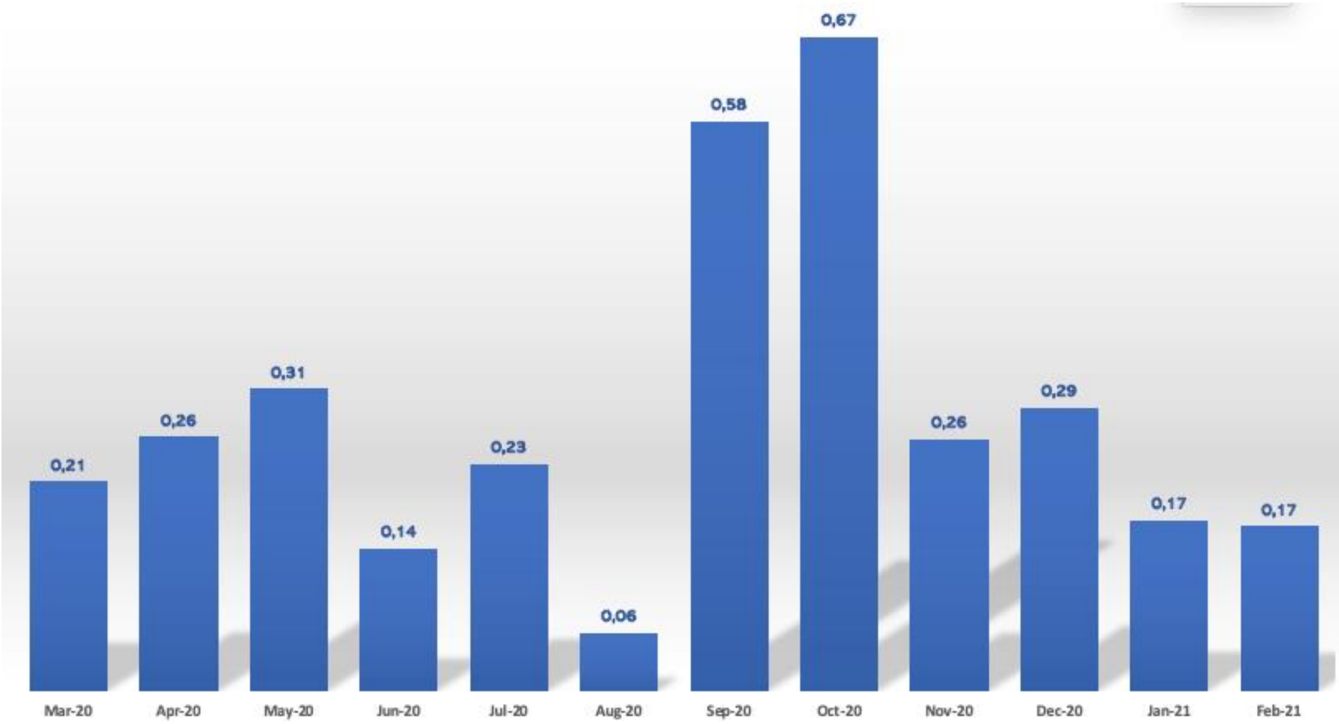


Figure 16: Mean hourly nightly bat passes per month for the 110 m monitoring system (A) at the proposed Koup 1 WEF site.

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. 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, together with data from 10m masts and site investigations, are used to compile a mitigation schedule to be implemented when the turbines start to turn. 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 as a whole.

Weather data from the 112 m sampling point (System A) 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 Figure 17 and summarised inTable 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	0.485	Moderate positive relationship between temperature and bat activity. As temperature increases so does the bat activity.
Wind speed and bat activity	-0.243	Weak negative relationship between wind speed and bat activity. As wind speed increases the bat activity decreases.
Humidity and bat activity	-0.072	Weak negative relationship between humidity and bat activity. As humidity increases the bat activity decreases.

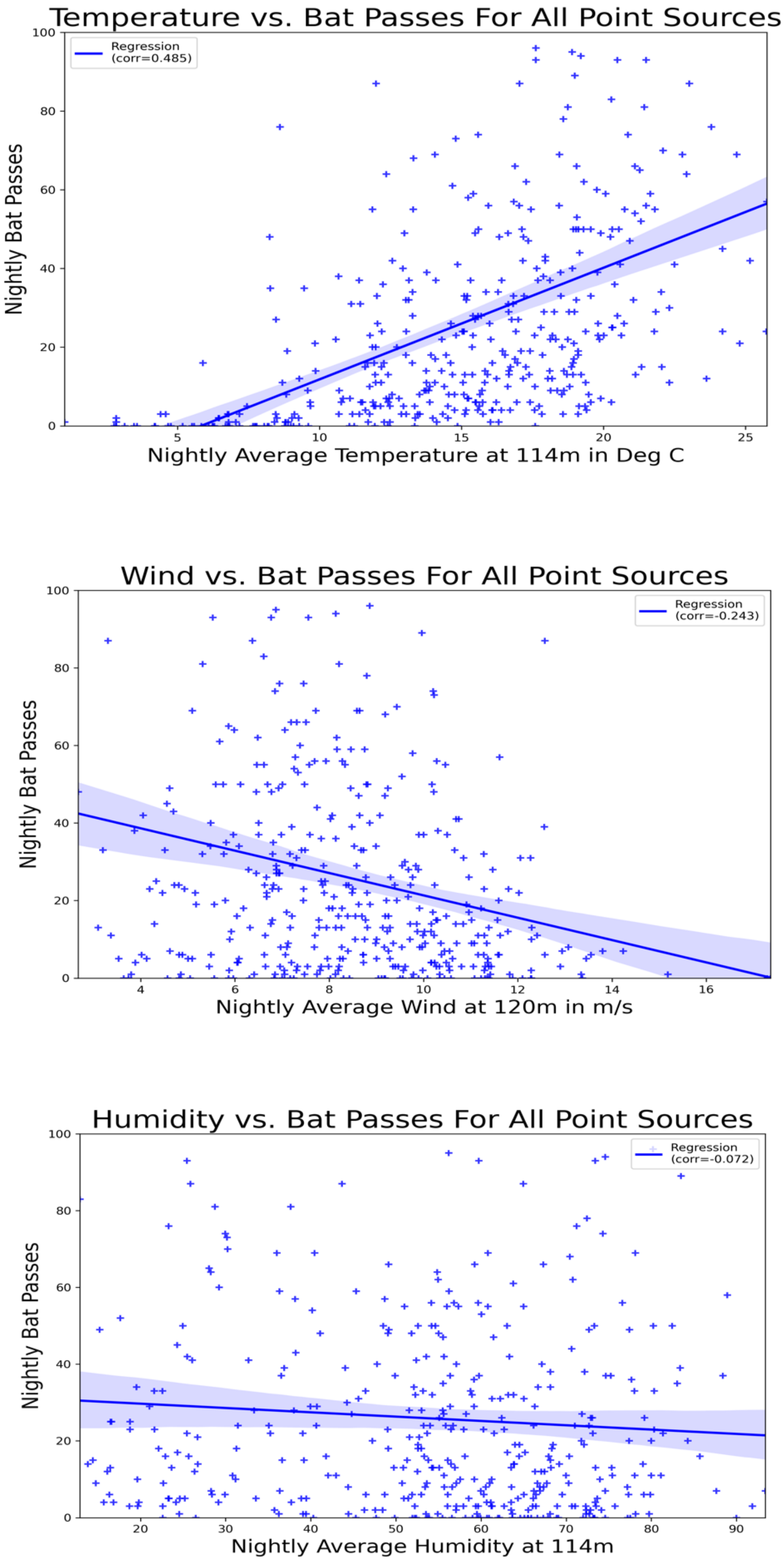


Figure 17: Linear regressions of temperature, wind speed and humidity as predictors of the distribution of bat activity.

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 A was plotted with wind speed, temperature and humidity and the following trends are observed:

- Approximately 60% of the bat activity was recorded below approximately 7,5m/s wind speed.
- Approximately 80% of the bat activity was recorded above 12ºC.
- Approximately 80% of the bat activity was recorded above 40% humidity.

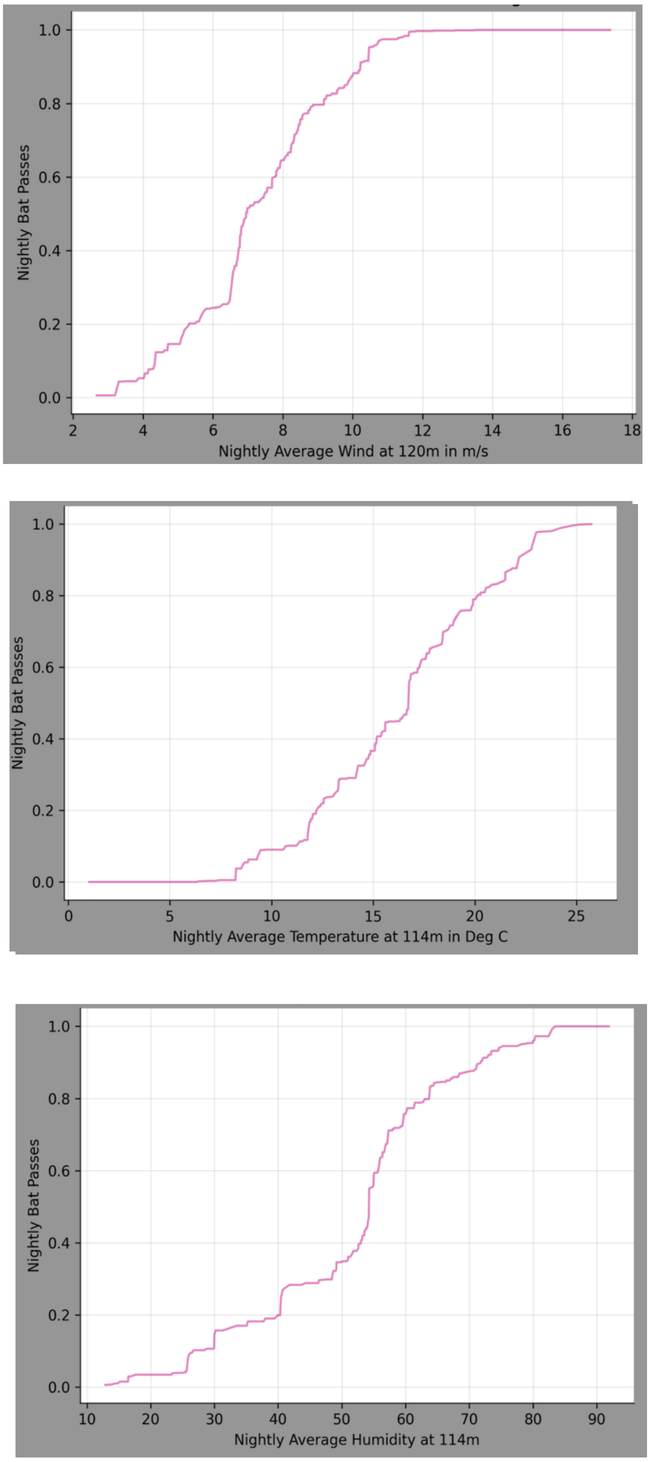


Figure 18: Cumulative Distribution Function (CDF) of nightly bat passes with nightly average temperature, wind speed and humidity.

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 Figure 19. Darker areas indicate a concentration of activity.

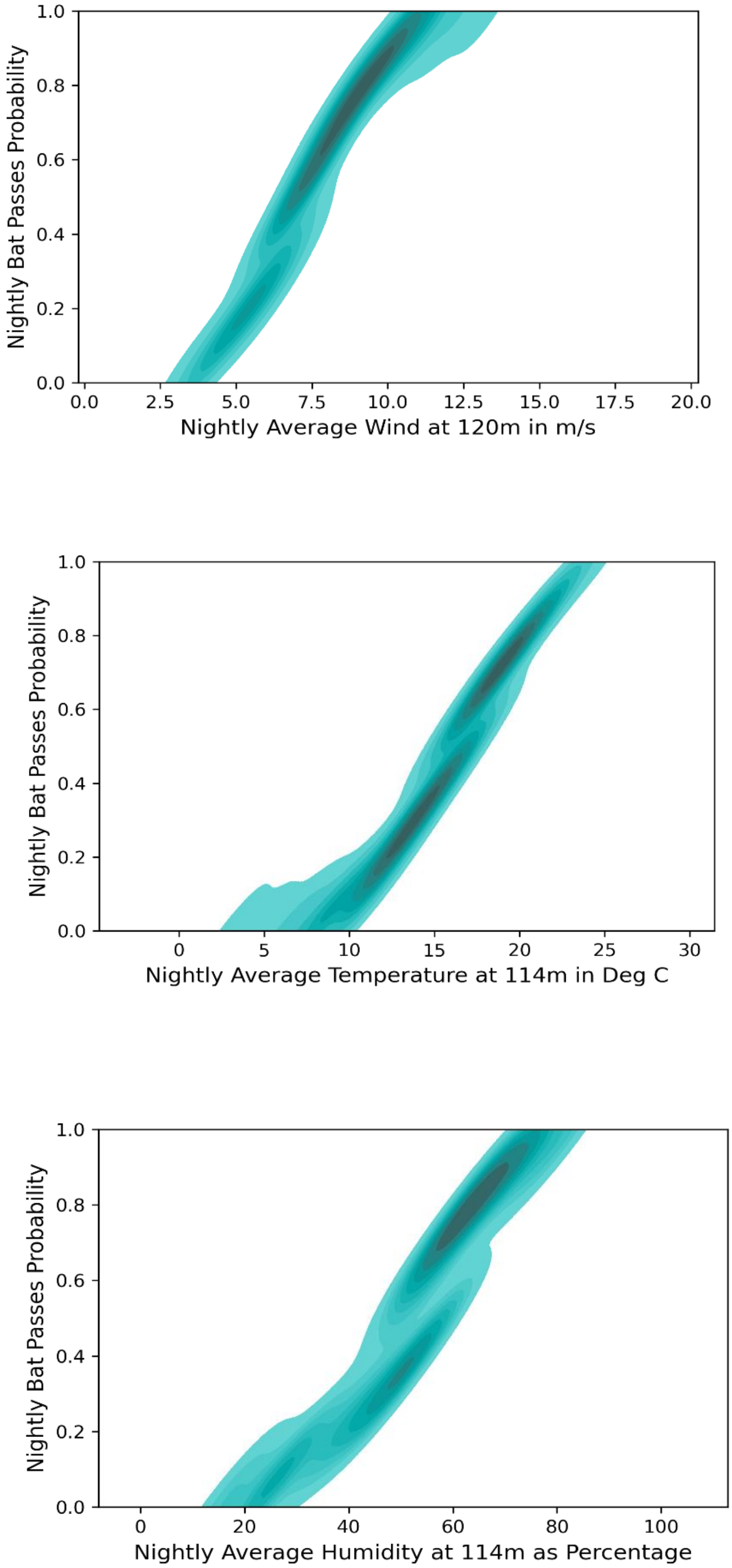


Figure 19: Cumulative distribution function heat maps for System A (Met 112 m) showing bat activity with wind speed, temperature and humidity.

In Figure 19, the density of bat passes during certain temperature, wind speed and humidity at System A (110m on the Met mast) can be observed when CDF heat maps are plotted, and the following could be derived:

- **Nightly bat activity and wind speed:** A relative higher concentration of activity is experienced between 7m/s and 10m/s. There is also a second, lower concentration displayed around 5m/s.
- **Nightly bat activity and temperature:** Bat activity appear to be concentrated between 10 ºC to 25 ºC, with two concentrations, between 13 ºC and 16 ºC, and 16 ºC and 20 ºC.
- **Nightly bat activity and humidity:** Bat activity are concentrated between 55% and particularly 70%, with some density in activity around 50% humidity.

Figure 20 depicts similar CDF heat maps for the combined 10 m masts (Mainly System B and D). Apart from humidity, which 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, some similarity is seen between the wind and humidity plots, but the peak activity plotted for lower 10 m masts differ from the graphs plotted with the high-altitude system (A) on the Met mast. Where the highest concentration of activity is seen between 13 ºC and 20 ºC at the high-altitude system, the combined 10 m masts portray the highest concentration of activity between 13 ºC and 16 ºC. This might be due to the foraging preferences of different species recorded at the different systems. One could speculate that *T.aegyptiaca*, which represents most of the activity at high altitude, might just prefer a wider range of temperatures than, for example, *N.capensis*, which portrayed higher activity at 10 m mast D. 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.

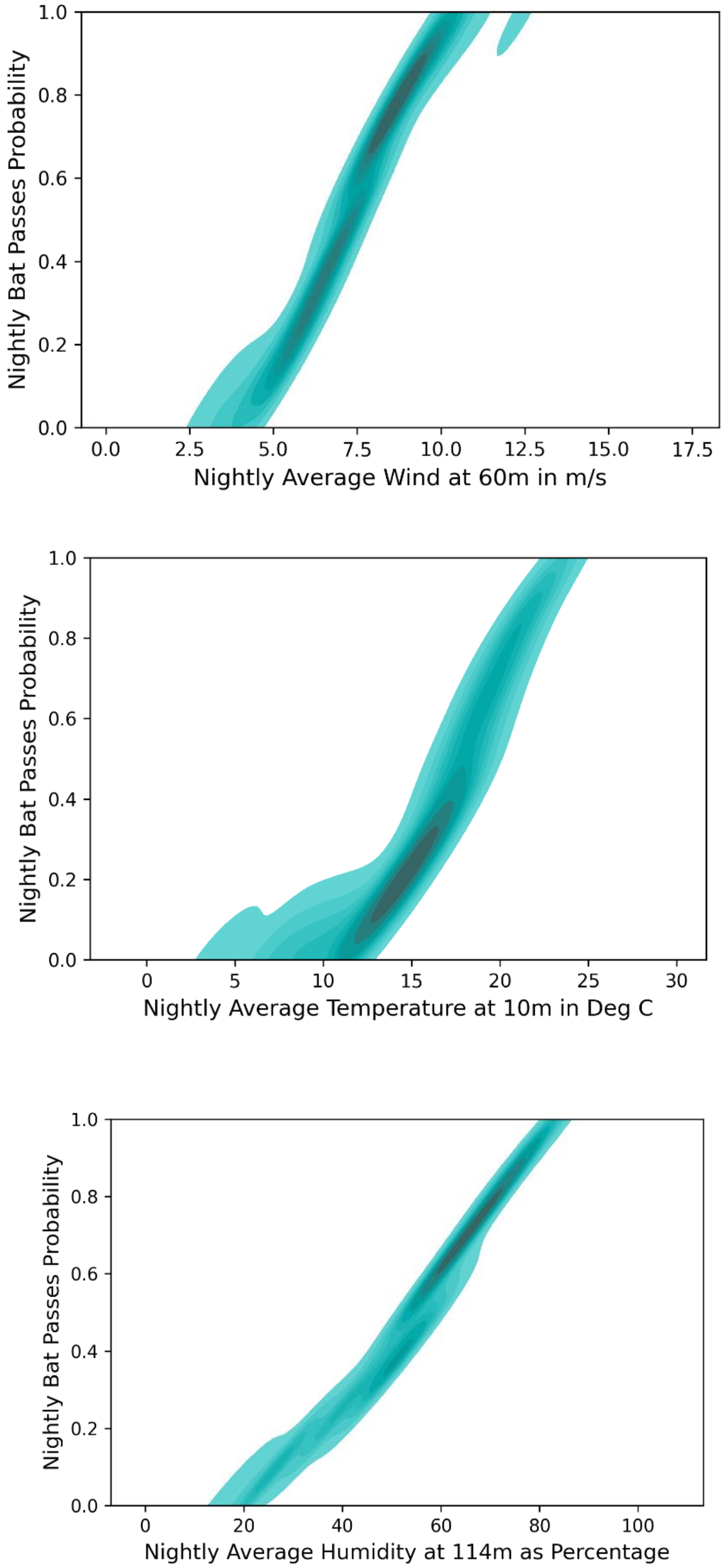


Figure 20: Cumulative distribution function heat maps for the combined 10 m masts showing bat activity with wind speed, temperature and humidity

7. TRANSECTS

Transects are just a snapshot in time but does confirm species present at site. In Figure 21 the transect route followed at Koup 1 WEF, with the stationary monitoring points, can be observed. The positions of the three bat passes recorded during the four seasons of monitoring, are marked.

Figure 21: Koup 1 transect route, showing the positions of the recorded bat calls and the stationary monitoring points.

As can be seen in Table 5, no bats were recorded during the transects in winter and spring, while one bat was recorded during summer and two bats were recorded on the second night of transects in autumn, one being the endangered *Miniopterus natalensis*.

Table 5: Koup 1 WEF winter and spring transect data

Date	Temperature	Wind	Cloud cover	Results
Winter				
10 June 2020	Approx. 12 ºC	Approx. 4 m/s	Partly cloudy	No bat calls
11 June 2020	Approx. 7 ºC	Approx. 3 m/s	Partly cloudy	No bat calls
Spring				
25 Sept. 2020	Approx. 15 ºC	Approx. 3 m/s	Partly cloudy	No bat calls
26 Sept. 2020	Approx. 16 ºC	Approx. 2 m/s	Partly cloudy	No bat calls
Summer (no transects)				
21 Jan 2021	Approx. 38 ºC	Approx. 3 m/s	Partly cloudy	No bat calls
22 Jan 2021	Approx. 43 ºC	Approx. 1 m/s	Partly cloudy	1 X *N.capensis*
Autumn				
24 April 2021	Approx. 27ºC	Between 0 m/s to 0,6 m/s	Clear	No bat calls
25 April 2021	Approx. 28ºC	No wind	Clear	1 X *M. natalensis* 1 X *N. capensis*

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 sites 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 1 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 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 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.

8.1 High sensitivity zones

Due to the high bat activity, equivalent to the highest bat sensitivity class for the Nama Karoo (Sowler, et al., 2017), recorded at Mast D, and the importance of the ecological bat corridor created by the river and river vegetation, the lower part of Platdoringsrivier is buffered by a 300 m buffer. 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. Limited bat droppings have been found at all the farm dwellings, as well as small bat roosts in some buildings.
- 300 m buffer around the higher order section of the Platdoringsrivier and the riparian shrub along the valley.
- 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 fourth and third order streams.
- 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 relative dense thicket 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 does not support thicket or riparian vegetation.

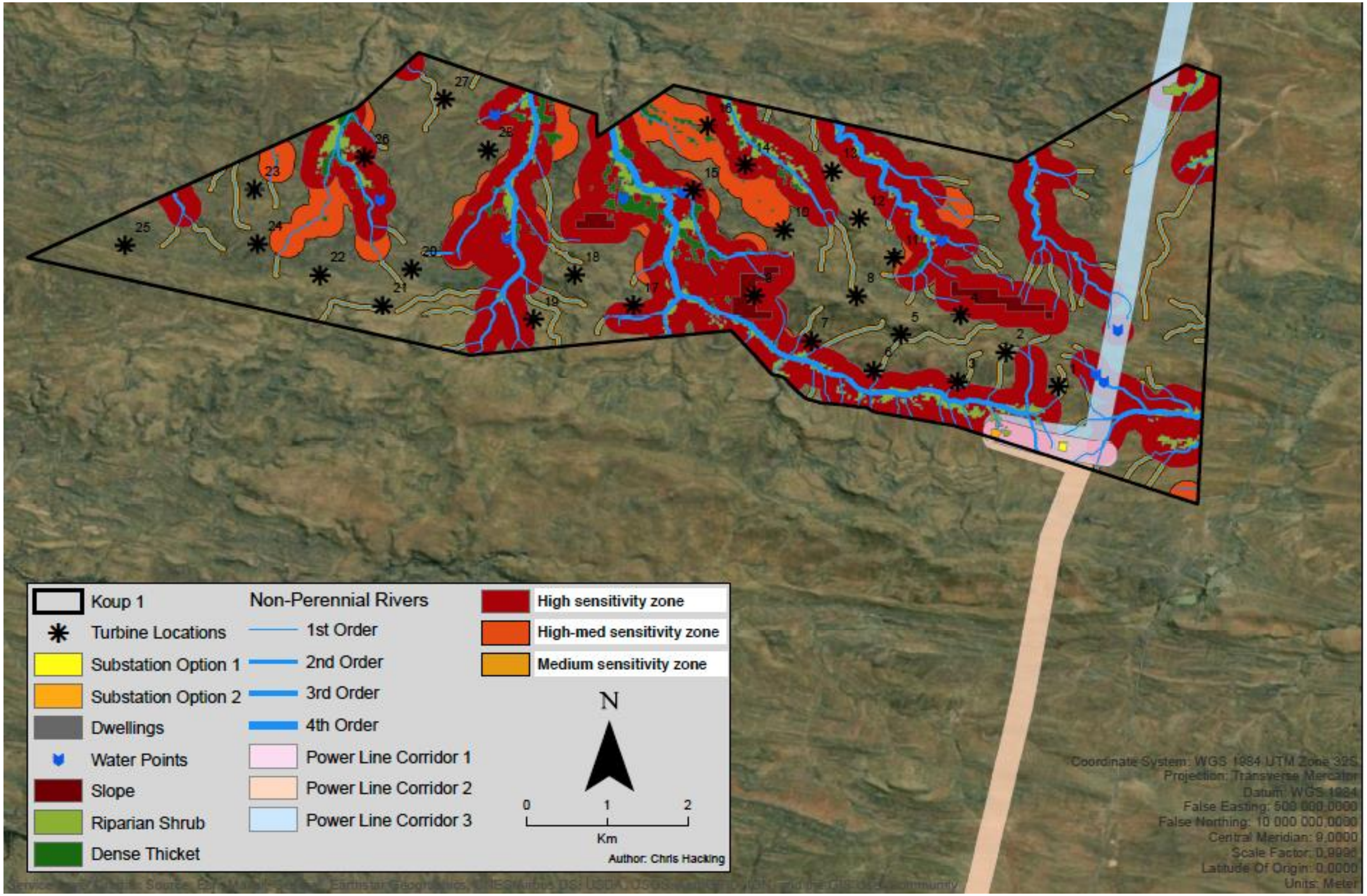


Figure 22: Sensitivity Map - Koup 1 WEF.

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 of sensitive areas. It is therefore recommended that the applicant reconsider turbine positions situated within High-sensitivity areas, and where possible, High-medium sensitivity areas, see Table 6. To avoid mitigation measures, the applicant might also consider shifting turbines situated outside medium sensitive zones. Many of these turbines might not actually be situated within the sensitivity zone, but as turbine specifics are not available yet, it appears as if they are. With fine scale placing and more information regarding turbine specifications, little mitigation might be necessary.

Table 6: Turbine numbers or turbine components situated within sensitivity zones.

High Sensitivity	High-medium Sensitivity	Medium Sensitivity
4	10	1
6	11	2
7	16	3
9		5
14		8
15		21
17		27
19		
26		

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 *Molossidae* 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.

Apart from System D, the other monitoring systems indicated low bat activity for the Nama Karoo during the monitoring period. Interviews with Koup 1 landowners as well as bordering farms, indicate that they frequently experience bat presence along the riverbeds. Systems at the proposed Koup 2, bordering Koup 1 towards the west, also recorded high bat activity. 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 turbines will be shifted from High sensitivity areas and 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, 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 the 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. 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:

- Between September and May;
- From one hour after sunset, between approximately 18:00 and 19:00, up to seven hours after sunset, between approximately 1:00 and 02:00;
- Temperatures above 10ºC;
- Wind speed between 0 m/s and 10 m/s;
- 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 1 WEF site. Highlighted months indicate periods when turbines situated in high sensitivity zones must be curtailed immediately after installation.

CURTAILMENT FOR TURBINES IN HIGH-MEDIUM SENSITIVITY ZONES			
Months	**Time periods**	**Temperature (°C)**	**Wind speed (m/s)**
September to May	One hour after sunset up to 7 hours after sunset	Between 10 ºC and 25 ºC	Between 0 m/s and 10 m/s

9.2.2 Medium Sensitivity zones

The bat monitoring undertaken at the proposed Koup 1 indicate, apart from Sensitivity zones, a low bat activity. Therefore, curtailment is not necessary for Medium Sensitivity zones at the start of the project. It is recommended, as far as possible, that turbines are moved out of Medium Sensitivity zones. The operational bat monitoring should inform the approach and confirm if further mitigation is required. Should medium to high estimated true bat mortality be experienced during these months, 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 1 WEF.

Table 8: Time periods and weather conditions (as measured at approximately 114m m height) at the proposed Koup 1 WEF site. Highlighted months indicate periods when turbines situated in Medium sensitivity zones must be curtailed immediately after installation.

CURTAILMENT FOR TURBINES IN MEDIUM SENSITIVITY ZONE			
Months	**Time periods**	**Temperature (°C)**	**Wind speed (m/s)**
September to December, April to May	One hour after sunset up to 7 hours after sunset	Between 12ºC and 20 ºC	Between 0 m/s and 7 m/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.

10. CUMULATIVE IMPACTS

Figure 23 presents the renewable energy facilities (approved or at proposal stage) within a 35km radius of Koup 1 and Table 12 provides a summary of renewable energy facilities within 35 km of the Koup 1 WEF site to assess the cumulative effect for bats, as per the Good Practice Guidelines (Sowler, *et al*., 2017).

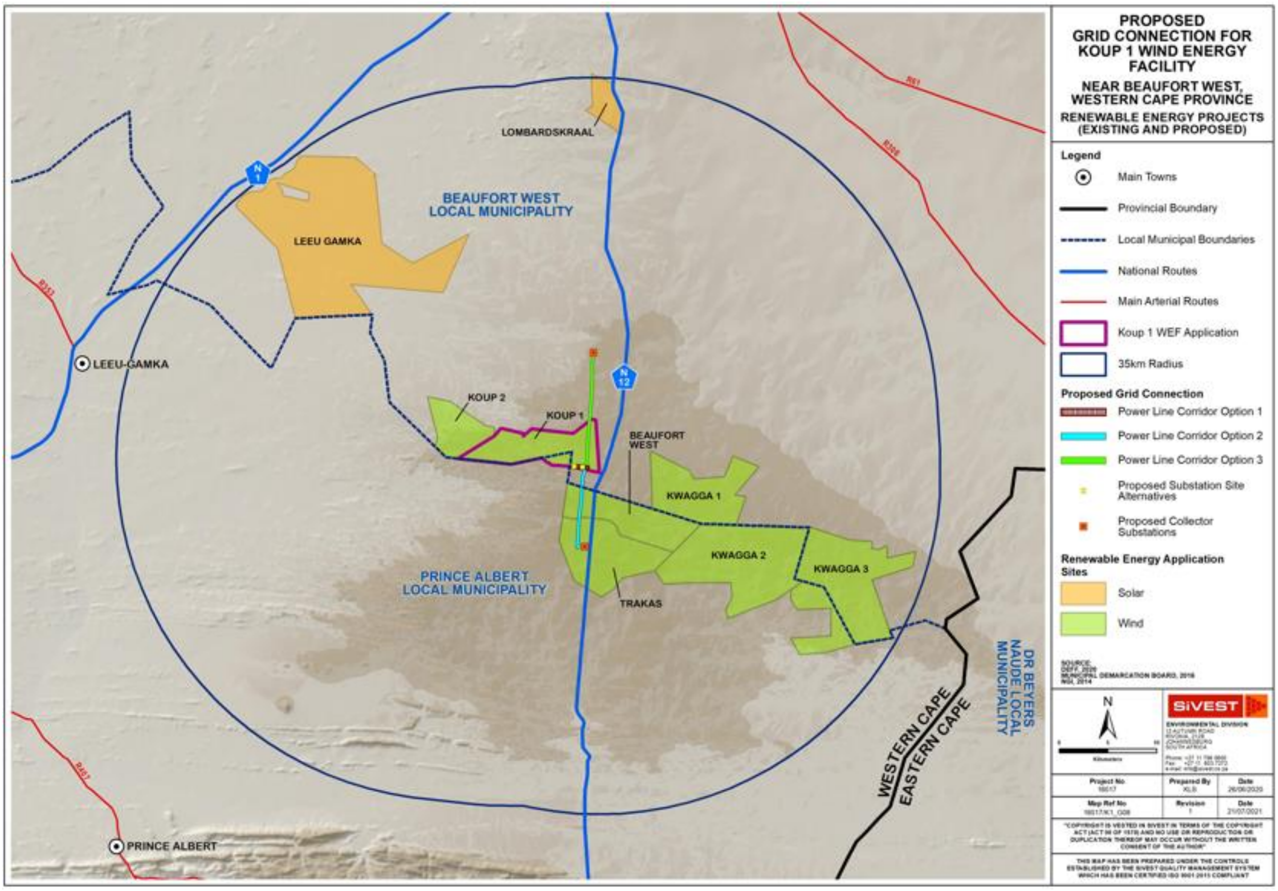


Figure 23: Renewable energy facilities (REF) within a 35 km radius of Koup 1 of which some have received environmental authorisation (Beaufort West and Trakas WEF) and others are at proposal stage.

Bat activity was confirmed during specialist field visits at the proposed Koup 1 WEF site and surrounding proposed WEF sites. Although there is an indirect impact of loss of foraging area, the direct potential impact of solar panels on bats are low; therefore, solar panels were not included in the calculations below.

Together with the data gained from field work done at the proposed Koup 1 and parallel Koup 2 sites, bat monitoring information was also acquired from bat studies undertaken on the adjacent approved Beaufort West and Trakas sites. Beaufort west and Trakas show an increase in bat activity between October 2015 and April 2016 (Animalia, 2016). Koup 1 indicated relative higher bat activity during January 2020 to May 2020 and September to December 2020 with a peak in March 2020.

Table 9 below presents project specific and cumulative calculations for insectivorous bats at WEFs within 35km radius of Koup 1 to predict and assess cumulative impacts. 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 1 WEF added to this, the combined electricity output will be approximately 420 MW. Together with Koup 2, the total combined electricity generation will be 560 MW. Although only approved wind farms have been considered, Koup 2 WEF, from the same developer and adjacent to Koup 1 WEF, was included in a separate row in Table 9. The reason being that the proposed Koup 1 and Koup 2 WEFs, are neighbouring farms and from the same ecological unit. These two sites should therefore, from an ecological perspective, be treated as one unit when looking at cumulative effects.

Table 9 presents the individual and cumulative features of the WEFs included in this impact assessment, 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 also includes other renewable energy projects (Wind and Solar) within 35km radius of Koup 1 awaiting approval and therefore not included in this impact assessment. However, available information such as the MW energy output data and area size of these projects are included to inform the cumulative impact.

Table 9: Summary of output, project size and risks to bats for REFs within a 35 km radius of Koup 1.

Approved WEFs within 35km radius of Koup 1	Energy Ouput 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 1	140	4279	0.48	86	Low
Total Beaufort West, Trakas and Koup 1	420	13742	2.57	274	High
Other Renewable Energy Facilities within 35km radius, which are in progress, but have not been taken into account for the Impact Assessment					
Proposed Koup 2	140	2477	0.41	50	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	_	_	_
Kwagga 1 Wind Energy	278	5136	_	_	*
Kwagga 2 Wind Energy	341	9204	_	_	*
Kwagga 3 Wind Energy	204.6	9385	_	_	*
Combined Total	1414	61768	2.98	324	High

*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 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, and for Koup 1, it is low at 0.48 bats per hour for the site as a whole. The combined cumulative annual bat activity per hour for these sites are 2,57 bats per hour. This places 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 1 increases the total area from 13 742 ha to a much larger area or cluster of 61 768 ha and potential energy output to approximately 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 final scoping reports for Kwagga is estimated to be Low after mitigation. The effect of cumulative impacts and the (SiVest) significance rating for bats at Koup 1 include the cumulative effect of the destruction of active roosts and features that could serve as roosts as medium before mitigation (28 in range 24-42) and low after mitigation (11 in range 5-23). Cumulative bat mortality due to direct collision or barotrauma during foraging of resident bats is rated high before mitigation (51 in range 43-61) and decreases to borderline medium/high after mitigation (42 in range 24-42).

The impact on migrating bats is rated high before mitigation (45 in range 43-61) and medium after mitigation (24 in range 24-42) and bat habitat loss over several farms is rated high before mitigation (45 in range 43- 61) and medium after mitigation (30 in range 24-42). Furthermore, the cumulative reduction in size, genetic diversity, resilience and persistence of bat populations is rated high before mitigation (64 in range 43-61) and continues as high after mitigation (54 in range 43-61). 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 site is just outside the REDZ, 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 Koup1 WEF over a 20-year life span, the total estimated true fatality could amount to approximately 4 640 bats.

Although this is only speculation and not a scientific way of calculating fatality over the lifespan of a wind farm, as the 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, one could get an idea of the severity of the cumulative impact over decades of wind energy generation.

Recommendations in previous reports relating to Beaufort West and Trakas WEFs include mitigating measures restricting the number of turbines and excluding turbines and all components from buffer areas and that those turbines located near Medium-to-high bat sensitivity buffers be prioritised during operational monitoring and that mitigation be applied.

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 aegyptiac*a 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 1 WEF:

Construction Phase

- Roost disturbance, destruction, and fragmentation due to construction activities.
- Creating new habitat amongst the turbines, such as buildings, excavations, or quarries, which could attract bats.
- 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 1 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 the WEFs.
- Cumulative reduction in the size, genetic diversity, resilience, and persistence of bat populations of the local as well as wider region.

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
CONSTRUCTION PHASE																			
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 and the removal 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 all bats that could potentially roost in trees and on the foraging of clutter and clutter-edge species.	1	3	3	3	4	2	28	-	Medium	1	2	2	2	2	1	9	-	Low

MITIGATION MEASURES:

- Construction activities to be kept out of all high bat sensitive areas.
- Rock formations occurring along the ridge lines in the should be avoided during construction, as these serve as roosting space for bats.
- Destruction of limited trees should be avoided during construction.
- Care should be taken if any dense bushes are destroyed.
- 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.

<table>
<tr><th rowspan="2">Environmental Parameter</th><th rowspan="2">Issue / Impact / Environmental Effect/ Nature</th><th colspan="9">Environmental Significance Before Mitigation</th><th colspan="9">Environmental Significance After Mitigation</th></tr>
<tr><th>E</th><th>P</th><th>R</th><th>L</th><th>D</th><th>I/M</th><th>Total</th><th>Status (+/ -)</th><th>S</th><th>E</th><th>P</th><th>R</th><th>L</th><th>D</th><th>I/M</th><th>Total</th><th>Status (+/ -)</th><th>S</th></tr>
<tr><td colspan="20">CONSTRUCTION PHASE</td></tr>
<tr><td>Excavation and building new structures</td><td>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.</td><td>1</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>22</td><td>-</td><td>Low</td><td>1</td><td>1</td><td>1</td><td>1</td><td>3</td><td>1</td><td>7</td><td>-</td><td>Low</td></tr>
<tr><td colspan="20">MITIGATION MEASURES:
▪ Completely seal off roofs of new buildings (e.g., substations and site buildings). Note a small bat species could enter a hole the size of 1 cm^2.
▪ Roofs need to be regularly inspected during the lifetime of the wind farm and any new holes need to be sealed.
▪ Excavation areas or artificial depressions should be filled and rehabilitated to avoid creating areas of open water sources which could attract bats during rainy spells.</td></tr>
<tr><td>Noise and light disturbance</td><td>Construction noise, especially during night-time, as well as lightening disturbance.</td><td>1</td><td>3</td><td>2</td><td>2</td><td>1</td><td>2</td><td>18</td><td>-</td><td>Low</td><td>1</td><td>2</td><td>1</td><td>1</td><td>1</td><td>1</td><td>6</td><td>-</td><td>Low</td></tr>
<tr><td colspan="20">MITIGATION MEASURES:
▪ Nightly construction activities should be avoided, or if necessary, minimised to the shortest period possible.
▪ With the exception of 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.</td></tr>
</table>

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
OPERATIONAL PHASE																			
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 species have predominantly been confirmed at the proposed Koup 1 WEF site.	2	4	3	4	3	3	48	-	High	2	3	2	3	3	2	26	-	Medium

MITIGATION MEASURES:

- All turbines and turbine components, including the rotor swept zone, should be kept out of all High sensitivity zones, and preferably High-medium sensitivity zones.
- Mitigation as proposed in Section 9 should be applied as soon as the turbines start turning.
- 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. Close operational monitoring should inform whether mitigation for medium sensitivity zones, as described in Section 9.2, Table 8, should be applied.
- A bat specialist should be appointed before the turbines start to turn and operational bat monitoring should start 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 adapted 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 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.

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
OPERATIONAL PHASE																			
▪ 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. ▪ 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 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.																			
Bat migrations	Bat fatality during migration. A limited number of calls like *Miniopterus natalensis* (Natal Long-fingered bat), a Near Threatened migration species, have been recorded. Not much research has been conducted on migration of bats in South Africa, and some of the other species occurring on site could also migrate.	2	3	3	3	3	2	28	-	Medium	2	2	1	2	2	2	18	-	Low
MITIGATION MEASURES: ▪ Care should be taken during post construction monitoring to verify the activity of *M. natalensis*, especially within the rotor swept area of the turbine blades. Carcasses should be identified so as to establish the fatality of this species. ▪ All turbines and turbine components, including the rotor swept zone, should be kept out of all High sensitivity zones, and preferably High-medium sensitivity zones. ▪ Mitigation as proposed in Section 9.2 should be applied as soon as the turbines start turning. ▪ Mitigation as proposed for high sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start operating. Close operational monitoring should inform whether mitigation for medium sensitivity zones, as described in Section 9.2, Table 8, should be applied.																			

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
OPERATIONAL PHASE																			
▪ 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 as a starting point for discussions. ▪ 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. ▪ 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. ▪ 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.																			
Loss of bats of conservation value	Loss of bats of conservation value. A limited number of calls like the red *data Miniopterus natalensis* have been recorded, as well as the endemic *Eptesicus hottentotus.*	2	3	3	3	3	2	28	-	Medium	2	2	1	2	2	2	18	-	Low
MITIGATION MEASURES: ▪ Loss of bats of conservation value. A limited number of calls like the red *data Miniopterus natalensis* have been recorded, as well as the endemic *Eptesicus hottentotus.* 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 turbine components, including the rotor swept zone, should be kept out of all the High sensitivity zones, and preferably out of the High-medium sensitivity.																			

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
OPERATIONAL PHASE																			
▪ Mitigation as proposed in Section 9.2, should be applied for turbines situated in High-medium sensitivity zones as indicated. ▪ Mitigation as proposed for medium sensitivity zones proposed in Section 9.2, Table 8, must be adhered to if bat fatality is high. The post construction bat specialist could adapt these as deemed necessary and as operational data becomes available. ▪ 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, with Section 9.2 as a starting point for discussions. ▪ 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. ▪ 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. ▪ 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.																			
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	2	2	2	2	2	18	-	Low	1	2	2	2	2	1	18	-	Low
MITIGATION MEASURES:																			

<table>
<tr><th rowspan="2">Environmental Parameter</th><th rowspan="2">Issue / Impact / Environmental Effect/ Nature</th><th colspan="9">Environmental Significance Before Mitigation</th><th colspan="9">Environmental Significance After Mitigation</th></tr>
<tr><th>E</th><th>P</th><th>R</th><th>L</th><th>D</th><th>I/M</th><th>Total</th><th>Status (+ /-)</th><th>S</th><th>E</th><th>P</th><th>R</th><th>L</th><th>D</th><th>I/M</th><th>Total</th><th>Status (+/-)</th><th>S</th></tr>
<tr><td colspan="20">OPERATIONAL PHASE</td></tr>
<tr><td colspan="20">

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.
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.
Little is known about this impact and mitigation could be adapted if more research becomes available.

</td></tr>
<tr><td>Foraging space lost due to the turning of turbine blades</td><td>Loss of habitat and foraging space during operation of the wind turbines.</td><td>2</td><td>4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>45</td><td>-</td><td>High</td><td>2</td><td>4</td><td>2</td><td>2</td><td>3</td><td>3</td><td>39</td><td>-</td><td>Medium</td></tr>
<tr><td colspan="20">MITIGATION MEASURES:

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 turbine components, including the rotor swept zone, should be kept out of all the High sensitivity zones, and preferably out of the High-medium sensitivity.
Mitigation as proposed in Section 9.2, should be applied for turbines situated in High-medium sensitivity zones as indicated.
Mitigation as proposed for medium sensitivity zones proposed in Section 9.2, Table 8, must be adhered to if bat fatality is high. The post construction bat specialist could adapt these as deemed necessary and as operational data becomes available.
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, with Section 9.2 as a starting point for discussions.
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.

</td></tr>
</table>

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
OPERATIONAL PHASE																			
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	4	3	3	3	3	45	-	High	2	3	2	3	3	3	39	-	Medium

- 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.
- 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.

MITIGATION MEASURES:

- 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 turbine components, including the rotor swept zone, should be kept out of all the High sensitivity zones, and preferably out of the High-medium sensitivity.
- Mitigation as proposed in Section 9.2, should be applied for turbines situated in High-medium sensitivity zones as indicated.
- Mitigation as proposed for medium sensitivity zones proposed in Section 9.2, Table 8, must be adhered to if bat fatality is high. The post construction bat specialist could adapt these as deemed necessary and as operational data becomes available.

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
OPERATIONAL PHASE																			

- 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, with Section 9.2 as a starting point for discussions.
- 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.
- 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.
- 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.

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 (+ /-)	S
DECOMISSIONING PHASE																			
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
MITIGATION MEASURES: ▪ 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

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/ N ATURE	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
CUMULATIVE IMPACTS																			
Destruction of active roosts	Cumulative effect of destruction of active roost 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

MITIGATION MEASURES:

- Although Genesis Eco-Energy do not have any control over other wind energy development, 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.
- Post construction monitoring as per the relevant South African guidelines.

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ N ATURE	E	P	R	L	D	I/M	Total	Status (+/-)	S	E	P	R	L	D	I/M	Total	Status (+/-)	S
Direct collision and barotrauma	Cumulative bat mortality due to direct collision with the blades or barotrauma during foraging of resident bats at several WEF sites.	3	4	4	3	3	3	51	-	High	3	2	3	3	3	3	42	-	High

MITIGATION MEASURES:

- Although not enforceable on the Koup 1 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.

<table>
<tr><th rowspan="2">ENVIRONMENTAL PARAMETER</th><th rowspan="2">ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ N ATURE</th><th colspan="9">ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION</th><th colspan="9">ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION</th></tr>
<tr><th>E</th><th>P</th><th>R</th><th>L</th><th>D</th><th>I/M</th><th>Total</th><th>Status (+/-)</th><th>S</th><th>E</th><th>P</th><th>R</th><th>L</th><th>D</th><th>I/M</th><th>Total</th><th>Status (+/-)</th><th>S</th></tr>
<tr><td>Migrating bats</td><td>Cumulative bat mortality of migrating bats due to direct blade impact or barotrauma during foraging of migrating bats on several wind farms</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>45</td><td>-</td><td>High</td><td>3</td><td>2</td><td>2</td><td>2</td><td>3</td><td>2</td><td>24</td><td>-</td><td>Medium</td></tr>
<tr><td colspan="20">MITIGATION MEASURES:
Although not enforceable on the Koup 1 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.</td></tr>
<tr><td>Several wind farms stretching over thousands of hectares</td><td>Habitat loss over several wind farms</td><td>3</td><td>4</td><td>2</td><td>3</td><td>3</td><td>3</td><td>45</td><td>-</td><td>High</td><td>3</td><td>4</td><td>2</td><td>3</td><td>3</td><td>2</td><td>30</td><td>-</td><td>Medium</td></tr>
<tr><td colspan="20">MITIGATION MEASURES:
Although not enforceable on the Koup 1 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.</td></tr>
<tr><td>Several wind farms with the associated bat mortality over the lifespan of wind energy facilities</td><td>Cumulative reduction in the size, genetic diversity, resilience and persistence of bat populations</td><td>3</td><td>4</td><td>3</td><td>3</td><td>3</td><td>4</td><td>64</td><td>-</td><td>High</td><td>3</td><td>4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>54</td><td>-</td><td>High</td></tr>
<tr><td colspan="20">MITIGATION MEASURES:
Although not enforceable on the Koup 1 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.</td></tr>
</table>

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ N ATURE	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
▪ Post construction monitoring as per the relevant South African Bat Guidelines applicable at the time is of crucial importance.																			

11.6 Overall Impact Rating

If the client adheres to mitigation measures, the impact on bats from the proposed Koup 1 WEF is predicted to be **Negative Low.**

Table 14: Summary table of expected impacts associated with Koup 1 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 12 with monitoring requirements.

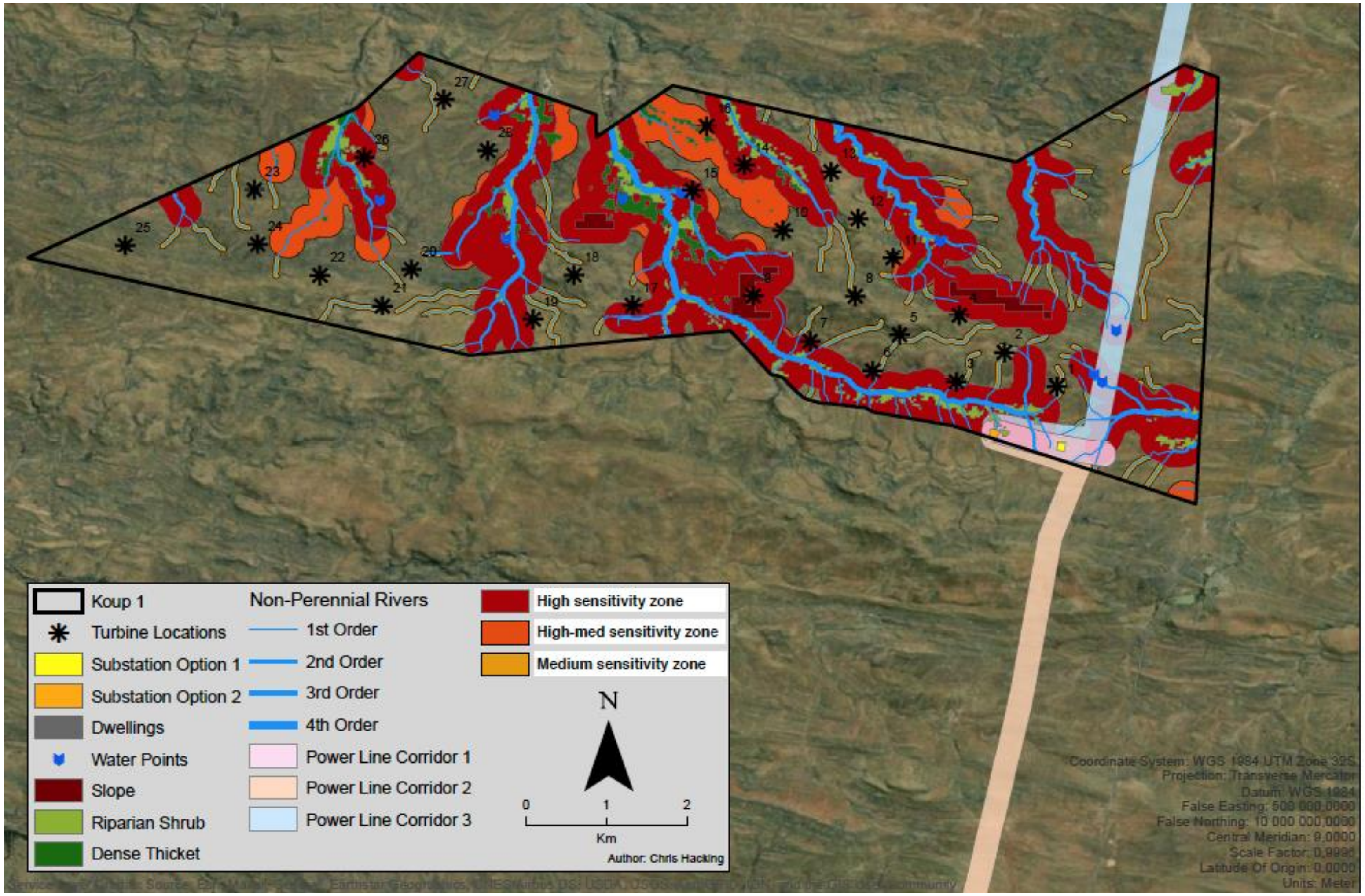


Figure 24: Bat sensivity map indicating areas that must be avoided by the proposed Koup 1 WEF development.

Table 15: Input to the environmental management programme (EMPR). The overarching aim from a bat perspective is to maintain the present roosts as it is, but not to attract new bat populations to the area.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
DESIGN PHASE					
Future impacts on Bats	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. ▪ A bat specialist should be appointed **before construction**, so as to provide advice concerning bats when needed.	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	One year of bat monitoring at height has already been completed.	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
	Avoid attracting bats to sensitive areas.	Plan to minimise artificial light at night.	Choice and light placement on turbines.	Final design	Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
CONSTRUCTION PHASE					
Avoid disturbance of foraging bats	Avoid habitat loss and destruction caused by clearing vegetation for the working areas, construction and landscape modifications.	▪ Avoid the removal of limited trees and large bushes as bats could potentially utilise these for roosting. ▪ Construction activities to be kept out of all high bat sensitive areas. ▪ Rock formations should be avoided during construction, as these serve as roosting space for bats. ▪ Care should be taken that there are no bat roosts if any telephone poles, dense bushes or rock formations are destroyed. The ECO should investigate before any of these features are destroyed.	▪ Monitor the efficiency of the EMPR. ▪ Monitor whether proposed measures are adhered to. ▪ ECO should be trained to recognize bat species and roost locations before construction starts.	▪ During construction phase. ▪ ECO should be trained before construction commences. ▪ Erosion and pollution monitoring during construction phase. ▪ Monitoring of off-road driving during construction phase. ▪ Monitor before anything is removed that	▪ Project Developer ▪ Construction manager ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
				could contain a bat roost.	
Active roost destruction and potential roost destruction and habitat loss	▪ Minimise impacts on bats during construction activities ▪ Keep construction out of high bat sensitive areas ▪ Avoid destruction of rock formations, trees, aardvark holes, derelict holes, excavations	▪ Construction activities to be kept out of all high bat sensitive areas. ▪ Rock formations occurring along the ridge lines should be avoided during construction, as these serve as roosting space for bats. ▪ Destruction of limited trees and relative large bushes should be avoided as far as possible during construction. ▪ Try to avoid the destruction of derelict holes such as aardvark holes and care should be taken in any fragmentation of woody habitat which includes dense bushes. ▪ The ECO should verify that there are no bat roosts if any bat sensitive features are destroyed.	▪ Visual inspection and continuous monitoring of high sensitivity areas, erosion prevention, chemical pollution and vehicle activity to prevent habitat destruction. ▪ Structures featuring potential roost to be investigated before it is demolished.	▪ Throughout construction. ▪ ECO to be present during all clearance of potential bat features. ▪ Access to bat specialist if ECO needs information or confirmation concerning bat presence.	▪ Project Developer ▪ Construction site manager ▪ ECO
Creating new habitat amongst the turbines that	▪ Prevent the creation of features that could attract bats to the terrain.	▪ Completely seal off roofs of new buildings (e.g., substations and site buildings). Note a small bat species could enter a hole the size of 1 cm^2.	▪ Continues inspection of sealed roofs regularly when maintenance of buildings are conducted – bats can move into	Throughout construction phase, and during lifetime of wind farm.	▪ Project Developer ▪ Site manager ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
might attract bats.	▪ Prevent bats from roosting in high-risk areas close to turbines and infrastructure such as roofs.	▪ Roofs need to be regularly inspected during the lifetime of the wind farm and any new holes need to be sealed. ▪ Excavation areas or artificial depressions should be filled and rehabilitated to avoid creating areas of open water sources which could attract bats during rainy spells.	holes as small as 1 X 1 cm. ▪ Oversee the rehabilitation of any excavation areas.		
Construction noise and lights, especially during night-time.	Prevent disturbance to bat activity and behaviour.	▪ Nightly construction activities should be avoided, or if necessary, minimised to the shortest period possible. ▪ Except for compulsory civil aviation lightning, artificial lightening during construction should be minimised, especially bright lights or spotlights. ▪ Lights should avoid skyward illumination, where possible. Turbine tower lights should be switched off when not in operation, where possible. Management of construction noise, especially during night-time, as well as lightening disturbance.	▪ Monitor construction to reduce noise and minimise disturbance in bat sensitive areas. ▪ Avoid construction activities at night, as far as possible.	Throughout construction phase.	▪ Project Developer ▪ Site manager ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
OPERATIONAL PHASE					
Fatality of resident bats through direct collision or barotrauma.	▪ Mitigate potential impacts on bats during operation of wind farm. ▪ Reduce bat mortality during the operational lifetime of the wind farm.	▪ Manage and mitigate 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 species have predominantly been confirmed at the proposed Koup 1 WEF site. ▪ No activities No-go areas. ▪ All turbines and turbine components, including the rotor swept zone, should be kept out of all No-go and high bat sensitivity areas. ▪ Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines blades start turning. ▪ Mitigation as proposed in Section 9.2, Table 7, must be adhered to as soon as the turbine blades start turning. Close operational monitoring should inform whether mitigation for medium sensitivity	▪ Regular bat monitoring reports, informed by the relevant SABAA operational bat monitoring guidelines. ▪ Adhere to the mitigation measures as indicated by the EA and Section 9 of the Bat Monitoring report. ▪ Maintain a register of bat mortality/injury. ▪ Regular communication between bat specialist and site manager. ▪ South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions of the	Throughout operation and during operational bat monitoring period.	▪ Site manager ▪ Project developer ▪ Bat specialist

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		zones, as described in Section 9.2, Table 8, should be applied. ▪ A bat specialist should be appointed before the turbines start to turn and operational bat monitoring should start immediately and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9 as a starting point for discussions. ▪ Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase. ▪ 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. ▪ 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 lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright	guidelines valid at the time of monitoring, as well as other relevant South African guidelines as applicable during the monitoring period.		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		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 ▪ 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. ▪ The use of ultrasound as a mitigation measure to deter bats should be			

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		investigated if necessary and as advised by a bat specialist.			
Bat fatality of migratory species.	▪ Mitigate potential impacts on bats during operation of wind farm. ▪ Reduce bat mortality during the operational lifetime of the wind farm.	▪ Bat fatality during migration. A limited number of calls like *Miniopterus natalensis* (Natal Long-fingered bat), a Near Threatened migration species, have been recorded. Not much research has been conducted on migration of bats in South Africa, and some of the other species occurring on site could also migrate. ▪ Care should be taken during post construction monitoring to verify the activity of *M. natalensis,* especially within the rotor swept area of the turbine blades. ▪ Carcasses should be identified to establish the fatality of this species. ▪ All turbines and turbine components, including the rotor swept zone, should be kept out of all No-go and high bat sensitivity zones. ▪ Mitigation as proposed in Section 9.2 and should be applied as soon as the turbines start turning.	▪ Regular bat monitoring reports, informed by the relevant SABAA operational bat monitoring guidelines. ▪ Adhere to the mitigation measures as indicated by the EA and Section 9 of the Bat Monitoring report. ▪ Maintain a register of bat mortality/injury. ▪ Regular communication between bat specialist and site manager. ▪ South Africa Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020)	Throughout operation and during operational bat monitoring period.	▪ Site manager ▪ Project developer ▪ Bat specialist

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		▪ Mitigation as proposed for High sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start turning. Close operational monitoring should inform whether mitigation for medium sensitivity zones, as described in Section 92., Table 8, should be applied. ▪ Careful observation should take place during the operational phase and mitigation should be adapted 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 civil aviation lightning, 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.	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.		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		▪ At least two years of post-construction bat monitoring is to be conducted and must be performed. ▪ The installation of more than one monitoring system at height need to be considered. ▪ The use of ultrasound as a mitigation measure to deter bats should be investigated if necessary and as advised by a bat specialist.			
Loss of bats of conservation value.	▪ Mitigate potential impacts on bats during operation of wind farm. ▪ Reduce bat mortality during the operational lifetime of the wind farm.	▪ Loss of bats of conservation value. A limited number of calls like the red *data Miniopterus natalensis* have been recorded, as well as the endemic *Eptesicus hottentotus.* ▪ 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 turbine components, including the rotor swept zone, should be kept out of all the No-go and High sensitivity	▪ Regular bat monitoring reports, informed by the relevant SABAA operational bat monitoring guidelines. ▪ Adhere to the mitigation measures as indicated by the EA and Section 9 of the Bat Monitoring report ▪ Regular communica-tion between bat	Throughout operation and during operational bat monitoring period.	▪ Site manager ▪ Project developer ▪ Bat specialist

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		zones, and where possible out of the High-medium sensitivity. ▪ Mitigation as proposed in Section 9.2, should be applied for turbines situated in High-medium sensitivity zones as indicated. ▪ Mitigation as proposed for medium sensitivity zones proposed in Section 9.2, Table 8, must be adhered to if bat fatality is high. The post construction bat specialist could adapt these as deemed necessary and as operational data becomes available. ▪ 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, with Section 9.2 as a starting point for discussions. ▪ Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright	specialist and site manager. ▪ 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.		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		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. ▪ 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.			
Bat fatality due to the attraction of bats to turbine blades.	Avoid activities that will attract bats to turbines.	▪ 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. ▪ Except for compulsory lightning required in terms of civil aviation, artificial lightning should be minimised, especially bright lights. Little is known about this impact and mitigation could be adapted if more research becomes available.	Reduce lights as far as possible.	Ongoing	▪ Site manager

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
Loss of habitat and foraging space during operation of the wind turbines.	▪ Mitigate the loss of habitat and foraging space.	▪ All components should be kept out of No-go areas. ▪ All turbines and turbine components, including the rotor swept zone, should be kept out of all the High sensitivity zones, and, if possible, out of the High-medium sensitivity. ▪ Mitigation as proposed in Section 9.2, should be applied for turbines situated in High-medium sensitivity zones as indicated. ▪ Mitigation as proposed for medium sensitivity zones proposed in Section 9.2, Table 8, must be adhered to if bat fatality is high. The post construction bat specialist could adapt these as deemed necessary and as operational data becomes available. ▪ At least two years of post-construction bat monitoring is to be conducted.	▪ Adhere to the mitigation measures as indicated by the EA and Section 9 of the Bat Monitoring report ▪ 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.	During operations.	Site manager/Project Developer and ECO
Reduction in the genetic pool of bats.	▪ Mitigate potential impacts on bats	▪ Reduction in the size, genetic diversity, resilience and persistence of bat populations. Bats have low reproductive	▪ Regular bat monitoring reports, informed by the relevant SABAA	During operations.	Project Developer/Site

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
	during operation of wind farm. ▪ Reduce bat mortality during the operational lifetime of the wind farm.	rates and populations are susceptible to reduction by fatalities other than natural death. Furthermore, smaller bat populations are more susceptible to genetic inbreeding. ▪ All turbines and turbine components, including the rotor swept zone, should be kept out of all the High sensitivity zones, and preferably out of the High-medium sensitivity. ▪ Mitigation as proposed in Section 9.2, should be applied for turbines situated in High-medium sensitivity zones as indicated. ▪ Mitigation as proposed for medium sensitivity zones proposed in Section 9.2, Table 8, must be adhered to if bat fatality is high. The post construction bat specialist could adapt these as deemed necessary and as operational data becomes available. ▪ Careful observation should take place during the operational phase and mitigation should be discussed between the bat	operational bat monitoring guidelines. ▪ Adhere to the mitigation measures as indicated by the EA and Section 9 of the Bat Monitoring report ▪ Regular communica-tion between bat specialist and site manager. ▪ 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		manager and ECO.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, with Section 9.2 as a starting point for discussions. ▪ 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. ▪ 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.	applicable during the monitoring period.		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		▪ 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.			
DECOMMISSIONING PHASE					
Decommissioning activities and noise, especially at night- time.	Minimum disturbance due to decommissioning activities.	▪ Bat disturbance due to decommissioning activities and associated noise, especially during night-time. ▪ 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 areas.

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION SITE ALTERNATIVES (AS PER FIGURE 24)		
Substation Option 1	**Preferred**	• The area is situated outside the high sensitivity zone • It is expected that less trees or bush cover will have to be removed • It is further from the higher order river and associated vegetation
Substation Option 2	**Least Preferred**	• The area is situated within the high sensitivity zone • Some riverine vegetation or bush cover, which might provide roosting opportunity to bats, might be destroyed • It is situated closer to the riverbed if compared to Option 1
CONSTRUCTION LAYDOWN AREA SITE ALTERNATIVES		
Construction Laydown Area Option 1	**Preferred**	• The area is situated outside the high sensitivity zone • It is expected that less trees or bush will have to be removed • The area is further removed from the higher order river and associated vegetation
Construction Laydown Area Option 2	**Least Preferred**	• The area is situated within the high sensitivity zone • The area is overlapping with Karoo thicket, which might provide roosting opportunities for bats • Some riverine vegetation, which might provide roosting opportunity to bats, might be destroyed • The area is situated closer to the riverbed if compared to Option 1

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. CONCLUSION AND SUMMARY

13.1 Summary of Findings

Bats are adversely affected by the wind turbines that encroach on air space where bats 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. Bat droppings of insectivorous bats were found at all the farm dwellings and one small roost with less than 20 bats was identified. 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 and occurrence which have not been accounted for in this report. Bat occurrence between ground level and approximately 30 m altitude are alike, although a higher activity was recorded in the north-western part of the wind farm. This part of the wind farm has not been grazed much before the bat monitoring started. The abundance of veld flowers might attract more insects, which subsequently attract more bats. The highest likelihood of fatality at Koup 1, as indicated through the present data in this report, is *T. aegyptiaca* (Egyptian free-tailed bat).

The Koup 1 site is covered by distribution map overlays of five families and approximately 12 bats species. Four species have conservation status of Near Threatened, one is Vulnerable and three Near Threatened. *Eptesicus hottentotus* (the Long-tailed serotine) and *Cistugo seabrae* (the Angolan wing-gland bat) are endemic to Southern Africa (Monadjem et al, 2010).

51% of the recorded activity represents the clutter-edge forager *Neoromicia capensis*, which is the dominant species on site. The second highest percentage of calls (48%) represents the Molossidae family, namely 44% calls like *Tadarida aegyptiaca* and 4% *Sauromy petrophilus*. Both these are high-risk species, physiologically adapted to fly at medium or high altitudes, in the vicinity of the turbine blades, so that the risk of collision and barotrauma is high. The endangered *Miniopterus natalensis* comprises 1% of the activity. The species diversity is generally higher at lower altitudes.

Mast D, the 10 m mast situated towards the western centre of the terrain, recorded the highest bat activity, with an exceptionally high activity of *N. capensis*. System A, at 110 m on the Met mast, recorded 89% activity belonging to the family Molossidae, the high-flying *T. aegyptiaca*, true to its narrow wing morphology adapted for open air.

The table below summarises the overall significance rating of the impacts of the Koup 1 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 impact	47 (43-61) High	32 (24-42) Medium
Combined for the site	28 (24-42) Med	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 1 and Koup 2 WEFs, was considered. Nama-Karoo bat thresholds (Sowler, *et al.* 2017), the combined yearly hourly bat activity of Koup 1, namely 0,48 bats per hour, categorises Koup 1 as Low. 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 for Nama-Karoo, which is High. The cumulative impact significance rating at Koup 1 fall into the same category as the surrounding WEFs with a high negative (47) before mitigation and medium negative (32) after mitigation.

Operational monitoring and mitigation need to be implemented upon construction of the WEFs to try to curb the high collected impact and turbines need to be controlled below cut in speed and freewheeling not be allowed from onset of operations.

- Curtailment to be implemented as specified in Section 9.2, Table 7 immediately from the onset of the turbines situated within the High-medium sensitivity zone, thus the moment the turbines start to turn. Curtailment should be refined as more data becomes available during the operational bat monitoring. If the number of turbines is reduced, the developer could consult with the operational bat specialist as to whether curtailment could also be reduced, after more data becomes available.
- Curtailment as specified in Section 9.2, Table 8, for those turbines situated in the medium zone, if necessary and with the advice of the operational bat specialist.
- Freewheeling: The cut-in speed is the lowest wind speed at which turbines generate power. Freewheeling should be prevented to an extent that bat mortality is avoided below cut-in speed, and

feathering applied to all turbine blades during periods when no power is generated for the duration of the project to prevent bat mortality.

- Bat deterrents could be an option for mitigation but will have to be investigated.

Operational monitoring should inform the extent of mitigation required.

Alternatives have been provided, with the preferred option 1 for both the proposed on-site substation and Battery (BESS) complex laydown areas. se

It should be noted that 12 months pre-construction bat monitoring is required in terms of the latest Bat Good Practice Guidelines (Sowler, *et al*. 2017), but the semi-desert Succulent Karoo environment is subjected to erratic climate conditions which vary from year to year.

13.2 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. Cumulative bat mortality due to direct collision or barotrauma during foraging of resident bats is rated high before mitigation (51 in range 43 to 61) and decreases to borderline medium/high after mitigation (42 in range 24 to 42). The potential cumulative reduction in bat population size remains high before and after mitigation. The cumulative impacts on migratory bats and habitat loss are reduced from high before mitigation to 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 1 Wind Farm is therefore predicted to be Negative Low. **Considering the findings of the one-year pre-construction monitoring undertaken at the proposed Koup 1 WEF site, this specialist is of the opinion that no fatal flaws exist, and environmental authorisation may be granted.**

14. REFERENCES

Animalia, 2016: Fifth and Final Progress Report of a 12-month Long Term Bat Monitoring Study for Beaufort West and Trakas WEFs, Western Cape. Animalia Zoological & Ecological Consultation (Pty) Ltd.

Aronson, J., Richardson, E., MacEwan, K., Jacobs, D., Marais, W., Taylor, P., Sowler, S., Hein. C. and Richards, L. 2020. South African Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities – ed 2. South African Bat Assessment Association.

Aronson, J., MacEwan, K., and Sowler, S. 2018. Mitigation Guidance for Bats at wind Energy Facilities in South Africa, 2nd Edition.

Department of Environmental Affairs 2019: *https://egis.environment. 7.za/data_egis/data_download/current* [Accessed 13 June 2019].

Google Earth: https://www.google.com/earth/download/html.

Google Maps, 2020. *Beaufort West.* [Online] Available at: https://www.google.com/maps/@-32.8888105,22.5528132,3a,75y,312.19h,85.39t/data=!3m6!1e1!3m4!1sv91_c7SKA7F9cjBu2kbrg!2e0!7i13312!8i6656 [Accessed 1 March 2020].

Karoo-South Africa, 2019. *Koup.* [Online] Available at: https://www.karoo-southafrica.com/koup/ [Accessed 27 February 2020]

Kunz, T.H., E.B. Arnett, W.P. Erickson, G.D. Johnson, R.P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle, 2007: Ecological Impacts of Wind Energy Development on Bats: Questions, Hypotheses, and Research Need. Frontiers in Ecology and the Environment: 5: 315-324.

Meteoblue accessed 29/1/2020

MacEwan, K., Sowler, S., Aronson, J., and Lötter, C. 2020a. South African Best Practice Guidelines for Pre-construction Monitoring of Bats at Wind Energy Facilities - ed 5. South African Bat Assessment Association.

MacEwan, K., Aronson, J., Richardson, E., Taylor, P., Coverdale, B., Jacobs, D., Leeuwner, L., Marais, W., Richards, L. 2020b. South African Bat Fatality Threshold Guidelines: Edition 3. Published by the South African Bat Assessment Association.

MacEwan, K., Aronson, J., Richardson, K., Taylor, P., Coverdale, B., Jacobs, D., Leeuwner, L., Marais, W., Richards, L. 2017. South African Bat Fatality Threshold Guidelines for Operational Wind Energy Facilities. Edition 1, South African Bat Assessment Association, South Africa.

Monadjem, A., Taylor, P.J., Cotterill, F.P.D., Schoeman, M.C., 2010: *Bats of Southern and Central Africa: A Biogeographic and Taxonomic Synthesis.* University of the Witwatersrand, Johannesburg.

Mucina L. & Rutherford M.C. (eds). 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Olson, D. Dinerstein, E., Wikramanayake, E., Burgess, N., Powell, G., Underwood, E., D'amico, J., Itoua, I., Strand, H., Morrison, J., Loucks, C., Allnutt, T., Ricketts, T., Kura, Y., Lamoreux, J., Wettengel, W., Hedao, P., Kassem, K. 2001: Terrestrial Ecoregions of the World: A New Map of Life on Earth. BioScience. 51. 933-938. 10.1641/0006-3568(2001)051[0933:TEOTWA]2.0.CO;2.

Red List of South African Plants (see http://redlist.sanbi.org/redcat. solar en wind ontwikkelings-2020 php).

SANBI BGIS Database: www.sanbi.co.za (accessed 7/2019).

SANBI BGIS Landcover product: http://bgis.sanbi.org/SpasialDataset/Detail/610 (accessed 7/2021).

SANBI BGIS NFEPA Wetlands: https://bgis.sanbi.org/SpatialDataset/Detail/395 (accessed 7/2021).

SiVest Non-Perennial Rivers: http://www.ngi.gov.za (accessed 7/21).

South African Energy Integrated Resource Plan 2010-2030 promulgated 3/2011 www.Energy.gov.za (accessed 7/2019).

Sowler, S., Stoffberg, S., MacEwan, K., Aronson, J., Ramalho, R., Forssman, K., Lotter, C. 2017: South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments – Pre-construction : Edition 4.1. South African Bat Assessment Association.

The World Bank Climate Change Knowledge Portal available at http://sdwebx.worldbank.org/climateportal/.

Tooth, S., 2000. Process, form and change in dryland rivers: a review of recent research. Earth-Science Reviews, 51(1-4): 67-107.

Van Rooyen, C., Froneman, A. 2019: Application for addendum to the Avifaunal Impact Assessment conducted for the proposed Beaufort West Wind Energy Facility (WEF) near Beaufort West, Western Cape Province.

Van Wyk AE & Smith G. Regions of Floristic Endemism in Southern Africa. Umdaus Press 2001. Pretoria.

Western Cape Topography Data Maps 201701: http://media.dirisa.org/inventory/archive/spatial/ngi/topographic-vector-data/wc_ngi_topo_data_-201701-gdb.zip/view (accessed 7/2021).

APPENDIX A
SPECIALISTS DECLARATION CV

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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

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

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

PROJECT TITLE

Proposed construction of the Koup 1 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

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

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

Dawid Frawman

Signature of the Commissioner of Oaths

2021- 07 -04

Date

SUID-AFRIKAANSE POLISIEDIENS
STASIE BEVELVOERDER
STELLENBOSCH
2021 -07- 04
STELLENBOSCH
STATION COMMANDER
SOUTH AFRICAN POLICE SERVICE

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

Postal Address:	8 Florida Street, Stellenbosch, 7600
Telephone Number:	021-8801653
Cell:	0822005244
e-mail:	sdippenaar@snowisp.com

EDUCATION

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 COMMITTES

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

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

Completion	Project description	Role
2012-2013	Bat impact assessment for the Karookop Wind Energy Project EIA.	Bat specialist
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
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✞

Completion	Project description	Role
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

- 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 AnalookW software with Chris Corben, the writer of the Analook 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

Fluent in Afrikaans and English

PEER REVIEWED PUBLICATIONS

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

Minnelise Levendal **EIA Practitioner: CSIR** ***Contact Details:*** **Email: mlevendal@csir.co.za** **Office: 021-8882495**	***Brent Johnson*** **Vice President: Environment at Dundee Precious Metals** ***Contact Details:*** **email: b.johnson@dundeeprecious.com** **Office: +264672234201** **Mobile: +264812002361**

APPENDIX C

Site Sensitivity Verification: Koup 1 Wind Energy Facility

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 1 Wind (Pty) Ltd, to conduct a 12-month bat study for the proposed Koup 1 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 4 279 ha, and is situated in 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

The screening tool was applied to the study area and it was determined that areas of high bat sensitivity is expected to occur on site (Figure A).

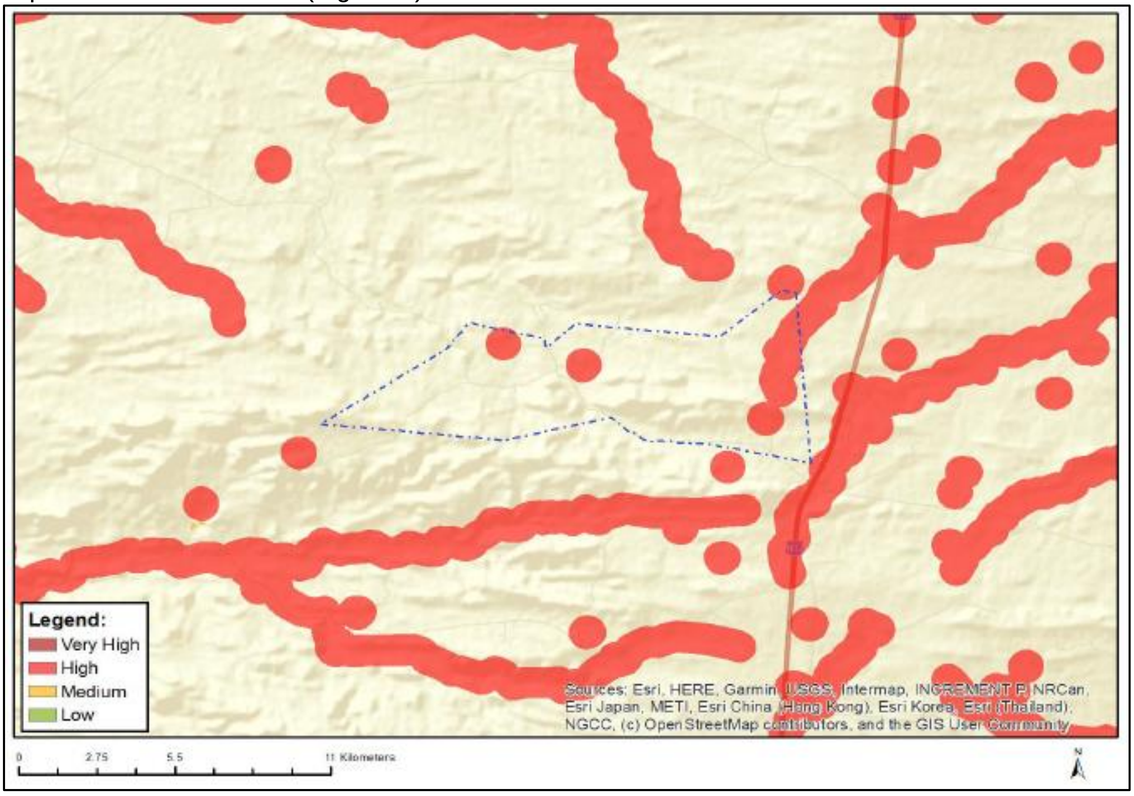


Figure A: Expected bat sensitive features at the Koup 1 WEF site.

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

- A desktop analysis was undertaken utilising 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 dwellings 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.

	**Vegetation** 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.
	**Rock formations and rock faces** Rock formations along the hill tops and along the river valleys provide ample roosting opportunities for bats. For example, a possible flight route might be found between the water source located behind the met mast and the rocky outcrops of the nearby hills.
	**Human dwellings** Where roofs are not sealed off, human dwellings could provide roosting space for some bat species. Evidence of bats were found in more than one derelict building situated within the borders of Koup 1.
	**Open water and food sources** Water troughs for the livestock and associated open cement reservoirs provide permanent, open water sources for bats right throughout the year. During few spells of rain, stagnant water that usually collects in small pans and dry ditches could serve as breeding ground for insects which could serve 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.

As indicated by the Screening Tool Site Sensitivity Map above, the greater part of the site is classified as low sensitivity. Contrary to the Site Sensitivity Tool classification, the river valley of the Platdoringsrivier, with its associated Karoo riverine vegetation, runs through the central part of the proposed wind farm, see Figure B. The riverbed, surrounding hills with rocky outcrops, derelict farm dwellings, and permanent water, could contribute to the high bat activity found in this area.

The Screening Tool site sensitivity also indicate a large area of high sensitivity in the east. The stream order of this river is low and does not indicate thicket or riverine vegetation conducive to higher bat activity. Also, two bat monitoring detectors deployed in this area indicated low bat activity.

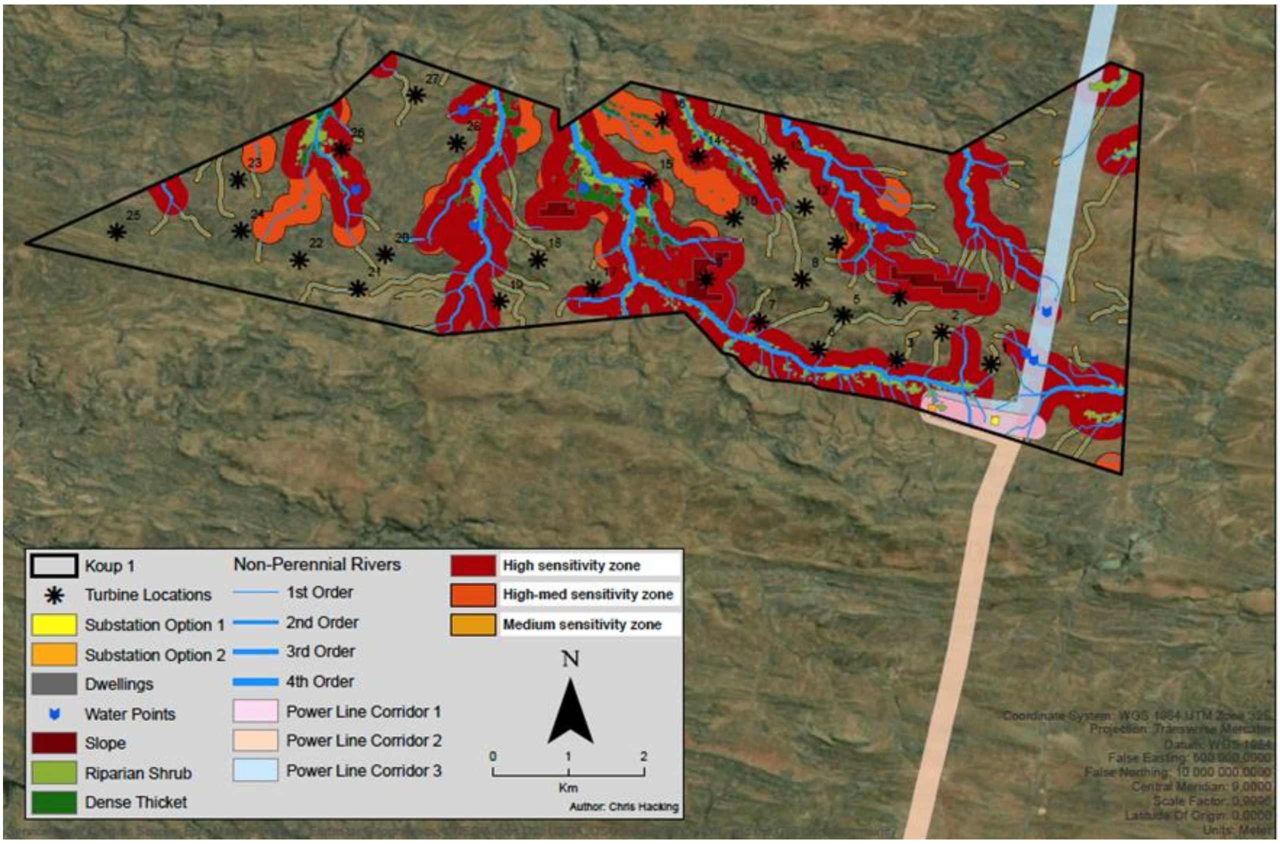


Figure B: Bat sensitivity map at Koup 1 WEF as confirmed during the 12-months bat monitoring.

4 CONCLUSION

According to our bat activity data, the Screening Tool sensitivity is correct for a large part of the site, if bat activity data is taken into account, but is inaccurate in the central part, which has been identified respectively as areas of No-go and High sensitivity. In general, several dry riverbeds are also cause for more No-go and High sensitivity zones, even though the bat activity in some of these areas was categorised 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

Koup1 weather and bat passes analysis June 2021.

Inus Grobler

Weather Summary Statistics:

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

	Mean (Average)	Min	Max	Median
Wind_120m	8.45 m/s	2.68 m/s	17.36 m/s	8.40 m/s
Wind_60m	7.44 m/s	1.69 m/s	15.87 m/s	7.56 m/s
Temp_114m	14.94 Deg C	1.02 Deg C	25.75 Deg C	15.48 Deg C
Temp_10m	14.79 Deg C	1.99 Deg C	26.46 Deg C	15.32 Deg C
Humidity_114m	54.48 %	12.88 %	93.39 %	56.66 %

APPENDIX E

KOUP 1 Overall Impact Significance Rating Matrix

KOUP 1 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
Construction Phase																				
Clearing and excavation of natural habitat.	The destruction of active bat roost and features that could serve as bat roosts, such as rock formations, removal of trees on site, destruction of derelict holes and fragmentation of habitat.	1	3	3	3	4	2	28	_	Medium	Construction activities to be kept out of all high bat sensitive areas. Rock formations occurring along the ridge lines in the should be avoided during construction, as these serve as roosting space for bats. Destruction of limited trees should be avoided during construction. Care should be taken if any dense bushes are destroyed. Aardvark holes or any large derelict holes or excavations should not be destroyed before careful examination for bats. A bat specialist should train the ECO before construction commences so that they know what to look out for during construction.	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 buildings with roofs that could 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 (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 should be filled and rehabilitated to avoid creating areas of open water sources that could attract bats during rainy spells.	1	1	1	1	3	1	7	_	Low
Impact of noise and light.	Construction noise, especially at night as well as light disturbance.	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.	1	2	1	1	1	1	6	_	Low

Operational Phase																					
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 would negatively impact on bats. High flying Molossidae species have predominately been confirmed at the proposed Koup 1 site.	2	4	3	4	3	3	48	_	High	Manage and mitigate 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. All components of the development should be kept out of all No-go areas and all turbine components, including the rotor swept area, should be kept out of High sensitivity areas. Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site. Close operational monitoring should inform whether mitigation for medium sensitivity zones, as described in Section 9.2, Table 8, should be applied. A bat specialist should be appointed before the turbines start to turn. Where high bat mortality occurs, those turbines should be mitigated, using Section 9 as a starting point for discussions. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase. 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 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. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the latest SABAA bat guidelines. 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, but more refined static data from sampling points at height, would aid in interpreting bat fatality. The use of ultrasound as a mitigation measure to deter bats should be investigated if necessary and as advised by a bat specialist.	2	3	2	3	3	2	26	_	Medium

Migratory bats	Bat fatality during migration. A limited number of calls similar to *Miniopterus natalensis* (Natal Longfingered bat), a Near Threatened migration species, have been recorded.	2	3	3	3	3	2	28	_	Medium	Care should be taken during post construction monitoring to verify the activity of M. natalensis, especially within the rotor swept area of the turbine blades. Carcasses should be identified to establish the fatality of this species. Manage and mitigate 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. All components of the development should be kept out of all No-go areas and all turbine components, including the rotor swept area, should be kept out of High sensitivity areas. Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site. Close operational monitoring should inform whether mitigation for medium sensitivity zones, as described in Section 9.2, Table 8, should be applied. A bat specialist should be appointed before the turbines start to turn. Where high bat mortality occurs, those turbines should be mitigated, using Section 9 as a starting point for discussions. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase. 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 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. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the latest SABAA bat guidelines. 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, but more refined static data from sampling points at height, would aid in interpreting bat fatality. The use of ultrasound as a mitigation measure to deter bats should be investigated if necessary and as advised by a bat specialist.	2	2	1	2	2	2	18	_	Low

Loss of bats of conservation value.	A limited number of calls similar to the red data *Miniopterus natalensis* have been recorded, as well as the endemic *Eptesicus hottentotus*.	2	3	3	3	3	2	28	_	Medium	Mitigation measures should be adapted if high activity of bats of conservation value is recorded, or if high numbers of carcasses are collected. Carcasses should be identified to establish the fatality of this species. All components of the development should be kept out of all No-go areas and all turbine components, including the rotor swept area, should be kept out of High sensitivity areas. Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site. Close operational monitoring should inform whether mitigation for medium sensitivity zones, as described in Section 9.2, Table 8, should be applied. A bat specialist should be appointed before the turbines start to turn. Where high bat mortality occurs, those turbines should be mitigated, using Section 9 as a starting point for discussions. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase. 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 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. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the latest SABAA bat guidelines. 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, but more refined static data from sampling points at height, would aid in interpreting bat fatality. The use of ultrasound as a mitigation measure to deter bats should be investigated if necessary and as advised by a bat specialist.	2	2	1	2	2	2	18	_	Low
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	Avoid 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. 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. Little is known about this impact and mitigation could be adapted if more research becomes available.	1	2	2	2	2	1	9	_	Low

Turning of turbine blades.	Loss of habitat and foraging space during operation of the wind turbines.	2	4	3	3	3	3	45	_	High	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 components of the development should avoid No-go zones. Turbines and turbine components, including the rotor swept zone, should be kept out of all the High sensitivity zones, and preferably out of the High-medium sensitivity. Mitigation as proposed in Section 9.2, should be applied for turbines situated in High-medium sensitivity zones. Mitigation as proposed for medium sensitivity zones proposed in Section 9.2, Table 8, must be adhered to if bat fatality is high. The post construction bat specialist could adapt these as deemed necessary and as operational data becomes available. At least two years of post-construction bat monitoring is to be conducted according to the relevant SABAA bat guidelines. 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, but more refined static data from sampling points at height, would aid in interpreting bat fatality. The use of ultrasound as a mitigation measure to deter bats should be investigated if necessary and as advised by a bat specialist.	2	4	2	2	3	3	39	_	Medium
Smaller genetic pool.	Reduction in the size, genetic diversity, resillience 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	4	3	3	3	3	45	_	High	Manage and mitigate 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. All components of the development should be kept out of all No-go areas and all turbine components, including the rotor swept area, should be kept out of High sensitivity areas. Mitigation as proposed in Section 9.2 and Section 9.3 should be applied as soon as the turbines start operating for the site. Close operational monitoring should inform whether mitigation for medium sensitivity zones, as described in Section 9.2, Table 8, should be applied. A bat specialist should be appointed before the turbines start to turn. Where high bat mortality occurs, those turbines should be mitigated, using Section 9 as a starting point for discussions. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase. 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 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. At least two years of post-construction bat monitoring is to be conducted and must be performed according to the latest SABAA bat guidelines. 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, but more refined static data from sampling points at height, would aid in interpreting bat fatality. The use of ultrasound as a mitigation measure to deter bats should be investigated if necessary and as advised by a bat specialist.	2	3	2	3	3	3	39	_	Medium

Decommissioning Phase																				
Removal of turbines.	Bat disturbance due to decommissioning activities and associated noise, especially during night-time.	1	3	1	2	1	1	8	_	Low	Bat disturbance due to decommissioning activities and associated noise, especially during night-time. Develop a decommissioning and remedial rehabilitation plan and adhere to compliance monitoring plan.	1	1	1	1	1	1	5	_	Low
Cumulative																				
Destruction of active roosts.	Cumulative effect of destruction of active roosts and features that could serve as potential roosts of several WEFs.	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 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 collison with the blades or barotrauma during foraging of resident bats at several WEF sites.	3	4	4	3	3	3	51	_	High	Althought not enforeable on the Koup 1 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 collison with the blades or barotrauma during foraging of migrating bats at several WEF sites.	3	3	3	3	3	3	45	_	High	Althought not enforeable on the Koup 1 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	2	2	3	2	24	_	Medium
Several wind farms stretching over thousands of hectares.	Habitat loss over several wind farms.	3	4	2	3	3	3	45	_	High	Althought not enforeable on the Koup 1 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	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	Althought not enforeable on the Koup 1 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

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

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

PROJECT TITLE

Proposed construction of the Koup 1 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

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

Dawid Fransman

Signature of the Commissioner of Oaths

2021- 07 -04

Date

SUID-AFRIKAANSE POLISIEDIENS
STASIE BEVELVOERDER
STELLENBOCH
2021 -07- 04
STELLENBOCH
STATION COMMANDER
SOUTH AFRICAN POLICE SERVICE