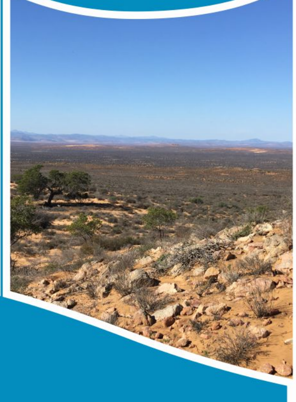
THE BASIC ASSESSMENT FOR THE PROPOSED KOMAS WIND ENERGY FACILITY AND ASSOCIATED INFRASTRUCTURE NEAR KLEINSEE IN THE NORTHERN CAPE PROVINCE.

APPENDIX C.4

Bat Assessment







BAT IMPACT ASSESSMENT:
KOMAS WIND ENERGY FACILITY

FINAL DRAFT

Bat Impact Assessment for the proposed development of the Komas Wind Energy Facility and associated infrastructure near Kleinsee in the Northern Cape Province

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EXECUTIVE SUMMARY

Stephanie Dippenaar Consulting has been appointed by the Joint Venture, Genesis ENERTRAG Komas (Pty) Ltd, to undertake a Bat Impact Assessment for the proposed Komas Wind Energy Facility (WEF) and associated infrastructure near Kleinsee in the Northern Cape Province. The assessment includes a 12-month pre-construction bat monitoring programme which will inform the Basic Assessment (BA) that is currently being undertaken by the Council of Scientific and Industrial Research (CSIR) for the proposed Komas WEF.

The size of the area which was investigated is approximately 2 080 ha and is situated in the Springbok Renewable Energy Development Zone (REDZ 8). The Komas WEF project proposes up to 50 wind turbine generators, with a hardstand area of approximately 1500m^2 per turbine, a hub height of up to 200 m and a rotor diameter of up to 200 m, with a maximum generation capacity of up to 300 MW. Associated infrastructure includes a Lithium-ion Battery Energy Storage System (BESS) comprising of batteries within a suitable housing structure on a concrete foundation, an on-site substation, a laydown area as well as a short access road leading to this site. Option 1 is the preferred site for this associated infrastructure.

The proposed Komas project will be developed on portions of the original Zonnekwa (Portion 1-4) and Kap Vley (Portion 4) Farms approximately 30 km south-west of the town Kleinsee in the Northern Cape Province. Landuse in the area is dominated by low shrubland utilized at the site and surrounding area for grazing small stock farming, which is presently the main impact on biodiversity. The closest formal conservation areas are the Namaqua National Park and Goegap Provincial Nature Reserve towards the south and the Richtersveld National Park and Nababieb Nature Reserve north of the proposed Komas WEF.

The farm buildings, rocky outcrops, relative denser vegetation, limited trees and livestock water points could be potential sources for bat roosting and foraging at the study area. According to SANBI's Database (2012) the main vegetation type at the study area is Namaqualand Strandveld. Namaqualand Klipkoppe Shrubland is situated at the south-eastern border of the site. This vegetation type is characterised by rocky outcrops and large boulders which are ideal for bat roosts. However, the updated project layout excludes this area for the placement of turbines or any associated infrastructure.

The most important aspect of the project that would affect bats adversely is the wind turbines themselves, and in particular, direct collisions and barotrauma because of operational turning blades. Loss of foraging habitat, loss of existing and potential roosts and attracting bats by artificially creating new bat conducive areas amongst the turbines, further summarise the main potential negative impacts to bats due to wind farm developments. The table below summarises the potential impacts for each phase.

Phase	Impact before mitigation (negative)	Impact after mitigation (negative)
Construction	Moderate	Low
Operation	High	Moderate
Decommissioning	Low	Very Low

For the cumulative effect, the total output of approximately 1063.7 MW for wind developments within a 50 m radius of Komas WEF, was considered. With Komas WEF added to this, the output will be 1363.7 MW. Although not all the bat studies undertaken as part of a BA/Environmental Impact

Assessment (EIA) of proposed wind farms within 50 km radius were available, the bat monitoring reports of the wind farms directly adjacent to the proposed Komas WEF, were obtained. The collective Bat Index, thus the mean number of bats per hour per year, using Kap Vley, Namas, Kleinzee, Zonnequa and Komas WEFs, is calculated at 0,18. According to the threshold levels of the Bat Guidelines (Sowler *et al*. 2017), this is classified as high. More so if one considers that most bats occurring at these farms have a medium-high or high risk of collusion with turbine blades. If mitigation is diligently conducted at all wind farms, this impact could be reduced.

Four static bat monitoring systems were deployed at the proposed Komas WEF site, two at the Met mast and two at temporary 10 m masts. Data was collected between 10 August 2019 and 23 September 2020, representing the four seasons of the year. Seven of the 12 species that have distribution ranges overlapping with the development site and nearby surrounding area were confirmed through bat recording devices. *Tadarida aegyptiaca* (Egyptian free-tailed bat) is the most dominant species on site, with nearly all the calls at the high monitoring system, situated within the rotor swept area, being part of the *Molossidae* family. These are high risk bats as they are adapted to forage at high altitudes. A limited number of one red data species, namely *Miniopterus natalensis (*Natal long-fingered bat), was recorded.

Low bat activity was recorded during winter and summer transects, but high activity occurred during the transect conducted in spring 2020. It is speculated that the relative increased rainfall in 2020 in the Kleinsee area, could have been the cause of occasional insect emergence, which resulted in sporadic high bat activity. This should be closely monitored during the operational phase.

According to the recorded data, bats at the proposed Komas WEF site are more active during late summer and autumn, between February and May, with a peak in activity around March. High bat activity is also observed in September, during spring. The highest bat activity was recorded in the southern section of the farm. In general, bats seem to be active from about two hours after sunset, with activity starting to decline around four to five hours before sunrise, around 1:00 a.m.

During the monitoring period, the hourly mean bat activity for the proposed Komas WEF site was higher than the highest threshold figures for the Succulent Karoo biome. This indicates that bat populations might be severely negatively impacted upon by the wind energy development should the development progresses without mitigation measures. The monitoring system stationed at high altitude was used to plot bat activity and weather conditions to describe the relationship between weather conditions and bat activity, in particular activity within the rotor swept area of the turbine blades. This information was then used to develop a mitigation scheme for the wind farm.

The following mitigation is suggested for the proposed Komas wind farm:

1. Curtailment

A. Curtailment is the act of limiting the supply of electricity to the grid during conditions when it would normally be supplied. This is usually accomplished by feathering the turbine blades with the aim to raise the cut-in speed. Curtailment should be implemented immediately from the onset of the turbines situated within the medium to high sensitivity zone, thus the moment the turbines start to turn:

CURTAILMENT FOR TURBINES NUMBERED WTG23, WTG24, WTG37, WTG38 AND WTG50			
Months	**Time periods**	**Temperature (°C)**	**Wind speed (m/s)**
February	19:00 – 02:00	Between 14 and 19 °C	Between 2.5 and 9 m/s
March	19:00 – 02:00	Between 14 and 19 °C	Between 2.5 and 9 m/s
April	19:00 – 02:00	Between 14 and 19 °C	Between 2.5 and 9 m/s

If the developer decides to reduce the number of turbines, the first option, after the wind regime is taken into account, should be to reduce the turbines in the medium to high sensitivity zone. If a substantial number of turbines in the medium sensitivity zone is reduced, it will be at the discretion of the operational bat specialist as to whether some of the curtailment at the medium to high zone could be relieved. Operational monitoring and carcass searches will have to inform this, and mortality will have to be below the threshold.

B. **Additional Curtailment** to be implemented, under the advice and supervision of the operational bat specialist, when medium and high **estimated true bat mortality** is experienced.

MITIGATION FOR TURBINE NUMBERS WTG23, WTG24, WTG37, WTG38 and WTG50, or as advised by the bat specialist			
Months	**Time periods**	**Temperature (°C)**	**Wind speed (m/s)**
September	19:00 – 02:00	Between 14 and 22 °C	Between 2.5 and 9 m/s
December	19:00 – 02:00	Between 14 and 22 °C	Between 2.5 and 9 m/s
January	19:00 – 02:00	Between 14 and 22 °C	Between 2.5 and 9 m/s

2. Feathering and Freewheeling of turbine blades.

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 minimal movement (not complete standstill) to prevent bat fatalities during conditions when power is not generated. The angle of feathering is usually around 90 degrees, but will have to be advised by the turbines manufacturer.

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 immediately after installation for the duration of the project to prevent bat mortality.

3. Bat deterrents

Bat deterrents is a developing technology that works on the principle of emitting ultrasonic noise that prevents bats from echolocating and therefore cause bats to avoid the area. Not enough research is done in South Africa to establish the success of bat deterrents yet, but this mitigation measure could be used together with curtailment, or even as an alternative, depending on research and the consequent opinion of the operational bat specialist and SABAA. During post construction, turbines with high mortality could be specifically targeted for bat deterrents.

All turbine components should be excluded from no-go areas as indicated on the bat sensitivity map. Mitigation is recommended, as per Section 9 and summarised above, for the turbines situated within the medium to high zones. The rest of the proposed Komas WEF site is classified as of medium sensitivity. Operational monitoring should inform the extent of mitigation required, but due to the bat activity being above threshold, there is a possibility that more stringent mitigation would be required and would need to be implemented by the developer; Therefore, the developer needs to include this in the financial cost structure from the start of the project. If bat mortality is lower than expected, thus below the threshold, it will be up to the discretion of the operational bat specialist as to whether curtailment could be reduced.

No turbine layout alternatives were provided. However, the turbine layout was re-designed after specialist input to avoid environmental sensitive areas on site. Alternatives were provided for the on-site substation area (Option 1 and Option 2). Associated infrastructure includes a Lithium-ion Battery Energy Storage System (BESS) comprising of batteries within shipped containers or a suitable housing structure on a concrete foundation, an on-site substation, and a laydown area located within a complex of 4 ha with Option 1 being the preferred alternative from a bat specialist perspective. Although the no-go option was investigated, it is understandable that this is a renewable energy development within the REDZ, and development is inevitable. The turbine layout of the development option of the proposed wind farm, as provided, is the preferred option to accommodate the bat sensitivity map by avoiding highly sensitive areas. Additional to mitigation by turbine positioning to avoid sensitive areas, other options may be utilised when necessary such as feathering of blades parallel to the wind to reduce blade rotation to a bare minimum and curtailment of blade movement when turbines are not generating power.

INCLUSION IN THE ENVIRONMENTAL AUTHORISATION

It is recommended that the following conditions are included in the Environmental Authorisation (EA):

- The final layout should adhere to the sensitivity map, as provided in Section 7.
- Apart from mitigation by turbine placement, curtailing blade rotation when turbines are not generating power and feathering of blades parallel to the wind will reduce blade rotation to avoid bat mortality.
- A mitigation scheme will be required for turbines situated within the medium to high sensitivity zone, as indicated below (A), which should be implemented when turbines start to turn.
- Further mitigation measures, if necessary, are indicated below (B) and should be applied and adapted by the operational bat specialist as need be.
- Mitigation measures in the Environmental Management Programme (EMPR) must be adhered to.
- A minimum of two years' operational bat monitoring as per the latest Best Practice Guidelines of the South African Bat Assessment Association (SABAA) should be conducted.
- Mitigation measures could be adapted as per the recommendations of the operational bat specialist as more information becomes available through operational bat monitoring.

A. MITIGATION FOR TURBINE NUMBERS WTG23, WTG24, WTG37, WTG38 and WTG50			
Months	**Time periods**	**Temperature (°C)**	**Wind speed (m/s)**
February	19:00 – 02:00	Between 14 and 19 °C	Between 2.5 and 9 m/s
March	19:00 – 02:00	Between 14 and 19 °C	Between 2.5 and 9 m/s
April	19:00 – 02:00	Between 14 and 19 °C	Between 2.5 and 9 m/s

B. MITIGATION FOR TURBINE NUMBERS WTG23, WTG24, WTG37, WTG38 and WTG50, or as advised by the bat specialist			
Months	**Time periods**	**Temperature (°C)**	**Wind speed (m/s)**
September	19:00 – 02:00	Between 14 and 22 °C	Between 2.5 and 9 m/s

It should be noted that currently 12 months pre-construction bat monitoring is required in terms of the latest SABAA Good Practice Guidelines (Sowler, *et al*. 2017), but the semi-desert Succulent Karoo environment is subject to erratic climate conditions which vary from year to year. These variations could result in changes in the bat activity and occurrence on site which have not been accounted for in this report. If the applicant adheres to the proposed mitigation measures, the impact on bats from the proposed Komas Wind Farm is predicted to be **Negative and of Moderate significance**. **It is therefore the opinion of the bat specialist, based on the one-year pre-construction monitoring undertaken at the proposed Komas WEF site, that EA may be granted to the proposed Komas WEF development.**

LIST OF ABBREVIATIONS

BA	Basic Assessment
CDF	Cumulative Distribution Function
CSIR	Council of Scientific and Industrial Research
ECO	Environmental Control Officer
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPR	Environmental Management Programme
MET	Meteorological
ms	milliseconds
MTS	Main Transmission Substation
PV	Photovoltaic
WEF	Wind Energy Facility
SABAA	South African Bat Assessment Association

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

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Addressed in the Specialist 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;	Appendix 4 and p.2
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix 3
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
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 3 and Section 5.3.1
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 3
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.1.4
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;	Section 3
g) an identification of any areas to be avoided, including buffers;	Section 7
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 7
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.10
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 2 and Section 5
k) any mitigation measures for inclusion in the EMPr;	Sections 9 and 11
l) any conditions for inclusion in the environmental authorisation;	Section 14
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 13
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 11 and Executive Summary
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 7
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Appendix 2
q) any other information requested by the competent authority.	Appendix 2
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.	Part A of the Assessment Protocols published in GN 320 on 20 March 2020 is applicable

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Addressed in the Specialist Report
	(i.e. Site sensitivity verification requirements where a specialist assessment is required but no specific assessment protocol has been prescribed). See Appendix 6.

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BAT IMPACT ASSESSMENT: KOMAS WIND ENERGY FACILITY

1. INTRODUCTION AND METHODOLOGY

Stephanie Dippenaar Consulting has been appointed by the Joint Venture, Genesis ENERTRAG Komas (Pty) Ltd, to undertake a Bat Impact Assessment, including a 12-month pre-construction bat monitoring programme to inform the Basic Assessment (BA) undertaken for the proposed Komas Wind Energy Facility (WEF). The Komas WEF is situated near Kleinsee in the Northern Cape Province (see Figure 1) with site coordinates (centre point) Lat -29.838216˚; Long 17.279958˚. The proposed project will comprise a maximum capacity of 300 MW and proposes up to 50 wind turbine generators with associated infrastructure including Option 1 as the preferred alternative for the on-site substation and BESS complex and laydown area. The wind turbine generators will have a hub height and rotor diameter of up to 200 m each. The study area, thus the area which was investigated, is approximately 2 080 ha in extent and is situated in the Springbok Renewable Energy Development Zone (REDZ 8). Pre-construction bat monitoring was conducted over thirteen months between 10 August 2019 and 23 September 2020.

The Bat Impact Assessment comprises the following sections:

- *Section 1*: Introduction and Methodology, which contains the Scope and Objectives, Project Description, Terms of Reference, Approach and Methodology, Assumptions and Limitations, and Source of Information.
- *Section 2*: Description of Project Aspects Relevant to Bat Impacts.
- *Section 3*: Description of the Affected Environment.
- *Section 4*: Applicable Legislation and Permit Requirements.
- *Section 5 and 6*: Results of the Bat Monitoring.
- *Section 7*: The Bat Sensitivity Map.
- *Section 8*: Cumulative Impacts.
- *Section 9 and 10*: Mitigation and Key Issues.
- *Sections 11 and 12*: Impact Assessment.
- *Section 13*: Environmental Management Programme (EMPR).
- *Section 14*: Conclusion.

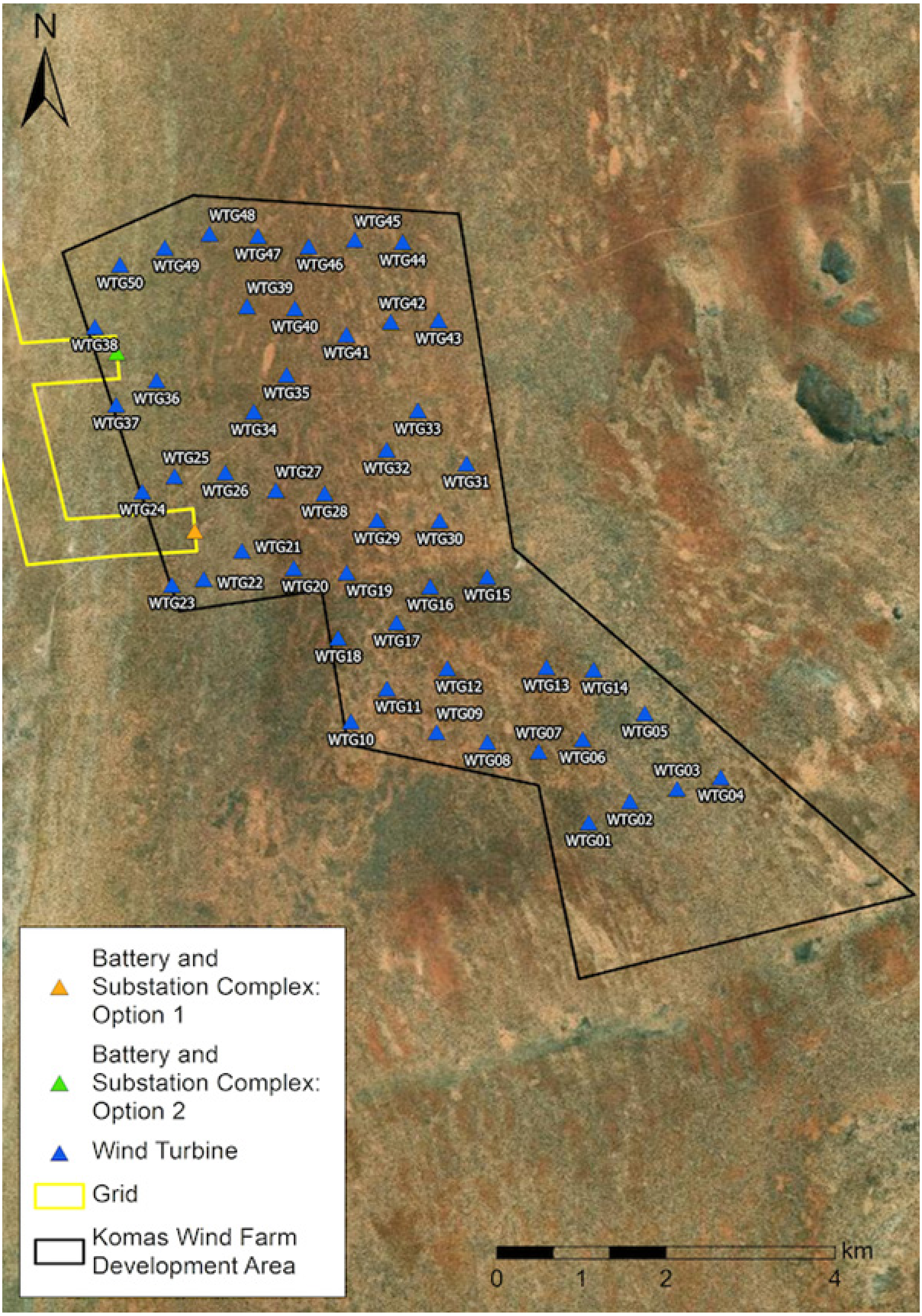


Figure 1 The proposed turbine layout and Battery and on-site substation complex alternatives for the proposed Komas WEF. Option 1 is the preferred alternative.

1.1 Scope and Objectives

The Bat Impact Assessment is informed by the findings of the 12-month pre-construction bat monitoring which documents the bat activity at the proposed Komas WEF site to assess the potential impacts on bats of the proposed Komas WEF based on current knowledge.

This assessment forms part of a BA being undertaken by the Council for Scientific and Industrial Research (CSIR) in terms of the Environmental Application process. It presents the results from the pre-construction bat activity monitoring undertaken over 13 months to predict the potential risk to resident and migratory bats associated with the proposed development of the Komas WEF.

The aim of the study is to present baseline information on bats which occur at the proposed Komas WEF site to inform the mitigation strategies for the final design, construction and operational phases. These mitigation strategies aim to avoid or reduce potential direct, indirect and cumulative impacts associated with the proposed development of the Komas WEF. Potential risks to bats due to the impact of WEFs include habitat displacement and habitat loss during the Construction and Operational phases. The main impacts on bats are fatalities due to bat collision with turbines or barotrauma.

The objective of collecting and providing the baseline environmental information is to present the nature of potential impacts of the proposed project during construction, operation and decommissioning as well as the mitigation and enhancement measures to avoid or minimise potential impacts to bats.

As knowledge in this field of study is growing and new evidence is constantly gained from current operating WEFs, mitigation and enhancement options may be adjusted as this project develops.

1.2 Project Description

The proposed Komas WEF assessment area that was investigated is approximately 2 080 ha and is situated near Kleinsee in the Springbok REDZ. The project proposes up to 50 wind turbine generators, with a hub height and rotor diameter up to 200 m each. It will have a maximum generation capacity of up to 300 MW.

The height of the sampling point for bats on the Met mast is of importance, as the Bat Guidelines prescribe that data be collected from within the rotor swept area of the turbine blades. Data was collected from 110 m on the Met mast, which would allow for a hub height and rotor diameter of approximately 200 m. The proposed turbine layout is indicated in Figure 1.

Each turbine will have a hardstand area of approximately 1 500 m^2, as well as a temporary construction laydown and storage area of approximately 4 500m^2. Medium voltage cables, that will connect the turbines with each other, will be laid underground. Internal roads with a width of up to 10 m to provide access to each turbine and accommodating cable trenches and stormwater channels. Existing roads will be upgraded wherever possible, although new roads will be constructed where necessary. A temporary construction laydown/staging area of approximately 22 500m^2 will be built to also accommodate the operation and maintenance (O&M) buildings. A 33/132kV on-site substation and BESS complex with a surface area of 4 ha and a laydown area outside the 4ha site will be built to feed electricity generated by the proposed Komas WEF into the national grid at the Gromis Main Transmission Substation (MTS).

The following alternatives were assessed:

- Two substation alternatives with Option 1 selected as the preferred alternative and the

- No-go alternative for the development.

1.3 Terms of Reference

The following Terms of Reference (ToR) is applicable to the bat monitoring on site, as informed by the current pre-construction guidelines, i.e. *The South African Good Practice Guidelines for Surveying Bats in Wind Farm Developments – Pre-Construction* (Sowler, *et al*. 2017):

- Gathering information on bat species that inhabit the site, noting higher, medium, or lower risk species groups; as indicated in Table 1, p11, of the Bat Good Practice Guidelines (Sowler, et. al. 2017);
- 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.

The following ToR for the Bat Impact Assessment was provided by the CSIR:

- Adhere to the requirements of specialist studies as indicated in Appendix 6 of the NEMA EIA Regulations 2014), as amended;
- Undertake a site sensitivity verification in terms of Part A of the Assessment Protocols published in GN 320 on 20 March 2020 (i.e., Site sensitivity verification requirements where a specialist assessment is required but no specific assessment protocol has been prescribed).
- Provide a description of any assumptions, uncertainties, limitations, and gaps in knowledge;
- Provide a description of the relevant legal context and requirements;
- Provide a description of the relevant environment, including the regional and local features. It must be informed by a field survey to identify sensitive areas, receptors or habitats and species of special concern;
- Provide a bat sensitivity map for the project site, including buffers. Identify areas of low, medium and high bat sensitivity, including no-go areas. Please note that the DEA considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads and internal cables is allowed in the 'no-go' areas. Should your definition of the 'no-go' area differ from the DEA definition; this must be clearly indicated in your assessment. You are also requested to indicate the buffer of the 'no-go' areas, as relevant;
- Identify and assess the potential direct and indirect impacts of the proposed project on bats during the construction, operational and decommissioning phases. Provide an assessment of the irreversibility of impacts, and the irreplaceability of lost resources;
- Use the Impact Assessment Methodology as provided by the CSIR;
- Identify and assess cumulative impacts from other Wind and Solar PV projects within a 50 km radius from the project site that have already received Environmental Authorisation (EA), or have submitted an application to DEA at the start of these BA processes;

- In addition, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following:
    - Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land.
    - The cumulative impacts significance rating must also inform the need and desirability of the proposed development.
    - A cumulative impact environmental statement on whether the proposed development must proceed.
- Assess the project alternatives and identify the preferred alternative with motivation for this selection;
- Assess the no-go alternative very explicitly in the impact assessment section.
- Incorporate and address issues and/or concerns raised by Interested and Affected Parties during the BA process where they are relevant to the specialist's area of expertise.
- Propose mitigation measures to address possible negative effects and to enhance positive impacts to increase the benefits derived from the project;
- Provide recommended mitigation measures, management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts to be included in the Environmental Management Programme (EMPr);
- Provide a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts and a reasoned opinion as to whether the proposed project should be authorised; and
- Identify any aspects which are conditional to the findings of the assessment which are to be included as conditions of the Environmental Authorisation, should the project be approved.
- Describe the affected environment from a bat perspective, including consideration of the surrounding habitats and bat habitat/foraging features (e.g., caves, ridges, crevices, migration routes, feeding, roosting & nesting areas, etc.);
- Describe and map bat habitats on the site, based on on-site monitoring, desktop review, collation of available information, studies in the local area, previous experience, and the Wind and Solar SEA (CSIR, 2015);
- Compile a detailed list of bat species present on site, including Species of Conservation Concern (SCC);
- Compilation of a bat sensitivity map within and surrounding the project sites by identifying areas of high sensitivity and/or no-go areas and buffer zones to inform the project layout. The mapping must include the sensitivity of the site in terms of bat features such as habitat use, roosting, feeding and nesting/breeding;
- Identify and assess the potential impacts of the proposed project on bats, including impacts that may be seasonal or diurnal, or linked to specific species and their feeding, roosting or nesting habitats and habits;
- Provide sufficient mitigation measures to include in the EMPr; and
- Propose a suitable bat monitoring programme for the evaluation of the impacts anticipated during the construction and operational phase of the development. This monitoring programme will be included in the EMPr.

1.4 Approach and Methodology

Acoustic monitoring of the echolocation calls of bats are used to determine the seasonal and diurnal activity patterns of bats at the proposed Komas WEF site. The *South African Good Practice Guidelines for*

Surveying Bats in Wind Farm Developments – Pre-Construction (Sowler, *et al*. 2017), is followed throughout the monitoring process. More recent guidelines have been issued in 2020, but the bat monitoring commenced in 2019, when the 2017 Guidelines were still applicable. The following South African Guidelines are used in conjunction with the pre-construction guidelines:

- South African Bat Fatality Threshold Guidelines for Operational Wind Energy facilities (MacEwan, *et al*. 2018);
- Mitigation Guidance for Bats at Wind Energy facilities in South Africa (Aronson, *et al*. 2018); and
- South African Good Practice Guidelines for operational monitoring for Bats at Wind Energy Facilities (Aronson, *et al*. 2014).

The following approach was followed as per the terms of reference provided during the proposal phase of the bat monitoring:

- A desktop study was conducted of available literature to establish which species occur in the area. This includes the surrounding area as well as information from other wind developments in the area, where accessible.
- Background was provided regarding ecosystem services and the impact of a loss of bats on the broader environment.
- The local and global conservation status of all identified bat species was determined.
- Reconnaissance site visits were conducted as part of the initial project screening phase which included the installation of bat detecting equipment.
- Four site visits were conducted on each site to conduct active surveys, one per season, and day-time investigations. These covered all the various biotopes occurring on site.
- The monitoring equipment was set up and verified. Data was downloaded throughout the monitoring year and echolocation calls were analysed. In cases of data loss, data was used from nearby monitoring system for statistical analyses or extrapolated. This is explained as such in the report.
- Interviews were conducted with the landowner(s) regarding possible bat occurrence on the property and the surroundings.
- Inputs were provided to inform the turbine layout.
- Information was gathered from other wind farm developments in the close vicinity of the proposed Komas WEF site to assess the cumulative impact of each WEF.
- Mitigation measures are recommended.

The methods of investigation of bats at the proposed wind farm development are described below.

1.5 Desktop Investigation of the proposed Komas WEF Development Area as well as the Surrounding Environment

A desktop study was done of the site itself, which was informed by information provided by the applicant and a literature review. Conservation areas in the vicinity of the study area were investigated and other renewable energy developments, particularly wind farms were noted for the discussion of cumulative effects.

1.6 Passive Acoustic Monitoring Systems

The monitoring systems used consist of four Wildlife Acoustics SM4BAT full spectrum bat detectors that are powered by 12V, 7 Amp-h sealed lead acid batteries replenished by photovoltaic (PV) solar panels, see Table 1. Two SD memory cards, class 10 speed, with a capacity of 64 GB or 128 GB each, were utilized within each detector to ensure substantial memory space with high quality recordings, even under conditions of multiple false environmental triggers.

Table 1: Summary of Passive Detectors deployed at the proposed Komas Wind Energy Facility site.

Detector	Situation	Coordinates	Microphone	Division ratio	High pass filter	Gain	Format	Trigger window	Drop in calibration (on chirp) at the microphone during installation*
SM4BAT (Met E)	Met mast: mic at 110m	29°49’33” S, 17°17’31” E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Approximately 10 to 12 dB when installed by Windhunter
SM4BAT (Met F)	Met mast: mic at 20m	29°49’33” S, 17°17’31” E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Approximately 10 to 12 dB when installed by Windhunter
SM4BAT (10 m Mast G)	Temporary 10 m mast: mic at 9 m	29°52’39,8” S, 17°20’14” E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Approximately 8,71 dB at the microphone
SM4BAT (10 m Mast H)	Temporary 10 m mast: mic at 9 m	29°48’58,9” S, 17°15’53,8” E	SMM-U2	8	16kHz	12dB	FS, WAV@ 384kHz	1,5 sec	Approximately 8,64 dB at the microphone

*Microphones (mics) are regularly calibrated, as possible, during field visits

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 16kHz and 18dB, is set to record for the duration of the sound and 1 500 milliseconds (ms) after the sound has ceased; this period is known as the trigger window.

The data from these recorders are downloaded every three to four 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 applicant and the bat monitoring systems on the Met mast represent the biotope associated with the plains of the Namaqualand Strandveld (SANBI, 2012), see Figure 2. 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, taken into account. The positions of the monitoring stations on the met mast are depicted in Figure 3.

The positions of the 10 m masts on site (see Figure 4) are motivated below:

10 m Mast G: This monitoring system represents the biotope towards the south of the proposed wind farm. This area differs in vegetation and geography if compared to the northern part of the terrain. Whereas the areas to the north have not been grazed in the last two to three years, the areas in the south are still extensively grazed by sheep. Monitoring station G represents the hills with sandy soil and rocky outcrops of the Namaqualand Klipkoppe Shrubland (SANBI, 2012), situated at the southern border of the development site. It is speculated that bats which occur in these hills might traverse the monitoring station to drink water at the open water point situated towards the north of the southern portion of the terrain.

10 m Mast H: This monitoring station represents the north western part of the proposed development and the Namaqualand Salt Pans (SANBI, 2012) situated towards the west of the northern section of the proposed Komas WEF and the Namaqualand Strandveld towards the east of the northern section, see Figure 2.

Figure 2: Monitoring Station H, on a 10 m temporary mast.

Figure 3: Monitoring Stations E, at 20 m and F, at 110 m on the Met mast.

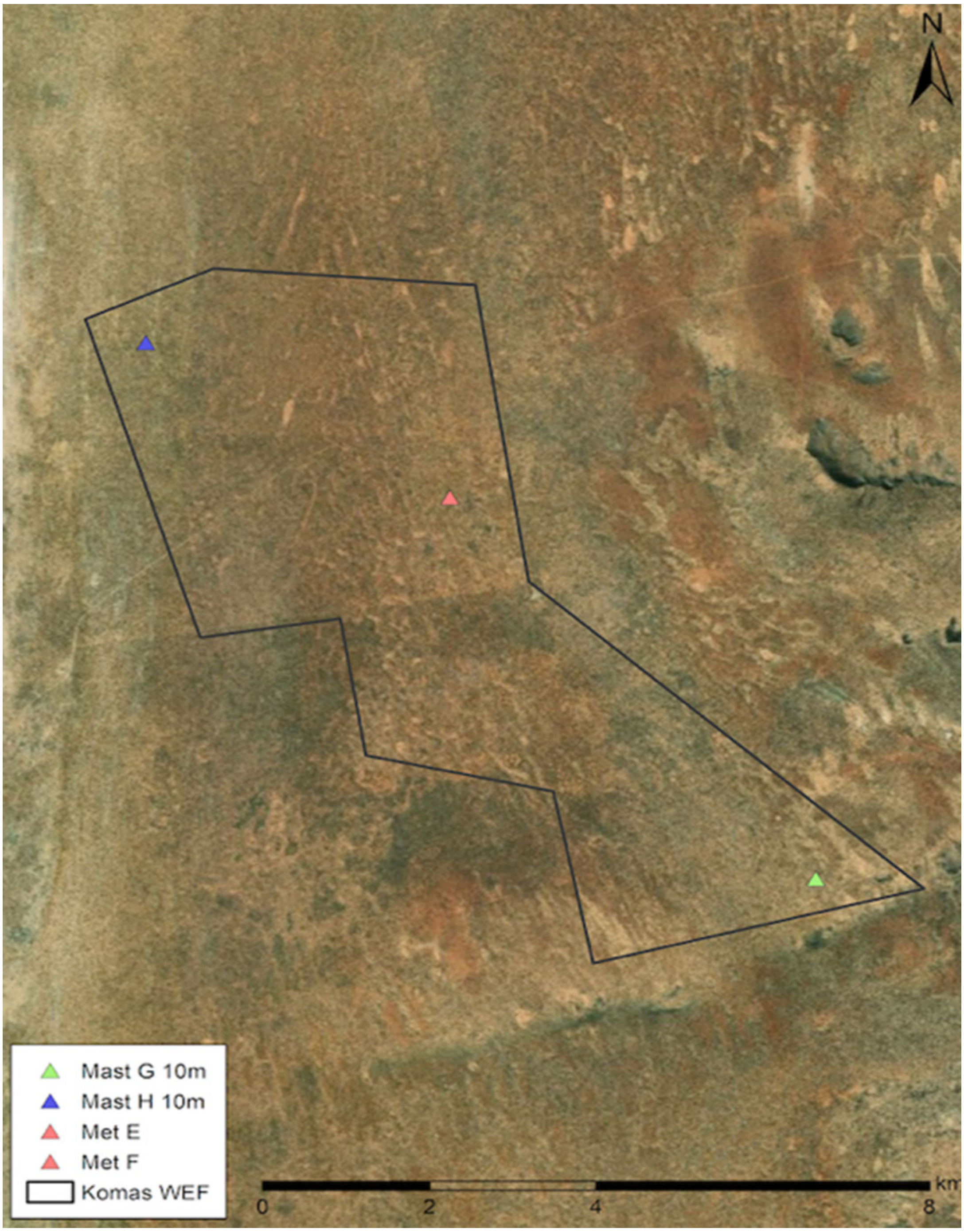


Figure 4: The proposed Komas WEF with the positions of the monitoring stations

1.7 Roost surveys

During site visits roost searches were conducted and any known roosts were inspected. Areas where possible roosts could be situated were investigated, but it was not always possible to have access to all roosts as they are sometimes in rock 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 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, therefore roost searches are concentrated to areas such as rocky outcrops or features which are favourable for bat roosts.

1.8 Driven Transects

Seasonal transects comprising of at least two transects per field visit, one for each season, were performed. Transects provide a snapshot in time and could confirm bat species or activity for that night. Where transects are skipped, for example in the case of travel restrictions associated with the Covid-19 situation, it is explained as such in the report, see Section 6.

A SM4BAT full spectrum recorder with the microphone mounted on a pole was used for transects, see Figure 5. Starting at sunset up to approximately two hours after sunset, the vehicle was driven at a speed between 10 to 20 km/h along a set route. The next evening the transect commences from the opposite side and follows the same route. All transect routes are the same so that seasonal data can be compared.

Figure 5: Microphone mounted on vehicle for transects.

1.9 Data Analysis

Data were downloaded manually approximately once every two to four months. Acoustic files downloaded from the detectors were analysed for bat activity with respect to the number of bats passes and the bat species. The latest version of Wildlife Acoustics Kaleidoscope Pro was used for analysing large quantities of data. Data analysed electronically were regularly tested by hand and up to now electronic data analysis have been more than 93% accurate when comparing to individual call analysis. Data sets were converted to ZC files and verified by Analook software periodically. In cases where there was uncertainty about a bat call, the call was classified as “unsure”.

1.10 Assumptions and Limitations

The following limitations are applicable to this study:

- Knowledge of several ecological aspects and behaviours, such as migration distances, flying height, population sizes, temporal movement patterns, etc., of several South African species is limited. Consequently, the impact of WEFs on several bat species is also unknown.
- Monitoring of bats with acoustic detectors is an internationally accepted method to assess bat activity levels and species richness however, the use of bat detectors has limitations. Acoustic monitoring can only provide an estimate of relative bat activity levels and not provide total population estimates of how many individuals are present on site, as the same individual could pass the detector more than once.
- Due to an 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 is as close as possible under the given circumstances and within the limitations of the survey technique applied.
- The recording of echolocation calls is dependent on the species being recorded (some species emit 'softer' calls than others) and weather conditions (high humidity and high wind speeds will reduce recording distance as it attenuates call intensity). Therefore, any monitoring based on echolocation calls cover only a limited area, depending on the type and intensity of the call.
- The accuracy of the species identification is also dependent on the quality of the calls. Species identification by echolocation calls is complex. Bats alter the frequencies and durations of their calls based on whether they are feeding, commuting, or migrating. They may also alter call characteristics based on the habitat and surrounding vegetation. There are several species with overlapping frequencies that makes identification challenging. For this study, if the species of a recording is unidentifiable, the species identification of the recording will be marked as 'unsure'. Recordings for which the species identification is 'unsure' were still included in the analyses.
- Transects only provide a snapshot in time and do not convey enduring spatial distribution of bat activity across the site. However, transects are useful in eliciting areas or time periods of high activity for the duration of the site visit.
- It is not possible to search the entire study area as well as the wider terrain for bat roosts. However, the site was driven and walked through as thoroughly as possible, keeping in mind the time constraints of an environmental assessment.
- The data collected during this study provides a baseline of bat activity across the site for the relevant monitoring period. Future bat activity patterns and inter-annual variation cannot be accurately inferred from this data, and as such, bat activity could vary substantially from the results presented here.
- Cumulative impacts are assessed by adding anticipated impacts from this proposed development to other proposed renewable energy facilities within a 50 km radius from the proposed Komas study area (see list of projects included in Appendix 1). Information on projects adjacent to the proposed Komas WEF was obtained, but all bat specialist studies of all the proposed projects within a 50 km radius were not available.
- Bat monitoring was not conducted for the full 12 months at 110 m on the Met mast (Monitoring System E) due to technical failure. As was agreed with SABAA, data from the 110 m Met mast on the neighbouring farm, which was collected during the same period, was used to fill the data gap, see Section 5.1 and Appendix 2.

1.11 Source of Information

1.11.1 Information used in the Bat Impact Assessment

Bat information:

- Bats of Southern and Central Africa: A Biogeographic and Taxonomic Synthesis. University of the Witwatersrand, Johannesburg. Monadjem *et al*. 2010.
- Behavioural responses of bats to operating wind turbines. Horn *et al* 2008. The Journal of Wildlife Management 72, 123-132.
- Monitoring of Bats at Wind Energy Facilities - ed 5. South African Bat Assessment Association.
- South African Bat Fatality Threshold Guidelines Edition 2. May 2018.
- South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments – Pre-construction Monitoring of Bats at Wind Energy Facilities. 2017.
- Kap Vley Wind Bat Progress Report 2 (Aronson, 2017) and Impact Assessment Report and Progress (CSIR,2018) .
- Kleinsee Wind EIA Final Scoping Report (2/2012).
- Namas Wind Bat Impact Assessment Report (Marais, 2018) and Basic Assessment Report (Opperman *et al*. 2018).
- Bat Impact Assessment Report Tooverberg (Dippenaar, 2018).
- Zonnequa Wind Bat Impact Assessment (Marais, 2018) and EIA: Basic Assessment Report (Opperman *et al*. 2018).
- Various academic sources as per the reference list.

Climate and precipitation data sourced from various websites:

- Acuweather; Meteoblu; Climate.org, MSN.com, worldweather online, Yr.no.
- The World Bank Climate Change Knowledge Portal available at http://sdwebx.worldbank.org/climateportal/

Environmental and other related Legislation:

- Department of Environmental Affairs 2019: https://egis.environment.gov.za/data_egis/data_download/current
- Namakwa District Municipality. 2017-2022. Integrated Development Plan. Namakwa District Municipality.
- South African Energy Integrated Resource Plan 2010-2030 promulgated 3/2011 www.Energy.gov.za

Personal conversation:

- Personal conversations during field work sessions were conducted with the landowners of Zonnekwa, Rooivlei and Kap Vley to discuss bat presence on the farms.
- Rainfall data was obtained from Willem and Ina Engelbrech, Rooivlei, on 28 October 2020.

Process information sourced from the client:

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

Tourism and general information:

- SA.Venues.com; Pathfinda.com; Kleinzee travel information, Namakwa.info.co.za

Vegetation:

- Red List of South African Plants SANBI.
- Regions of Floristic Endemism in Southern Africa. Van Wyk AE & Smith G.
- South African National Biodiversity Institute, 2012: Vegetation Map of South Africa, Lesotho and Swaziland [vector geospatial dataset] 2012. Available from the Biodiversity GIS website, http://bgis.sanbi.org/SpatialDataset/Detail/18
- The Vegetation of South Africa, Lesotho and Swaziland, Strelitzia 19, South African National Biodiversity Institute, Pretoria. Mucina, L., and Rutherford, M.C., 2006.

1.11.2 Importance of Bats

Bats are the second largest group of mammals after rodents. More than 50 bat species occur in South Africa (SA) (Taylor, 2000; Friedman and Daly, 2004; Monadjem, *et al.* 2010). Bats play important functional roles as insect predators, pollinators, and seed dispersers. Their populations are sensitive to changes in mortality rates and tend to recover slowly from declines. Bats can be classified into three broad functional groups based on their wing morphology and echolocation call structure. Of these groups, open-air foragers, bats that have a wing design and echolocation calls adapted to flying fast, high above the vegetation, are mostly at risk from wind turbine developments. Species that migrate over the proposed development will be further at risk regardless of their foraging behaviour.

In general, bats play important functional roles as insect predators and in the case of fruit bats, particularly pollinators and seed dispersers. Except for mortality and disturbance resulting from wind turbine developments, the major threats faced by bats include habitat destruction and change, cave disturbance, natural disasters, and the introduction of exotic species. The economic consequences of a widespread loss of bat populations could be substantial. Although the loss of bats in Southern Africa has not been quantified in economic terms, literature indicates that they play a crucial role in the disruption of population cycles of agricultural pests (Boyles, *et al.,* 2011).

The consumption of insects by insectivorous bats also plays a role in the control of diseases that afflict humans, such as malaria and dengue. Insectivorous bat species consume large numbers of mosquitoes and flies, the most important vectors in the transmission of these diseases (Monadjem, *et al.* 2010).

Malaria afflicts millions of people in Africa and the contribution bats make to reduce the number of insects that transmit diseases should not be underestimated.

The likely process of losing the abovementioned ecosystem services by means of bats, should be taken into consideration during the same time that the impact of wind farms on the environment is being determined (Peplow, 2020). Potential bat colony losses might not only cause a possible market price increase for pesticides, but the lessening of agriculture-related productivity as well (Peplow, 2020). By repressing the populations of destructive insects to less than the amount where pesticides are needed, bats might be able to supply an added extremely important agriculture-related service (Kinver, 2015).

2. DESCRIPTION OF PROJECT ASPECTS RELEVANT TO BAT IMPACT

2.1 Components of the project which could impact on bats

Components of the proposed Komas WEF which could impact on bats, directly through mortality during the operational phase, and indirectly, through the loss of foraging habitat, are the following:

- Noise of construction activities.
- Clearance of natural vegetation for electrical connections, upgrading of access roads, creating hard standing areas or laydown areas.
- Demolition of existing buildings.
- New buildings, such as the substation and BESS complex project.
- Excavating areas or creating borrow pits (if required).
- Operational wind turbines. The turbine hub height and rotor diameter is 200 m.
- Artificial lightning.
- Decommissioning activities.

2.2 Potential Impact on Bats

Bats are long-lived mammals and females often produce only one pup per year, resulting in a life-strategy characterized by slow reproduction (Barclay & Harder, 2003). Because of this, bat populations are sensitive to changes in mortality rates and their populations tend to recover slowly from declines.

The potential impact on bats includes the following:

Construction phase:

- Loss of existing roosts and/or potential roosts: Some of the bat species that occur on the proposed site are known to roost in the rocky ridges, crevices, or culverts (see Table 2). Any disturbance of these natural roosting space might have a negative impact on bats. The demolition of existing buildings will destroy bat roosts in those buildings.

- Attracting bats by artificially creating new roosting areas: The presence of new buildings within the study area may provide additional roost sites for those species making use of man-made structures (e.g., roofs of buildings; see Table 2).

Operational phase:

- Direct collisions with rotating turbine blades: The most important aspect of the project that affect bats adversely are the wind turbines, and in particular, direct collisions from the operational rotating blades.
- Fatalities from barotrauma: As the air moves over the turning turbine blades, an area of low pressure is created. Barotrauma occurs when bats experience a sharp decrease in atmospheric pressure near rotating turbine blades. This pressure drop causes a rapid expansion of the lungs, which is unable to be remedied through proper exhalation (Baerwald, *et al*. 2008), thus resulting in the haemorrhage of the lungs and ultimately mortality.
- Loss of foraging habitat: The turbines, during operation, will influence the natural foraging space of bats. Disturbance resulting from construction activities, such as noise after sunset from engines or generators might also deter bats, resulting in loss of feeding habitat.

Through the lifespan of the project, the ideal bat situation is to maintain bat populations as they occur on site, but to avoid attracting more bats to the area of potential collision.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Description of Affected Environment

A literature review of existing reports, studies and guidelines, legislation and SANBI GIS database, as well as site visits relevant to the study area, were conducted to establish a background study of the site and associated environment. The proposed development follows the South African national, regional and municipal proposition in the Integrated Resource Plan (IRP) 2010-2030 that 17 800 MW of renewable energy capacity should be secured by 2030 (energy.gov.za). Furthermore, wind energy development is an opportunity to address the key priority of job creation for the community of Kleinsee (Laurie, 2018).

The proposed Komas WEF and associated infrastructure will be developed on portions of the original Zonnequa and Kap Vley Farms situated approximately 30 km south-west of the town Kleinsee in the NamaKhoi Local Municipality of the Namaqua District Municipality on the west coast of the Northern Cape Province. The present farm names are Zonnekwa, northern section and Rooivlei, southern part.

Kleinsee is situated at the mouth of the Buffelsriver, 72 km south-east of Port Nolloth and 105 km west of Springbok. The area surrounding Kleinsee is known for the extensive De Beers surface-based diamond mining operations which took place within the 7km coastal belt near and north of the town. The population of the town grew to around 3000 until De Beers started downscaling around 2009. De Beers ceased operations, the town was proclaimed in 2011 and the land sold to private owners (Namakwa-info.co.za accessed 2019).

The Richtersveld National Park and Nababeeb Nature reserve are located north of Kleinsee and both the Namaqua National Park and Goegap Provincial Nature Reserve are situated to the south of the proposed Komas WEF, see Figure 6.

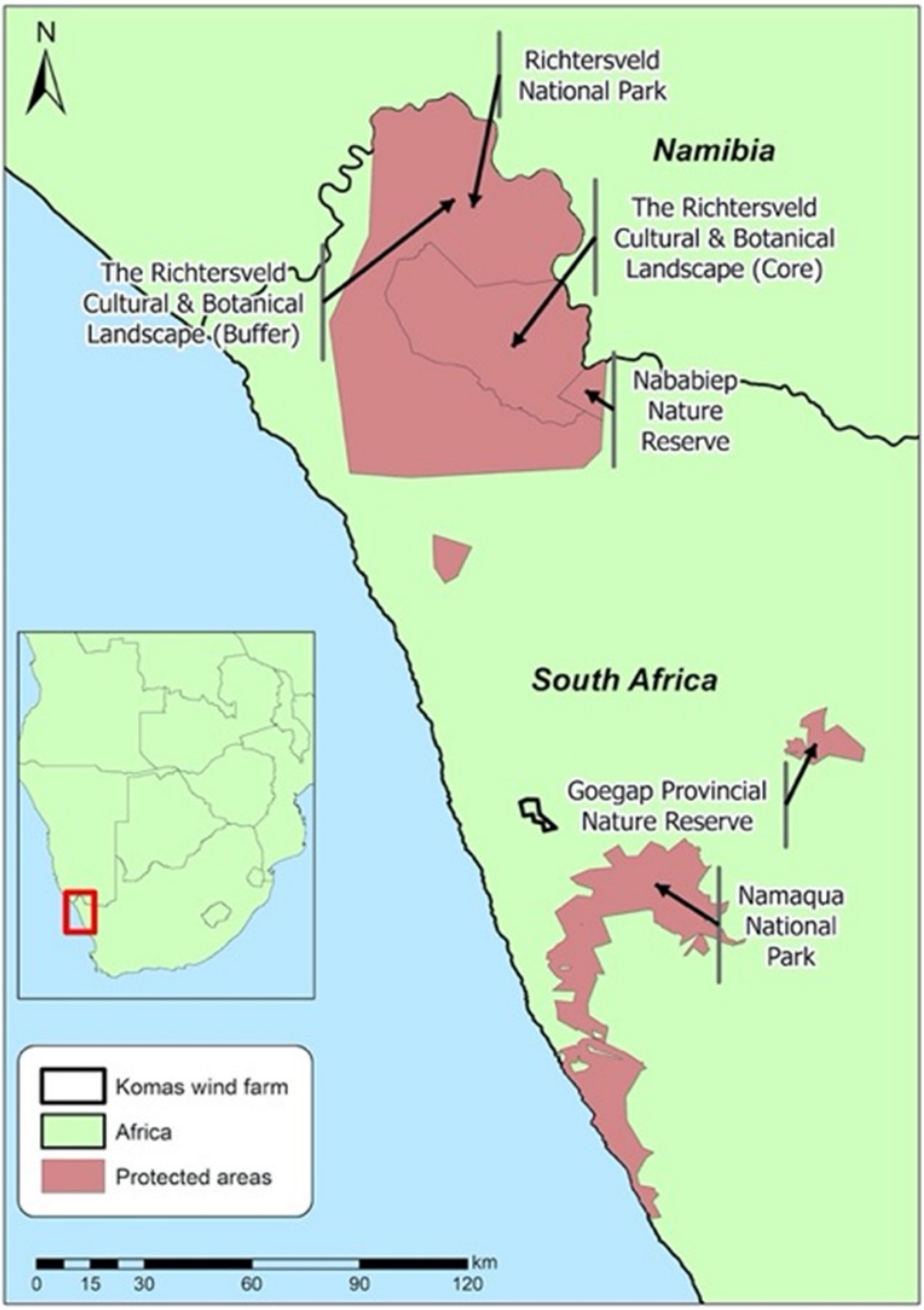


Figure 6: Protected areas in the vicinity of Komas WEF.

3.2 Geography

The topographical land elevation ranges from sea level along the coast to low ridges and local hills approximately 380 m above mean sea level in the south-west and north-west direction across undulating coastal plains to the beginning of the escarpment mountains rising in the east. The geology of the coastal plain is aeolian material overlying Tertiary and Quaternary marine sediments and mostly sand, calcrete and alluvium along the dry riverbeds (Lanz, 2018 and Todd, 2018).

Coastal plain soils are predominantly type Ah38 deep to moderately very sandy soils on underlying hardpan carbonate creating soils susceptible to wind erosion, especially when combined with the aridity of the environment and consequent low plant cover. This flatter plain land type is classified as Class 7 non-arable low potential grazing land. The shallow soil depths and rocky outcrops on the ridges are Class 8 non-utilisable wilderness land (Agriculture and Soil Potential study in Lanz, 2018). At present a major impact on biodiversity in the area is due to overgrazing from livestock, exposure to long-term coastal mining and wind erosion (Lanz, 2018).

The westward flowing non-perennial Buffels river and its tributary, the Komagas are the main hydrological features within the wider study area (Massie & Hutchings 2019 and CSIR, 2018). The Buffels river flows through Kleinsee approximately every 10 years, but most of the time it is a dry riverbed. Furthermore, the Namaqua salt pans vegetation unit was verified as non-hydrological features, (SANBI GIS Database and Mucina, *et al*. 2006), but exposed calcrete ground with a white appearance (Snyman-van der Walt, 2018 and Todd, 2018).

3.3 Landuse

Springbok is located 100 km to the east along the R355, 176 km from Garies along the N7 via Hondeklipbaai and Koingnaas and 60 km north along the R382 to Port Nolloth. The road between Kleinsee to Koingnaas is referred to as “the Diamond route”. Diamonds were discovered in Port Nolloth and Kleinsee in 1927. Access for grazing along the coastline was closed (Rebelo, 2003) and much of the coastline was taken up by extensive surface-based diamond mining that continued until 2009 when De Beers mining company withdrew from the area and the property was sold to private owners. Informal prospecting, where the miners as known as diggers, is still in abundance in the area east of the coastline.

As indicated in Figure 7, vegetation in the area is dominated by low shrubland that is utilized at the site and surrounding area for small stock grazing.

Limited open derelict mine areas occur in the area. These areas could potentially collect water during rainy spells, which is significant for bat populations, as bats might be drawn to the water and the standing water could be a potential breeding ground for mosquitoes.

The proposed project area is classified with a predominant land capability evaluation value of 5, although it varies from 4 to 6 across the site. Agricultural limitations that result in the low land capability classification of the site as described above are predominantly due to the very limited climatic moisture availability, with sandy soils as an additional factor. These factors render the site unsuitable for any kind of cultivation and limit it to low density grazing only (Lanz, 2018).

Industrial infrastructure in the area includes a network of distribution lines leading to and from Kleinsee and the Gromis MTS which is situated 15 km towards Springbok on the R355.

The only other infrastructure consists of sparsely distributed farmhouses, farm tracks and fences. The buildings, rocky outcrops, trees and the natural shrubland, thornveld and livestock water points could be potential sources for bat roosting and foraging at the study area (McEwan, 2015, Muniongo & Thomas, 2015, Aronson, 2017, Orton, 2017 and Lanz, 2018).

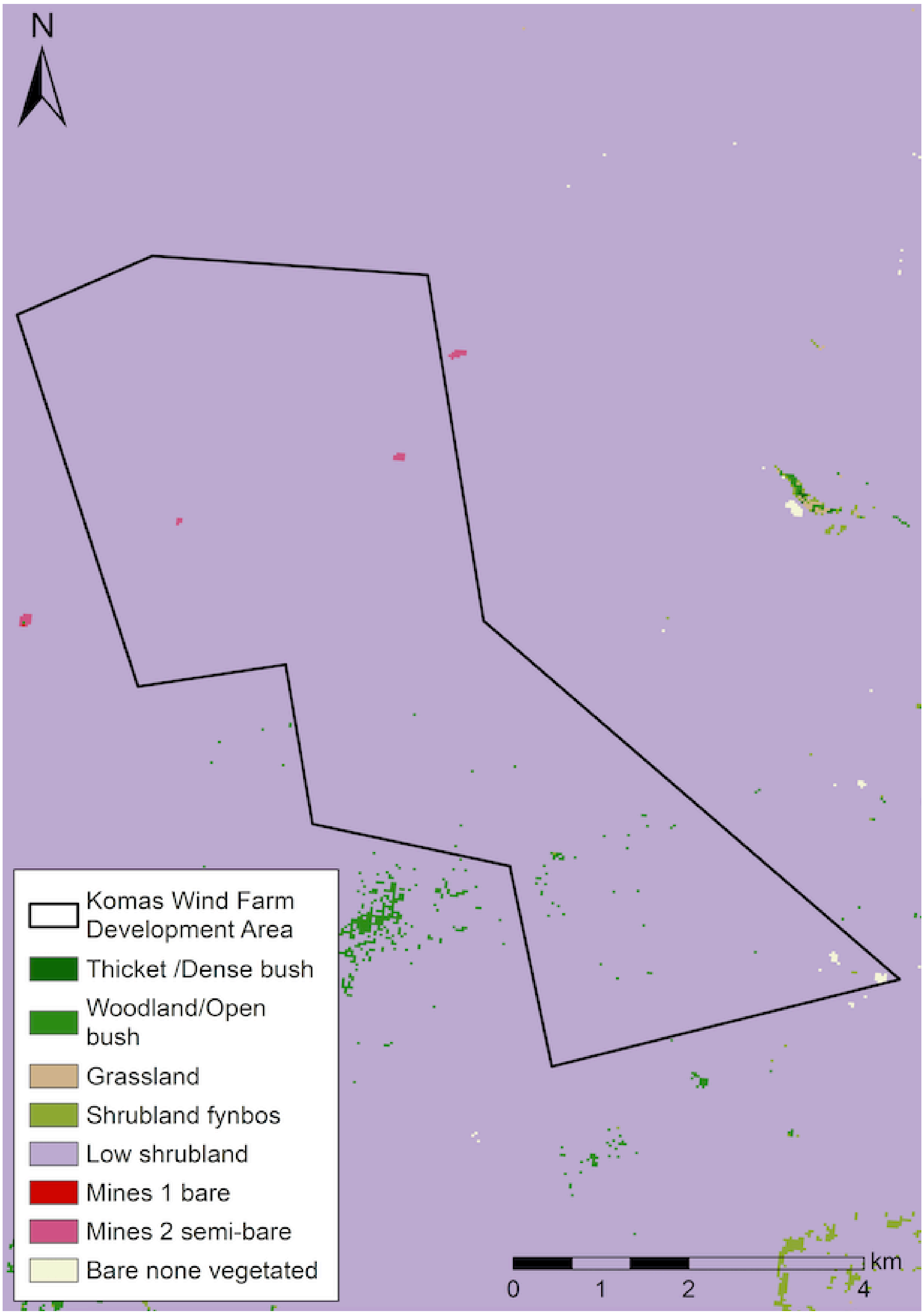


Figure 7: Landuse in the proposed Komas WEF area

3.4 Vegetation

The proposed study area falls within the Succulent Karoo Biome and regionally within the Namaqua Sandveld Bioregion which lies parallel to the West Coast. Namaqualand is known for its annual wildflower and succulent flower displays. Most of the site consists of coastal duneveld low-medium succulent and woody shrubs on pale yellow and greyish sands and some areas of sparsely vegetated sandy slopes (Muniongo & Thomas, 2015).

The Succulent Karoo Biome has high levels of plant endemism as earth's only entirely arid hot spot of plant diversity (Van Wyk & Smith, 2001). Regionally the site falls within the Namaqua Strandveld Bioregion which lies parallel to the west coast, see Figure 8.

SANBI's GIS Database (2012) note two main vegetation types found at the study area:

- Namaqualand Strandveld; and
- Namaqualand Salt Pans.

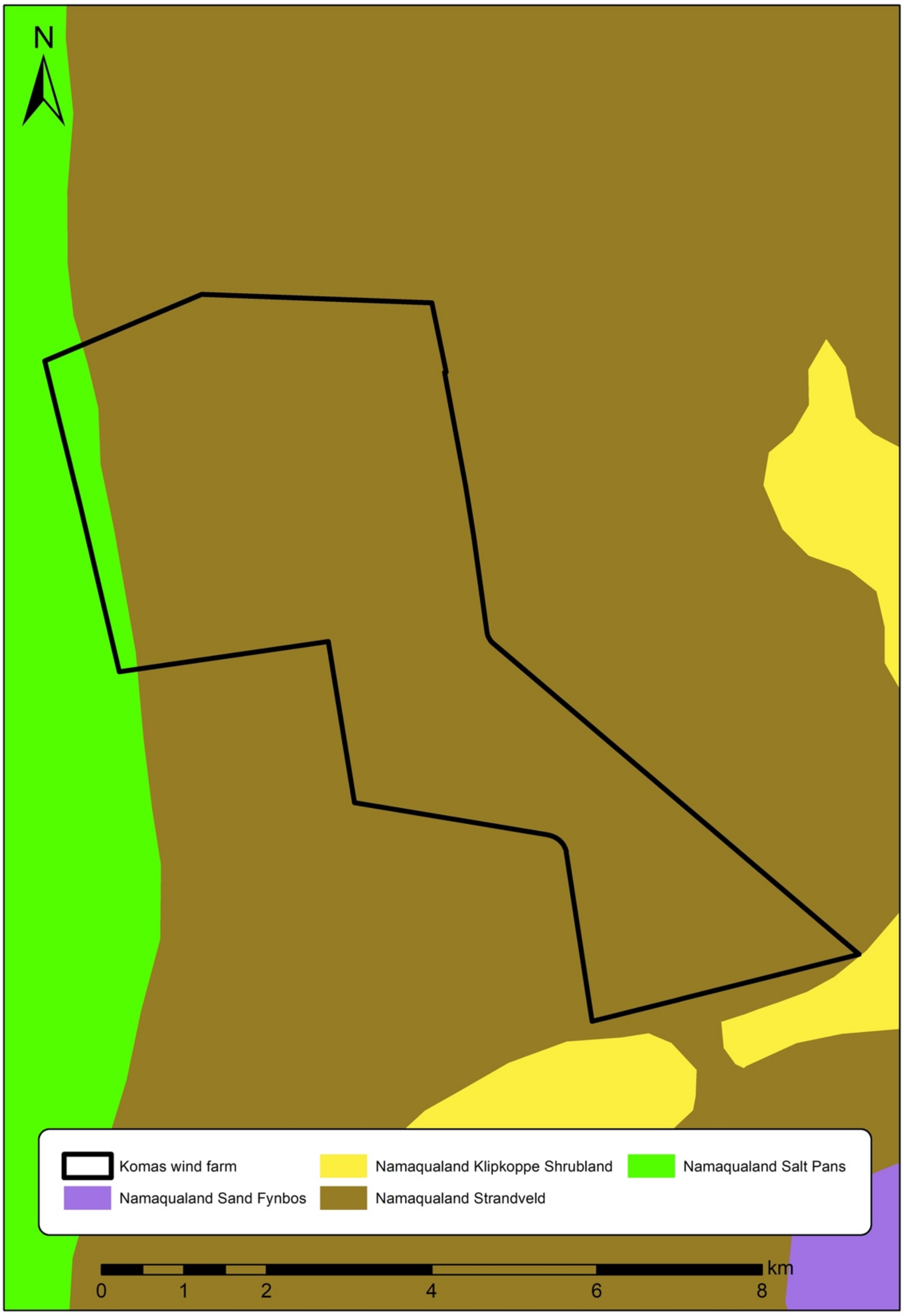


Figure 8: Vegetation Zones at the proposed Komas WEF site (SANBI, 2012)

Based on SANBI's GIS Database (2012) Namaqualand Klipkoppe Shrubland is situated just beyond the southern border of the proposed site. However, a very small area in the far south east of the site is mapped as Namaqualand Klipkoppe Shrubland in terms of the national vegetation map (Mucina and Rutherford, 2006/2018). This vegetation type is important for the bat situation, as it is characterised by rocky outcrops and large boulders which are ideal for bat roosts.

The Terrestrial Biodiversity specialist study confirmed vegetation on the SANBI Red data list and areas of biodiversity significance present on the site. In addition, 45 mammal species were observed and confirmed while reptiles preferred the rocky hills of the surrounding plains. Due to the lack of water, there is a low diversity of amphibians. The site also falls within the Northern Cape Protected Areas Expansion Strategy (NCPAES) Focus Area of 2017 for conservation purposes. Avoiding and mitigating the potential impact of the development on populations of these species should maintain the ecological functioning of the area and prevent local and regional populations of species from being compromised (Todd, 2018).

3.5 Climate

The Northern Cape climate is semi-arid with late summer-autumn rainfall between 0 to 200 mm per annum. Kleinsee and the study area is situated along the western coastal border of Namaqualand. The region around Kleinsee is known as a desert climate and receives its maximum rainfall in late autumn and winter. The average rainfall of the study area is about 98mm per annum and moisture is further reduced by evaporation. Fog is common near the coast (Low & Rebelo, 1998). Evaporation levels within this region exceed the annual rainfall and therefore the moisture availability is minimal and limits agricultural prospects (Lanz, 2018), see Figure 9.

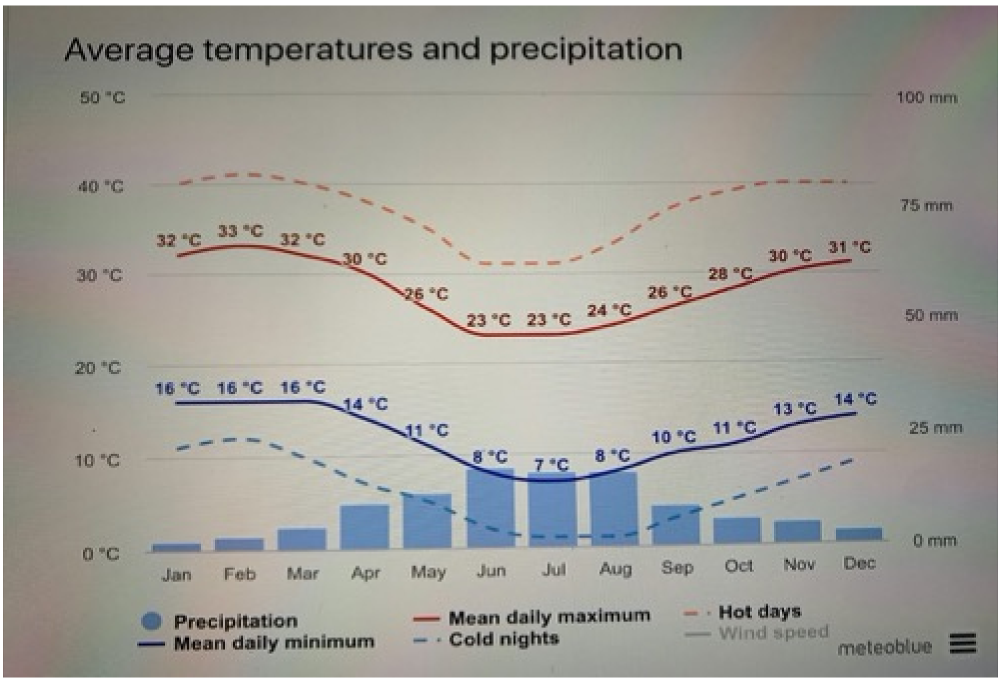


Figure 9: Climate of Kleinsee (Meteoblue, 2020)

Climatic conditions are extreme and vary from cold winters to hot summers. Extreme summer temperatures of 40 ^{0}C and winter temperatures of 4 ^{0}C have been recorded at Koingnaas, situated 40 km south of the study area. However, the mean maximum temperatures do not vary much throughout the year due to the Atlantic Ocean and Benguela current upwelling, with regular fog occurring over the coastal zone. Summer temperatures from December to March range between 20 to 30 ^{0}C; Autumn temperatures from March to May range between 22 to 24 ^{0}C; Winter temperatures from June to August range from 7 to 18 ^{0}C and Spring temperatures between September and November range between 20 to 25 ^{0}C. (Acuweather.com, Climate data.org and Pathfinda.com, July, 2019).

The prevailing surface winds are mostly from the south and south-east in summer when winds are very strong. In winter, strong winds can occur from west to north-west and easterly bergwinds in winter may exceed temperatures of 35 ^{0}C (Massie & Hutchings, 2019, CSIR, 2018, Muniongo & Thomas, 2015).

3.6 Species Diversity on Site

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.

3.6.1 Bat Species Diversity of the Local Area

A summary of bat species distribution in the local area, their feeding behaviour, preferred roosting habitat, and conservation status are presented in Table 2. The bats included in Table 2 have distribution ranges covering the proposed Komas WEF development area 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 Komas WEF falls within the distributional ranges of six bat families and approximately 12 bat species. Table 2 follows the most recent distribution maps of Monadjem *et al.* (2010). It should be noted that this table will be adapted during post construction monitoring.

Of the 12 bat species which have distribution ranges overlapping with the proposed development area, four have a conservation status of Near Threatened in SA 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 remaining suitable habitat (Monadjem, 2010). Note that *Cistugo seabrae* had been observed just north east of Kleinsee by the bat specialist, which confirms its presence in the wider area.

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) 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 were not considered a risk in the dry Kleinsee area, but due to the droppings found at the dwelling at Rooivlei Farm, have now become a risk species in the area.

Table 2: Potential bat species occurrence at the proposed Komas WEF site (Monadjem, et al. 2010; IUCN, 2017). Highlighted yellow cells indicate confirmed presence of bat species at the proposed Komas development site. The likelihood of fatality risk is indicated by the Pre-Construction Guidelines (Sowler, et al. 2017).

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 on site or close 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.	Medium-High	✓Most likely the bat droppings found at Zonnekwa farm dwelling
	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.	Medium-High	
MINIOPTERIDAE	*Miniopterus natalensis*	Natal long-fingered bat	Near Threatened	Near Threatened	Caves	Clutter-edge, insectivorous	Seasonal, up to 150 km	Medium-High	✓
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	✓

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 on site or close vicinity
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	✓
	Sauromys petrophilus	Robert's Flat-faced	Least Concern	Least Concern	Narrow cracks, under exfoliating of rocks, crevices.	Open-air, insectivorous		High	✓
On 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	Medium-High	✓
	Myotis tricolor	Temminck's myotis	Near Threatened	Least Concern	Roosts in caves, but also in crevices in rock faces, culverts	Limited information available	Not known	Medium-High	

Family	Species	Common Name	SA conservation status	Global conservation status (IUCN)	Roosting habitat	Functional group (type of forager)	Migratory behaviour	Likelihood of fatality risk*	Bats confirmed on site or close vicinity
					and manmade hollows				
	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	

*Note that there has been a re-classification of *Neoromicia capensis,* but for the purpose of this study, the species is still classified within the *Vespertilionidae* family.

3.6.2 Features conducive for bats at the proposed Komas WEF site

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

3.6.3 Roosting opportunities

a) Vegetation

Although some bush cover occurs at the WEF development terrain, hardly any trees are growing at the site. For those bats that might prefer roosting in vegetation or under the bark of trees, the sparse trees and dense bushes could provide roosting opportunities, see Figure 10.

Figure 10: Sparsely situated trees at the southern border of the proposed Komas WEF site.

b) Rock formations and rock faces

Large parts of the development terrain are covered by sandy soils, but boulders and rock formations along Byneskop in the south, provide ample roosting space for bats. Figure 11 depicts these rock formations with bat rests found at some of the crevices.

Figure 11: Byeneskop at the southern border: Left, boulders at the rocky outcrops, and right, bat droppings found at some crevices in the rock formations.

c) *Human dwellings*

Where roofs are not sealed off, human dwellings could provide roosting space for some bat species. The Zonnekwa farmhouse, where more than one bat roost was found, is situated approximately 1,77 km from the closest proposed WEF border and there is a likelihood of daily migration between the house and the proposed WEF. Due to the bat conducive features, such as water and trees, at the farm dwelling, a point source was installed during the night of 25 October 2019. 157 bat passes were recorded, with most calls like *Neoromicia capensis (92%), Tadarida aegyptiaca* (6%), *Eptesicus hottentotus* (2%) and *Miniopterus Natalensis*, see Figure 12. These are all medium-high risk species, with *T. aegyptiaca* as a high-risk species. As depicted by data from the monitoring stations at the proposed Komas WEF stie, bats were mostly active four hours after sunset, see Figure 13. This is the period when they emerge from their roost to drink water and forage. The point source was not situated at the proposed WEF site itself, and it is interesting that the majority of bat calls are similar to that of *N. capensis*. Limited activity of this species was recorded on site, although the Bat Impact Assessment undertaken as part of the EIA for the proposed Kap Vley WEF indicates that *N. capensis* was the predominant species during their bat monitoring (CSIR, 2018).

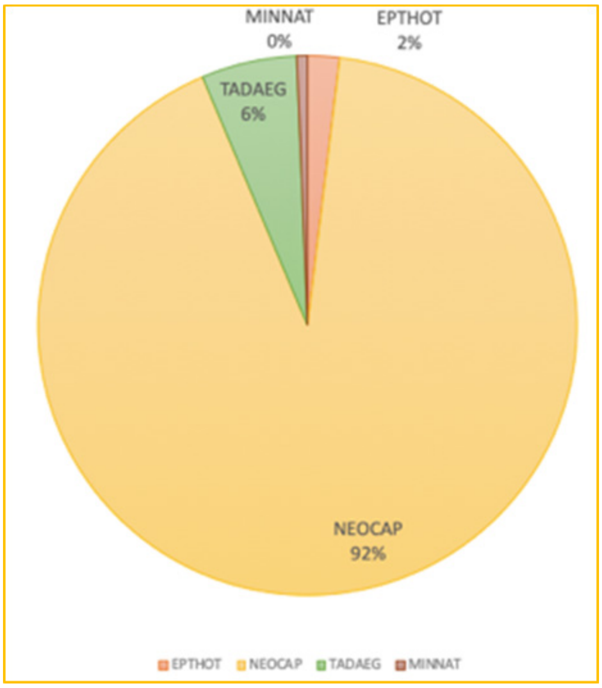


Figure 12: Bat species recorded at the point source at Zonnekwa farm dwelling

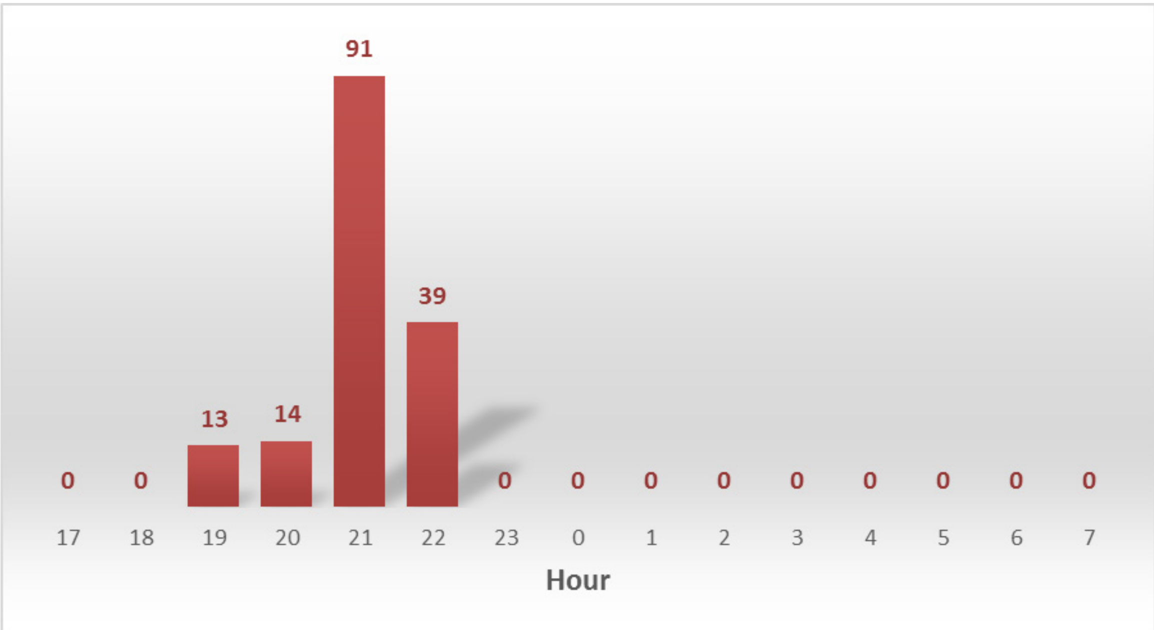


Figure 13: Hourly bat passes at Zonnekwa farm dwelling on 25 October 2019

Clear evidence of the presence of insectivorous bats had been found at the Rooivlei farm dwelling, situated 1,45 km from the nearest border of the proposed Komas WEF site. Up to now no day roosts could be established, but bats use the dwellings as night roosts.

Surprisingly, fresh fruit bat droppings were found at one of the buildings at the Zonnekwa farm dwelling, see Figure 14. This indicates that fruit bats either migrate through the area or that there is a fruit bat roost somewhere in the vicinity of the proposed Komas WEF site. The Rooivlei farm dwelling does not contain any fruit trees within the farm area, and as a result the bats are likely to feed on wild fruit and flowers in the veld. The bats may potentially be migrating through the area. The most likely species that might occur in the area is *Eidolon helvum*. *Rousettus aegyptiaca* is also modeled to occur in the area, but has not been found in the proposed Komas WEF vicinity up to now.

Figure 14: Fruit bat droppings found at the Zonnekwa farm dwelling

d) *Open Water Sources*

Water troughs for the livestock and associated open cement reservoirs provide permanent, open water sources for bats through-out the year.

e) *Food Sources*

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.

4. APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

Environmental law in the form of legislation, policies, regulations, and guidelines guide 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, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA)
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
- Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)
- 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).

Apart from the laws indicated above, guidelines have also been developed by the South African Bat Assessment Association (SABAA) to inform wind energy development:

- South African Good Practice Guidelines for Surveying Bats in Wind Energy Facility Developments – Pre-Construction (Sowler, *et al*. 2017).
- 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 Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (Aronson, 2014).

5. RESULTS OF THE BAT MONITORING

5.1 Static Recorders

Passive bat monitoring data was collected between 10 August 2019 and 23 September 2020. In cases where comparisons with other sites are not applicable, the thirteenth monitoring month is included. For Bat Indexes, data between 10 August 2019 and 10 August 2020, thus the minimum of 12 months monitoring, have been used, so that it is comparable with other sites.

It is important to note that static recordings have limitations, as discussed in Section 1, but do provide a scientifically sound method of assessing the bat situation on site.

Although all statistical analysis is considered for the report, in order to streamline the report, not all graphs are shown. Readers are welcome to request those graphs, as agreed by the applicant.

Bat data loss was experienced at the 110 m monitoring system at the Komas WEF site due to equipment failure (December 2019 to May 2020; see Figure 16). Due to the Covid-19 travel restrictions, data was only downloaded in May 2020, resulting in a data gap of more than five months. The final site visit to the Komas WEF sites was conducted at the end of September 2020 (Spring). Data from the three monitoring systems, monitoring at heights between 10 m and 20 m, which, apart from one month of data loss at one 10 m mast, were fully functional at the proposed Komas WEF site. Further data loss however occurred at the 110 m monitoring system at Komas WEF site (June-September 2019).

The 110 m monitoring station is the most important system, as it is situated within the rotor swept area of the turbine blades. Data from this system is usually plotted with weather, due to the situation of the microphone at height.

After discussions with CSIR, the applicant, the national Department of Environment, Forestry and Fisheries (DEFF) and SABAA the following approach and way forward was decided upon in order to inform the BA process, see letters from SABAA in Appendix 2. The data loss experienced can be supplemented from the following met masts in the surrounding area, see Figure 15:

- Data from the 110 m met mast microphone at the Gromis WEF site, which belongs to the same developer. This bat monitoring system is situated 13,7 km south of the Komas met mast and 6.5 km from the Komas WEF southern site border, in a similar environment and running concurrently with the Komas WEF bat monitoring. In total, the two development sites are less than 10 000 ha. Although each site should have its own Met mast to collect data from height, the minimum requirement of the guidelines also state that a wind energy facility should have one monitoring station at height for at least every 10 000 ha. This data will be added to Komas WEF so as to fill the gap for data at height.
- Data from the three other monitoring systems at Komas WEF, monitoring at heights between 10 m and 20 m, which apart from one month of data loss at the 20 m monitoring system, were fully functional for the monitoring period.
- Data from the 2018 Namas WEF met mast, situated approximately 9,7 km west of the Komas met mast, in the same biotope as the Komas met mast, will be taken in consideration.
- Data from the 2018 Kap Vley WEF met mast, situated approximately 8km south east from the Komas met mast, will also be taken into consideration.
- It is further suggested that the monitoring station is left on the Met mast for another four to five months to gather some extra data. This data will not feed in the environmental assessment but will be carried over to the operational phase to assist post-construction bat specialist study. In the unlikely case of a sudden unexpected high bat activity, the client as well as DEA will be alerted to this.

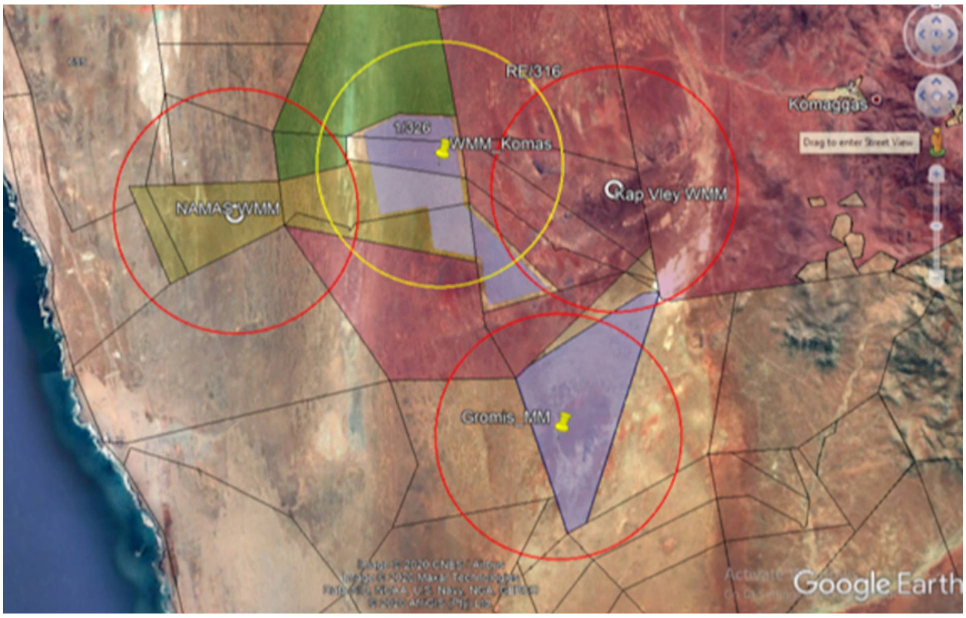


Figure 15: Three Met masts, surrounding the Met mast at the proposed Komas WEF site, where data from the high (110 m) monitoring systems was collected

The bat specialist is of the opinion that the above bat monitoring data collected from the three 110 m monitoring stations in the surrounding area should provide enough information regarding the bat aspects on site to make an informed decision, without delaying the BA process. This approach is supported by SABAA in their letter dated 20 October 2020 (Appendix 2).

Figure 16 depicts data shortages over the 13-month bat monitoring period at the proposed Komas WEF site.

Reports	Available Data	Gaps during monitoring period	Extra data
Report 1	9 Aug 19 - 25 Oct 19	None	All masts: 10/08/2020 to 23/09/2020
Report 2	26 Oct 19 - 14 May 20	Met 20m (F): 25/03/2020-14/05/2020 Met 110m E: 29/11/2019-14/05/2020	
Report 3	15 May 20 - 23 Sept 20	Met 110m E: 15/05/2020-10/08/2020	

Figure 16: Bat monitoring data gaps at the proposed Komas WEF site according to a 12 months monitoring period, showing the extra monitoring time

Data from the entire 13-month bat monitoring period was used for statistical analyses, but where Bat Indexes were calculated, only 12 months bat monitoring data has been considered, thus from 10 August 2019 to 9 August 2020. This was done so that seasonal Bat Indexes could be compared with surrounding proposed WEFs, also considering that future applications for WEFs might use these figures for assessing the potential cumulative impacts.

5.2 Bat Species Diversity

Calls similar to five of the 12 bat species which have distribution ranges or maps overlaying the proposed development site have been recorded by the static recorders on the terrain, see Table 2 and Figure 17. Two more species have been confirmed on the neighbouring surrounding wind farms. 71% of the total calls at Komas WEF represent *Tadarida aegyptiaca,* which is the dominant species on site. *T. aegyptiaca* is a high-risk species, physiologically adapted to fly high, in the vicinity of the turbine blades, so that the risk of collusion and barotrauma is high.

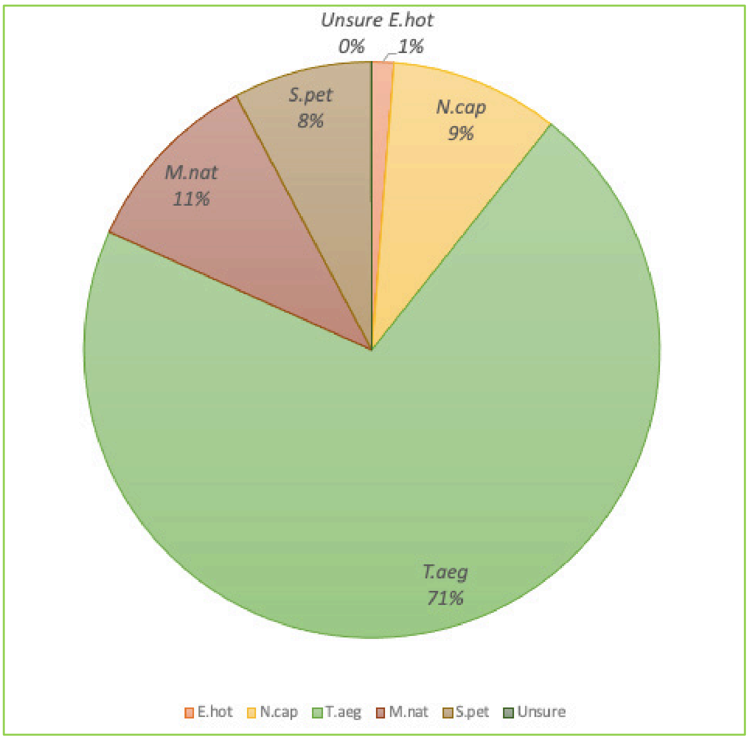


Figure 17: Species diversity at the proposed Komas WEF site

Bats can be divided in terms of their preferred foraging altitudes and are adapted, mostly by the physiology of their wings, to forage at lower altitudes (clutter) amongst the bushes and trees, medium altitudes (clutter-edge) and high-flying bats (open-air). The species diversity is often higher at lower altitudes, which is demonstrated by Figure 18 depicting the species recorded at 20m and at 110m on the Met mast. The 10m masts on the terrain show similar trends to the 20m Met mast. Apart from the predominant representation of the *Molossidae* family, namely 71% of the activity related to *T.aegyptiaca* and 8% to the endemic *Sauromys petrophilus,* the *Vespertilionidae* family is represented by 9% of the activity being related to *Neoromicia capensis*, and some limited activity of *Eptesicus hottentotus (1%)*. 11% of the total number of calls are those of the red data *Miniopterus natalensis.*

The high-flying *T. aegyptiaca,* true to its narrow wing morphology adapted for open air, with 95% of the calls recorded, is more abundant at the 110 m recording point, see Figure 18. 5% of the calls are that of *S. petrophilus*, which indicate that the *Molossidae* family was predominantly recorded at higher altitude during the bat monitoring period. The rest of the calls represent *M.natalensis, E. hottentotus* and *N.capensis*. As explained in Section 5.1, data is supplemented from the 110 m Met mast data at the adjacent proposed Gromis WEF site. The data collected from the met mast at the proposed Gromis WEF site shows the same trend of high activity by *T.aegyptiaca* at 110 m. A statistically insignificant number of calls similar to the red data species, *M. natalensis,* were recorded at the high microphone, also during the time when the 110 m monitoring mast at the proposed Komas WEF site was in full operation.

The low occurrence of *N.capensis* at the proposed Komas WEF site is noteworthy, as it was the species predominantly recorded at the proposed Kap Vley WEF site during the bat monitoring undertaken in 2018.

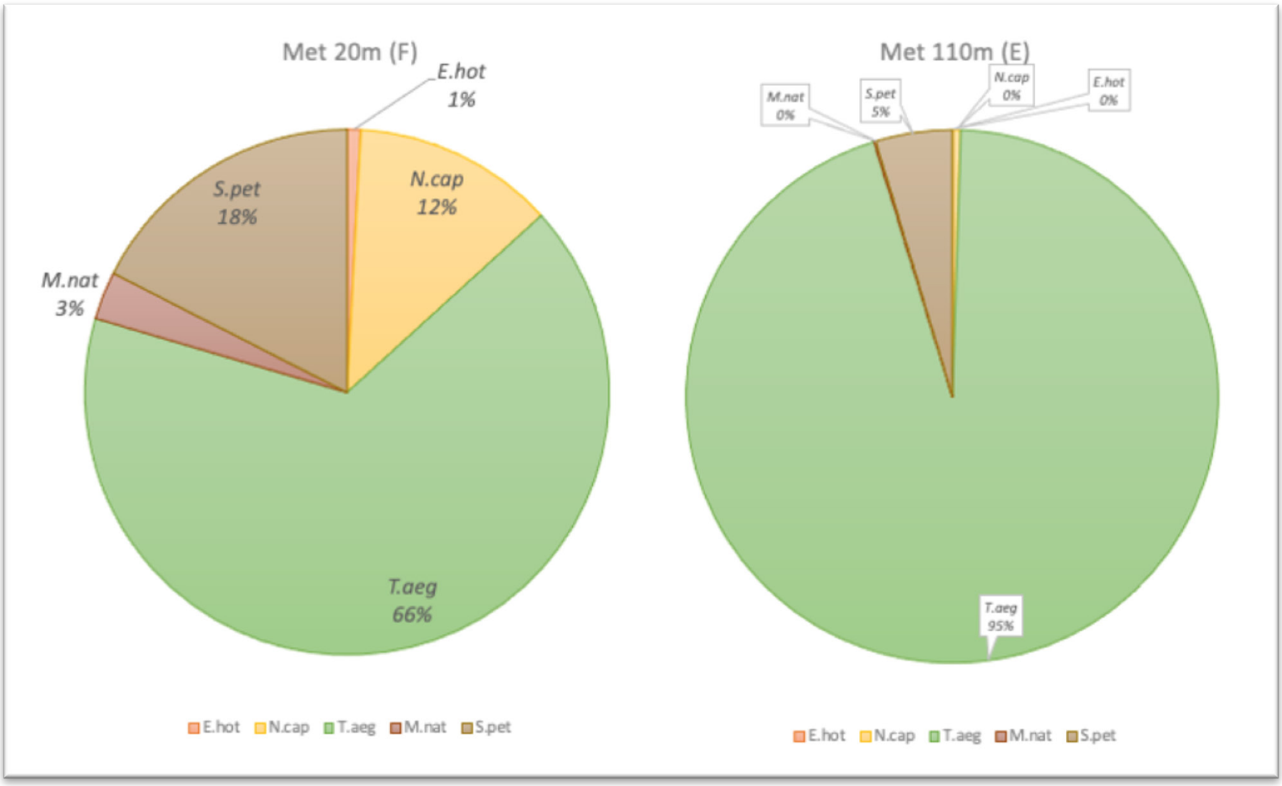


Figure 18: Species diversity recorded at 20 m (Met mast F) and at 110 m (Met mast E) on the Met mast

5.3 Species distribution over the monitoring period

Figure 19 portrays total weekly bat passes over the monitoring period per monitoring station at the proposed Komas WEF site. The orange histogram depicts the relative higher occurrence of *Tadarida aegyptiaca*, especially during early spring, with a peak in September, and during late summer to autumn, with a peak in March. This might be with the start of the rainfall season as bats are often active in autumn before becoming passive during the winter months when they spend more time in torpor. Although there is another increase in activity during August to September in 2020, the activity is significantly less compared to the same period in 2019. An interesting observation is the declining activity as summer approaches. Early summer and winter show less activity. All species, including the endangered *Miniopterus natalensis,* are portraying a similar increase in activity during spring and autumn. Therefore, according to the data from the monitoring period, in general, different species tend to portray similar seasonal activity.

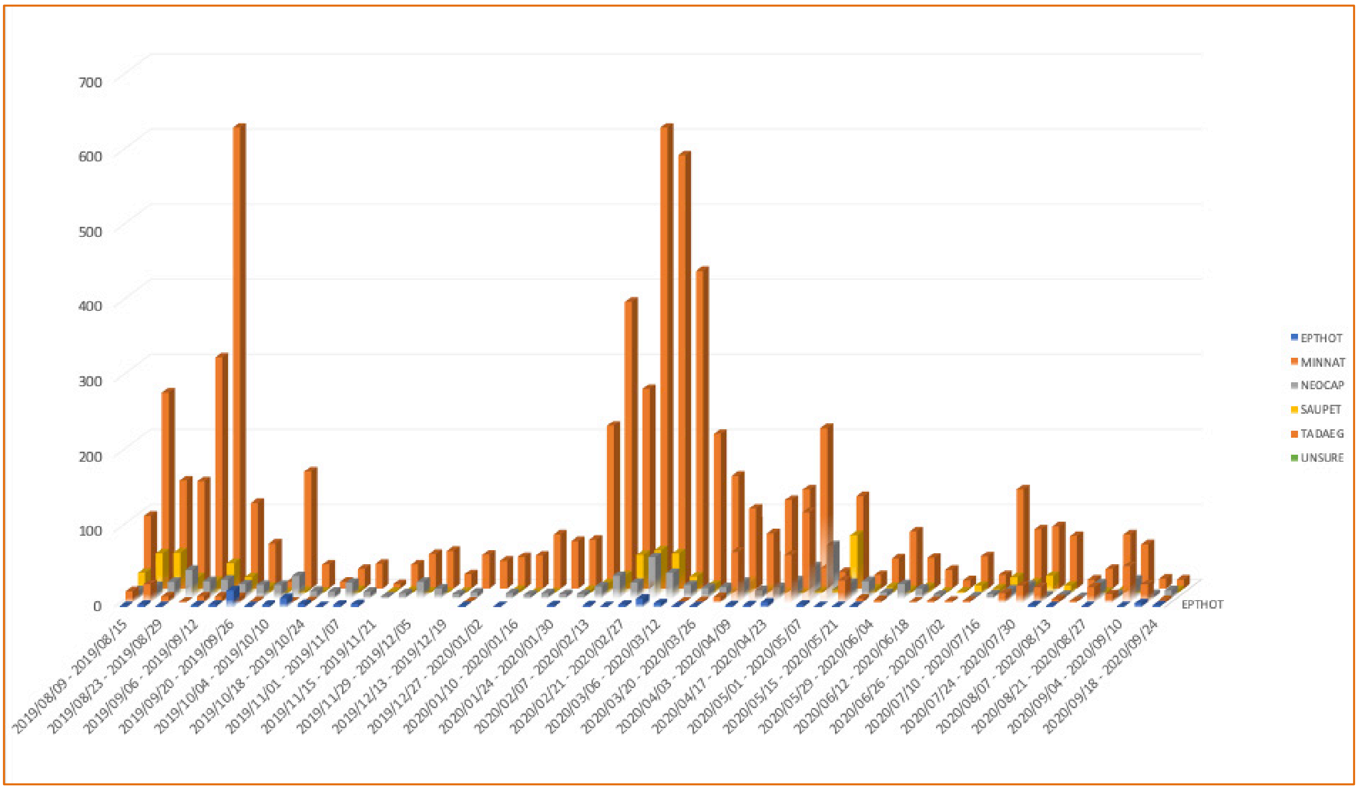
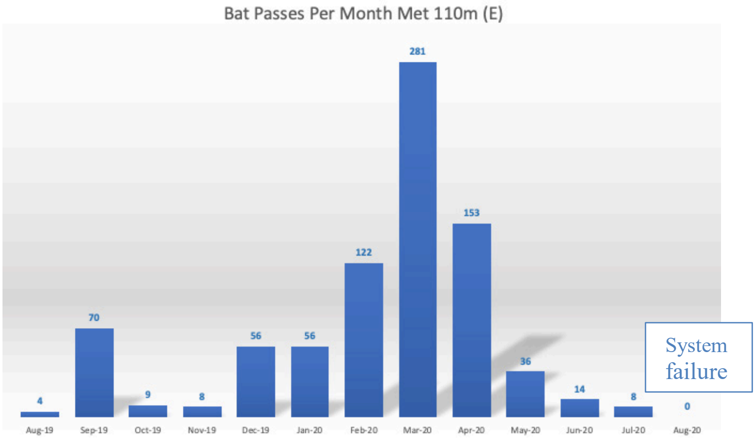


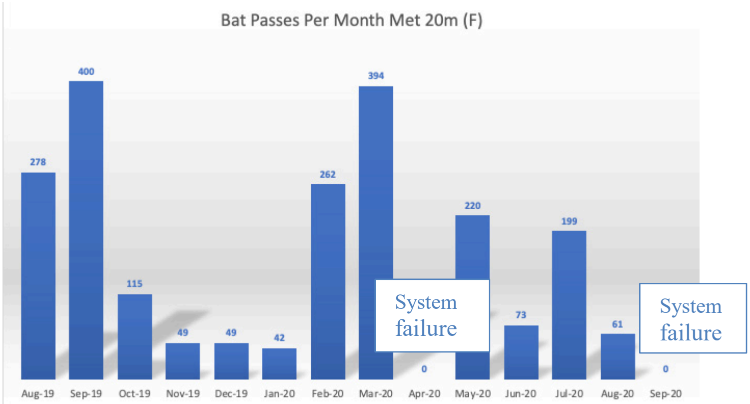
Figure 19: Temporal distribution of total weekly bat passes over the monitoring period at the proposed Komas WEF site.

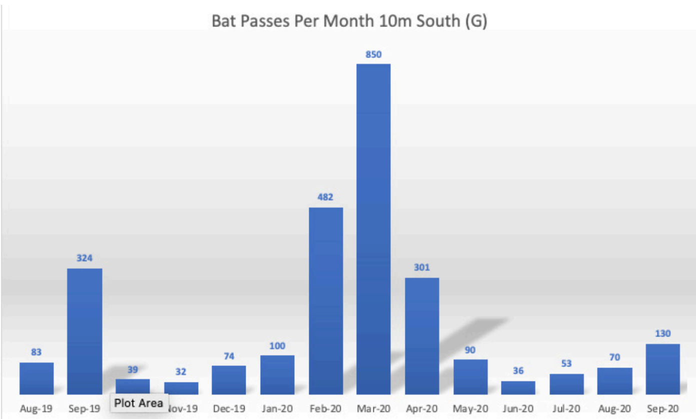
5.4 Monthly species activity

From Figure 20, which depicts bat monthly activity, one can clearly observe that all the monitoring stations indicate a peak of activity, as discussed in Section 5.3, 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.

The highest peak in bat activity on the terrain is experienced at Mast G, situated in the southern part of the terrain, north of the hills where signs of bat roosts were found. Mast H also indicate quite high activity during this period, but although the peak portrays lower activity, the elevated activity is carried through to May. It should be noted that the southern part of the proposed Komas WEF site is used for sheep grazing at present. Areas which are utilised for grazing often experienced higher insect occurrence, which could serve as an attraction for bats.


Bat Passes Per Month Met 110m (E)
4
70
9
8
56
56
122
281
153
36
14
8
0
System failure
Aug-19 Sep-19 Oct-19 Nov-19 Dec-19 Jan-20 Feb-20 Mar-20 Apr-20 May-20 Jun-20 Jul-20 Aug-20


Bat Passes Per Month Met 20m (F)
278
400
115
49
49
42
262
394
0
220
73
199
61
0
System failure
System failure
Aug-19 Sep-19 Oct-19 Nov-19 Dec-19 Jan-20 Feb-20 Mar-20 Apr-20 May-20 Jun-20 Jul-20 Aug-20 Sep-20


Bat Passes Per Month 10m South (G)
83
324
39
32
74
100
482
850
301
90
36
53
70
130
Plot Area
Aug-19 Sep-19 Nov-19 Dec-19 Jan-20 Feb-20 Mar-20 Apr-20 May-20 Jun-20 Jul-20 Aug-20 Sep-20

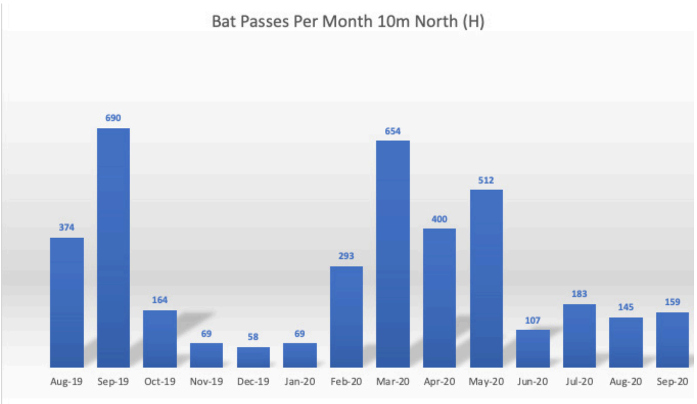

Bat Passes Per Month 10m North (H)
374
690
164
69
58
69
293
654
400
512
107
183
145
159
Aug-19 Sep-19 Oct-19 Nov-19 Dec-19 Jan-20 Feb-20 Mar-20 Apr-20 May-20 Jun-20 Jul-20 Aug-20 Sep-20

Figure 20: Monthly bat activity per monitoring station at the proposed Komas WEF site.

5.5 Total species activity per monitoring system

When observing Figure 21, the high activity of bats with calls associated with *T. aegyptiaca* can be seen, where the monitoring stations G and H both portray recorded activity over 2 000 bat passes for the monitoring period. Monitoring station H, at the 10 m mast situated in the northern part of the proposed Komas WEF site, portrays the highest activity associated with the red data species, *Miniopterus natalensis,* with 710 bat passes for the monitoring period. As mentioned before, this is a medium to high-risk species, which could forage at high altitudes within the rotor swept area of the turbine blades.

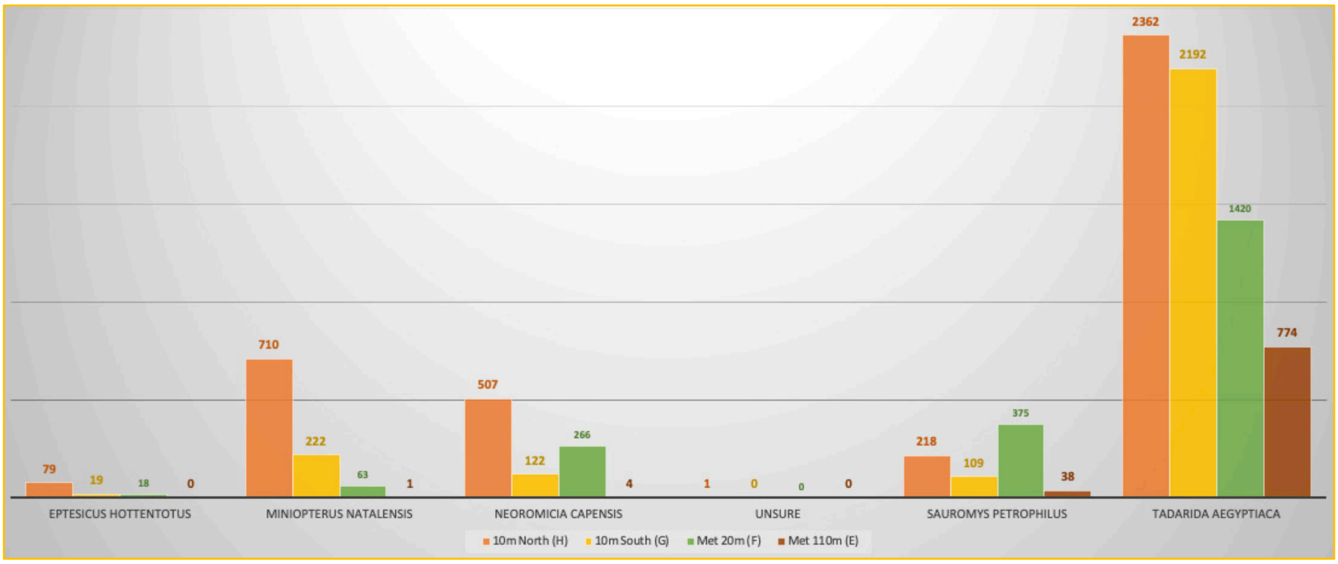


Figure 21: Total bat activity per monitoring station at the proposed Komas WEF site.

5.6 Hourly bat passes per night

Total hourly nightly bat passes at the proposed Komas WEF site for the monitoring period is portrayed in Figure 22, providing insight into the general distribution of bat activity from sunset to sunrise. As expected, higher activity is portrayed two hours after sunset, while a gradual decline of activity is shown from 0:00 to sunrise. At the northern monitoring system (H) activity peaks earlier in the evening, around 20:00, if compared to the south (G), where peak activity is portrayed around 23:00 to 0:00. A general decline in activity is observed from 2:00 to sunrise. Note that these figures are a summary of all seasons and thus a generalisation up to now.

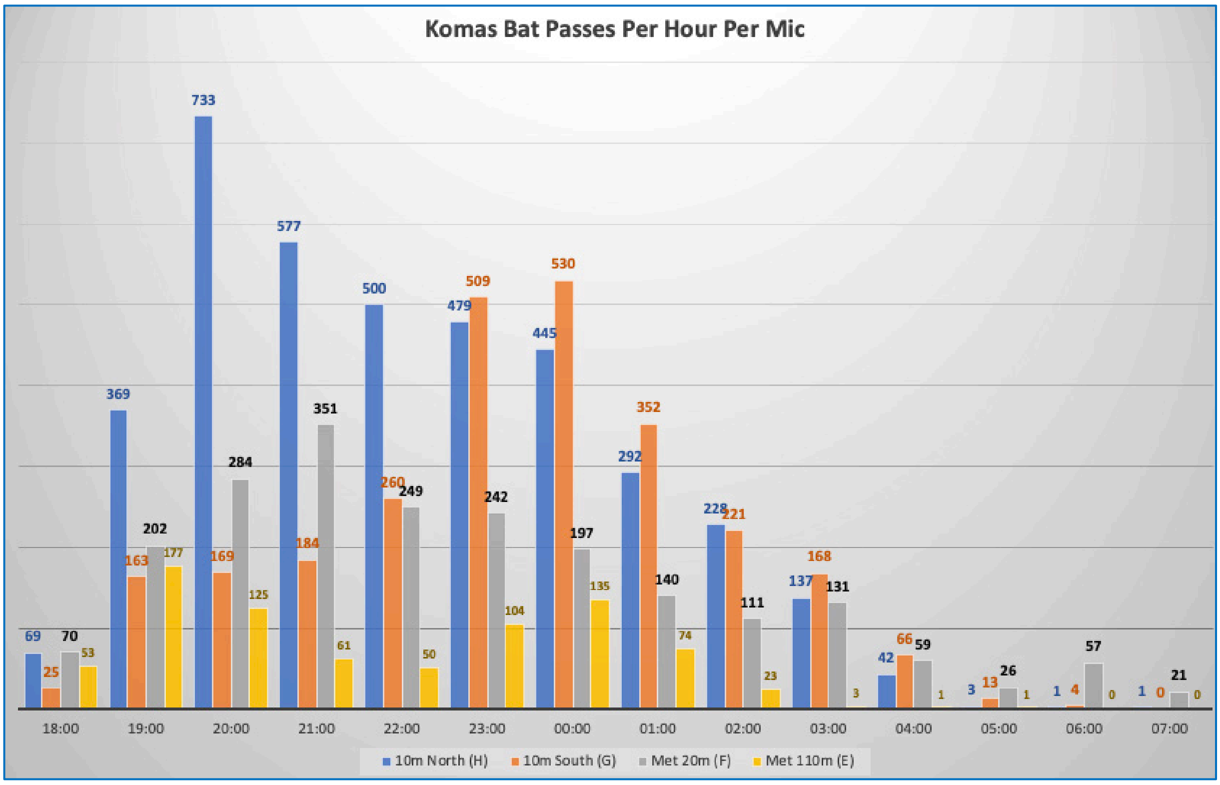


Figure 22: *Hourly nightly bat passes at the proposed Komas WEF site*

These patterns are of importance if mitigation measures are to be developed, as they indicate the most active periods during the night.

5.7 Bat index

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

Figure 23 indicates the annual average bat activity per hour for the monitoring systems at the proposed Komas WEF site, showing the Low, Medium, and High thresholds as indicated by the Bat Good Practice Guidelines (Sowler, *et al*. 2017). The annual average activity for the site as a whole is 0,50 bats per hour for the 12-month monitoring period at the proposed Komas WEF site, which is within the range of high risk for the Succulent-Karoo terrestrial ecoregion, as indicated in the Pre-construction Bat Good Practice Guidelines (Sowler, *et al*. 2017). All the monitoring systems at the site portray high average annual hourly bat activity according to the thresholds provided in the Bat Good Practice Guidelines (Sowler, *et al*. 2017). Monitoring system H, situated in the north of the proposed Komas WEF site, portrays the highest bat activity, with Monitoring Systems E and F, showing bat activity characteristic to the site.

As expected, the monitoring system situated at 110 m on the Met mast, although still categorising as high activity according to the threshold guidelines, portrays lower activity than the other monitoring stations.

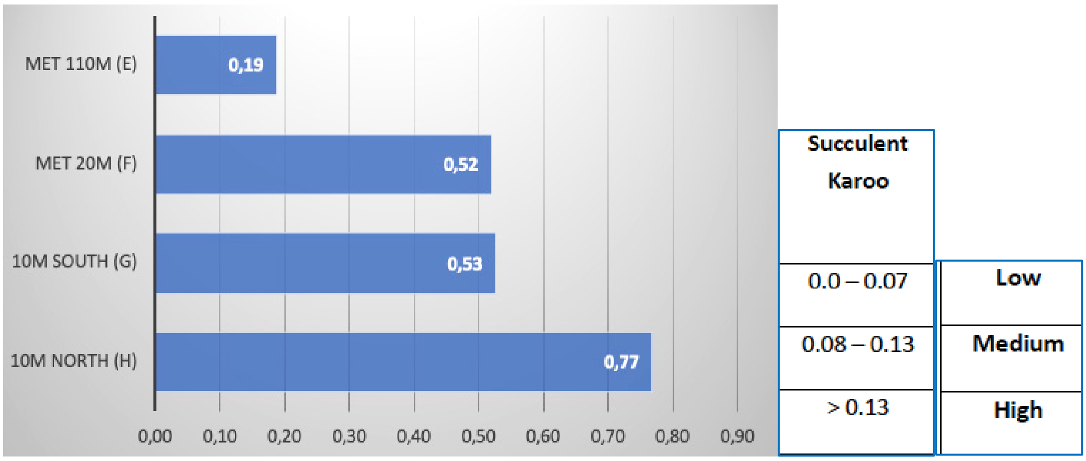


Figure 23: Mean hourly nightly bat passes over the 12-month monitoring period at the proposed Komas WEF site, with the annual average ranges of mean number of bat passes per hour for the Succulent Karoo as per the Bat Best Practice Guidelines (Sowler, et al. 2017)

Figure 24 depicts the mean hourly nightly bat passes per month for the 110 m monitoring system (E) at the proposed Komas WEF site. February to April indicate high activity if compared to the upper class of the Succulent Karoo bat threshold of >0,13 bat passes per hour. As indicated in Section 5.4, overall high activity is experienced during autumn. Spring also shows elevated activity in September, but in general high activity at height is portrayed during autumn. Low activity is only experienced during winter and late spring. In general, summer months also portray activity higher than the threshold, but not as high as autumn months.

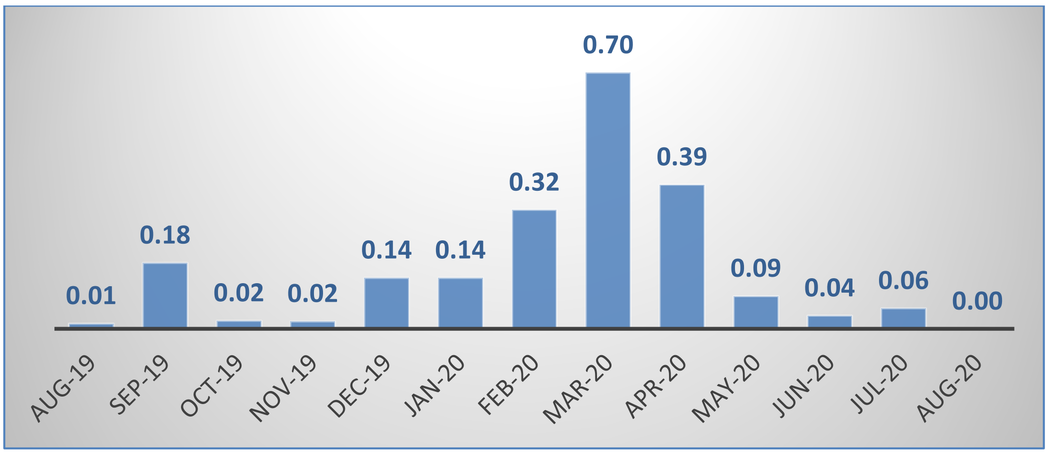


Figure 24: Mean hourly nightly bat passes per month for the 110 m monitoring system (E) at the proposed Komas WEF site.

5.8 Weather conditions and bat activity

The information provided in this section describes the relationship between weather conditions and bat activity, in particular activity within the rotor swept area of the turbine blades. Lower monitoring systems follow to a large extent the same pattern, but as weather monitors are close to the high microphone, and the high microphone is within the rotor swept area of the turbine blades, it is believed that this system provides more accurate data to plot with the weather data. This data is also used to compile a turbine curtailment schedule to be implemented from the onset of operation of the WEF. This curtailment schedule is used in conjunction with data from the monitoring systems from the adjacent proposed WEFs to refine mitigation strategies. Weather conditions, especially temperature and wind, have an influence on bat activity. Literature (Arnett, *et al*. 2008, Baerwald, *et al*. 2009, Kunz, *et al*. 2007), as well as observations from personal experience, indicate that bats tend to be more active at lower wind speeds and higher temperatures. Therefore, bats tend to be more active during warm, quiet nights, combined with elevated humidity; especially when there is an abundance of food, such as termites. Higher activity has also been reported during dark moon.

Weather data from the Met mast was utilised for the statistical analyses below, as this sampling system is situated in the area of collusion. See Appendix 5 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 116 m anemometer situated on the Met mast.
- Humidity data from 116 m on the Met mast.

5.8.1 Cumulative distribution functions (CDF)

Figure 25 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. The term If the cumulative percentage bat passes at the monitoring stations are plotted with temperature and wind speed, the following trends are observed:

- Approximately 60% of the bat activity was recorded under 19^{o}C, with approximately 90% of the bat activity occurring above 15^{o}C.
- Approximately 60% of the bat activity was recorded below 8m/s wind speed, with 90% of the activity occurring below 11 m/s.
- Approximately 60% of the bat activity was recorded between 40% and 80% humidity.

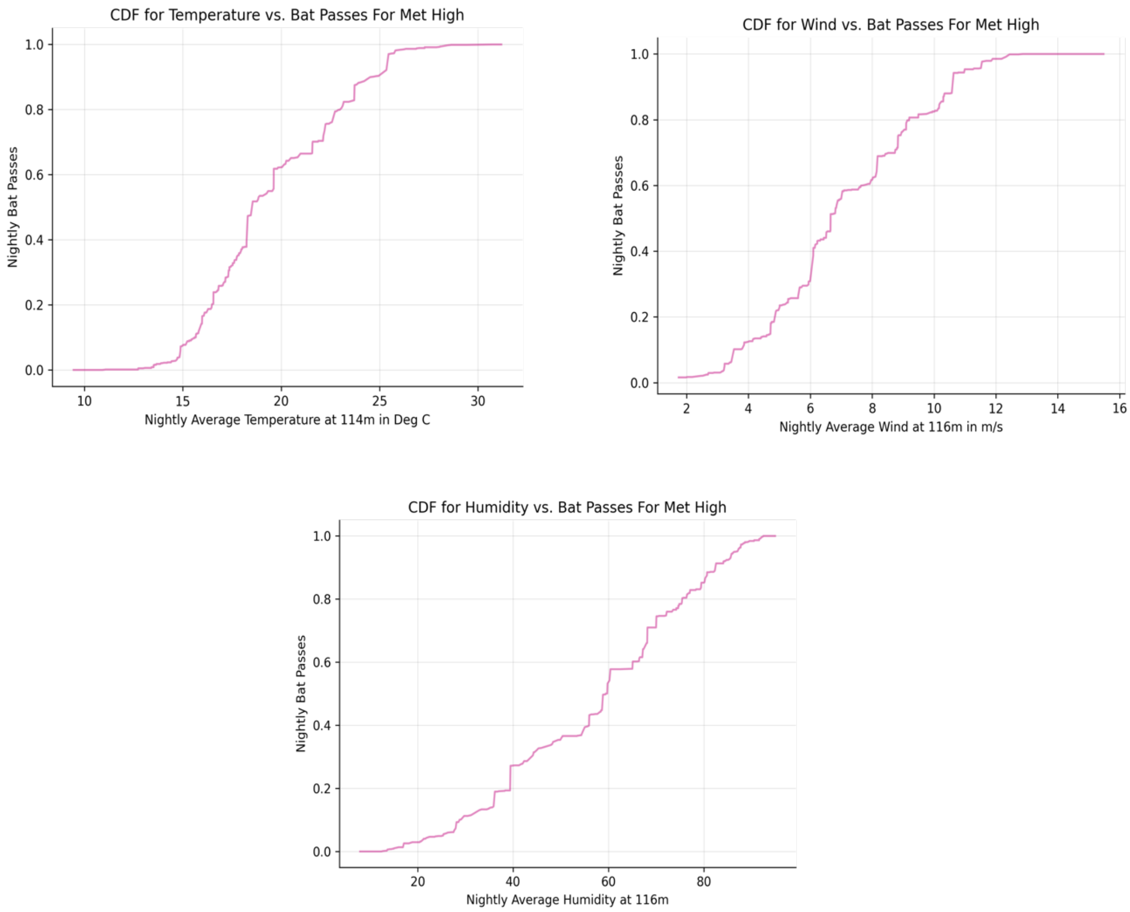


Figure 25: Cumulative Distribution Function (CDF) of nightly bat passes with nightly average temperature, wind speed and humidity.

5.8.2 Linear Regression

Results of a linear regression between weather conditions and bat activity are provided in Figure 26 and summarised in Table 3. Due to the general small sample size of bat data observed from 110 m high monitoring systems in Succulent Karoo, which is also the case at the proposed Komas WEF site, and bats not necessarily being active during various weather conditions, the linear regression results do not provide much insight into the bat situation at the proposed Komas WEF site. Limited bat activity portrayed over one year and limited variation in weather data of one year shows inadequate variation. See Appendix 5 for weather distribution graphs. The same situation occurs with humidity. As soon as more data is available during post construction, linear regressions analyses should be applied to the data again.

Table 3: Summary of linear regression

	Correlation Coefficient	
Temperature and bat activity	0.169	Weak positive relationship between temperature and bat passes. As temperature increases so does the bat activity.
Wind speed and bat activity	-0.008	No relationship between wind speed and bat passes. As wind speed increases/decreases the bat activity does not necessarily increase or decrease.
Humidity and bat activity	-0.064	Weak negative relationship between humidity and bat passes. As humidity increases the bat activity decreases.

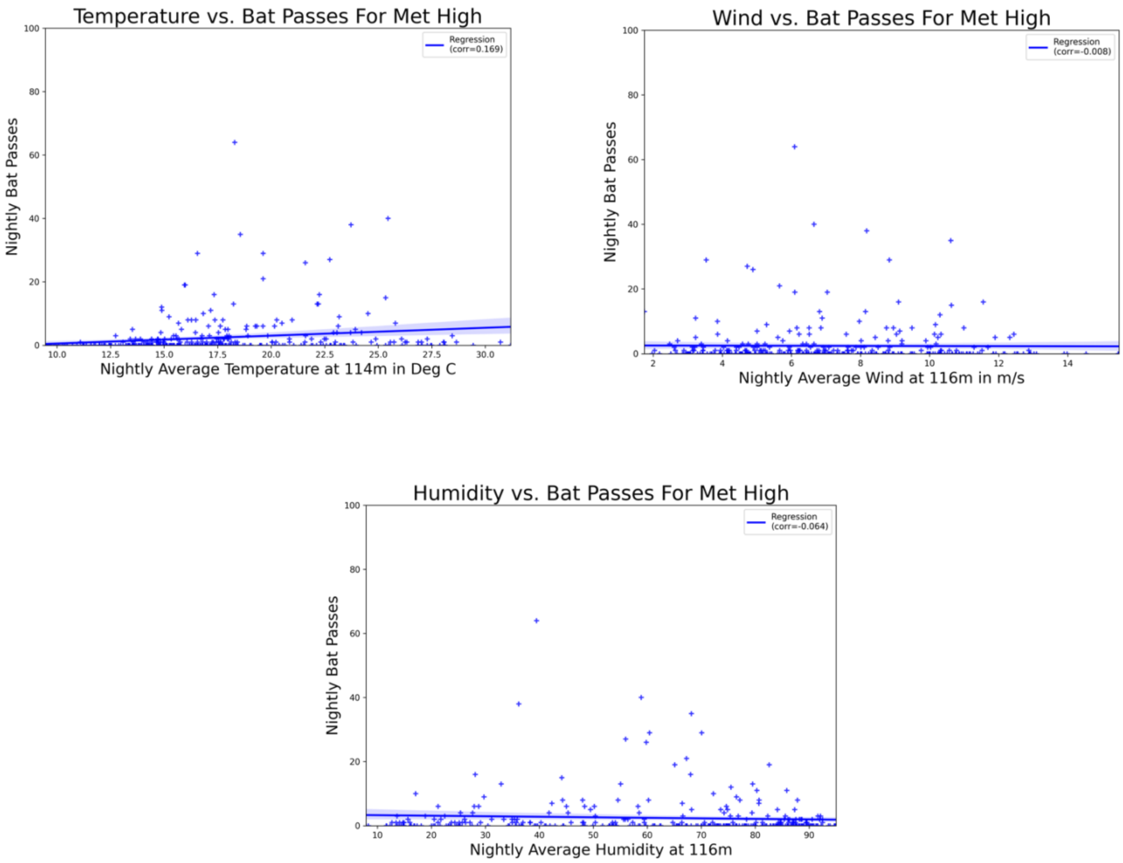


Figure 26: Linear regressions of temperature, wind speed and humidity as predictors of the distribution of bat activity.

5.8.3 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 27. Darker areas indicate a concentration of activity.

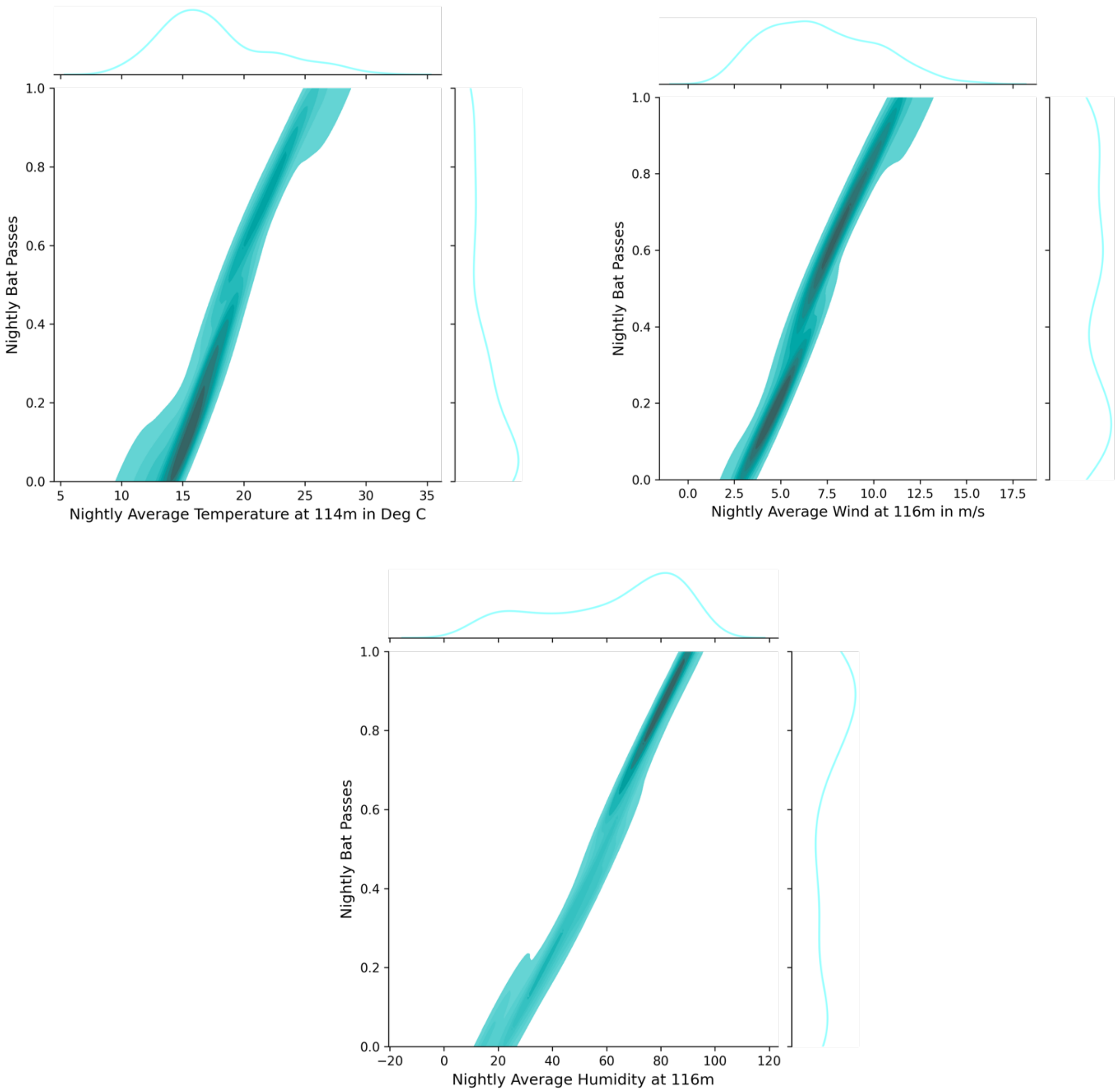


Figure 27: Cumulative distribution function heat maps showing bat activity with temperature, wind speed and humidity.

The density of bat passes during certain temperature, wind speed ranges and humidity can be clearly observed when CDF heat maps are plotted and from Figure 27, the following could be derived:

- Nightly average activity and temperature: Highest bat activity occurred between 14°C and 19°C, but activity density is observed as high as 25 °C.
- Nightly average activity and wind speed: More than 60% of the bats are active up to 12 m/s, showing no range of lower activity between approximately 2 m/s to 11m/s.
- Nightly average activity and humidity: Bat activity is distributed between 10% and 100% humidity. Some density is indicated above 80%, but the data doesn't portray a significant effect of humidity on bat activity.

6. TRANSECTS

Transects were conducted for three seasons of the monitoring year, namely winter, summer, and spring. Due to the Covid-19 pandemic and the restrictions which applied under Lockdown Level 1, no transects were conducted during autumn of 2020. Transects provide only a snapshot in time, and as static recorders were covering the proposed Komas WEF site, it is believed that omitting this transect will not jeopardise the decision making as to whether the proposed Komas WEF must be authorised or not from a bat perspective. Results are indicated in Figures 28 to 30, showing the transect routes and where the bats were recorded, while Table 4 summarises the results.

Like the predominantly recorded family from the static recorders, bats from the family *Molossidae* were recorded during the transects, namely calls similar to *Tadarida aegyptiaca* and *Sauromys Petrophilus,* and *Miniopterus natalensis.*

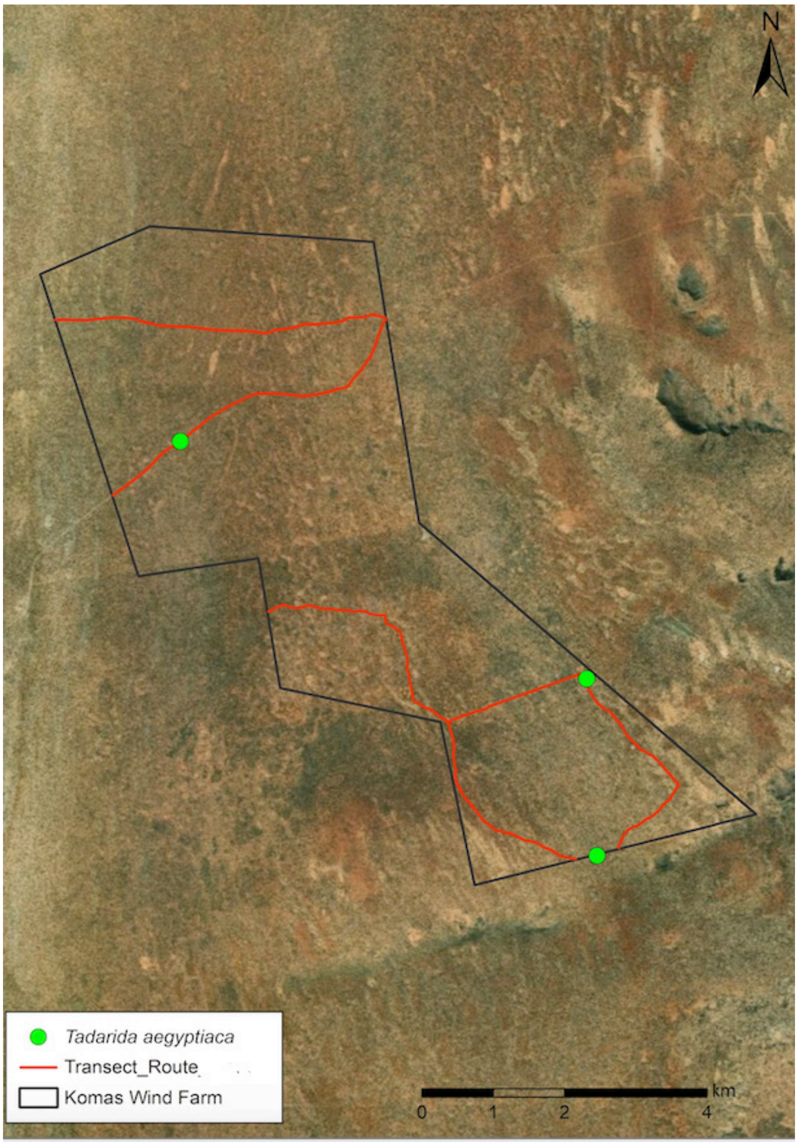


Figure 28: Transects conducted at the proposed Komas WEF site, showing the positions where bats (Tadarida aegyptiaca) were recorded during November 2019.

No bats were recorded during the first transects in August 2019, while three calls were recorded during November 2019. During spring 2020, an exceptionally high bat activity of 37 bat passes, was recorded in the southern section of the proposed wind farm, see Figure 29 and Table 6. Similar high activity was recorded during the same period at the proposed Gromis WEF, situated south of the proposed Komas WEF. It is speculated that higher rainfall during 2020 could have caused higher insect emergence, which could have resulted in higher bat activity. Although there was an increase in bat activity during September 2020 at the static recorder in the south (G), there is no indication of a prolonged period of high activity during the rest of September 2020. This sudden increase in activity should be carefully observed during post construction monitoring.

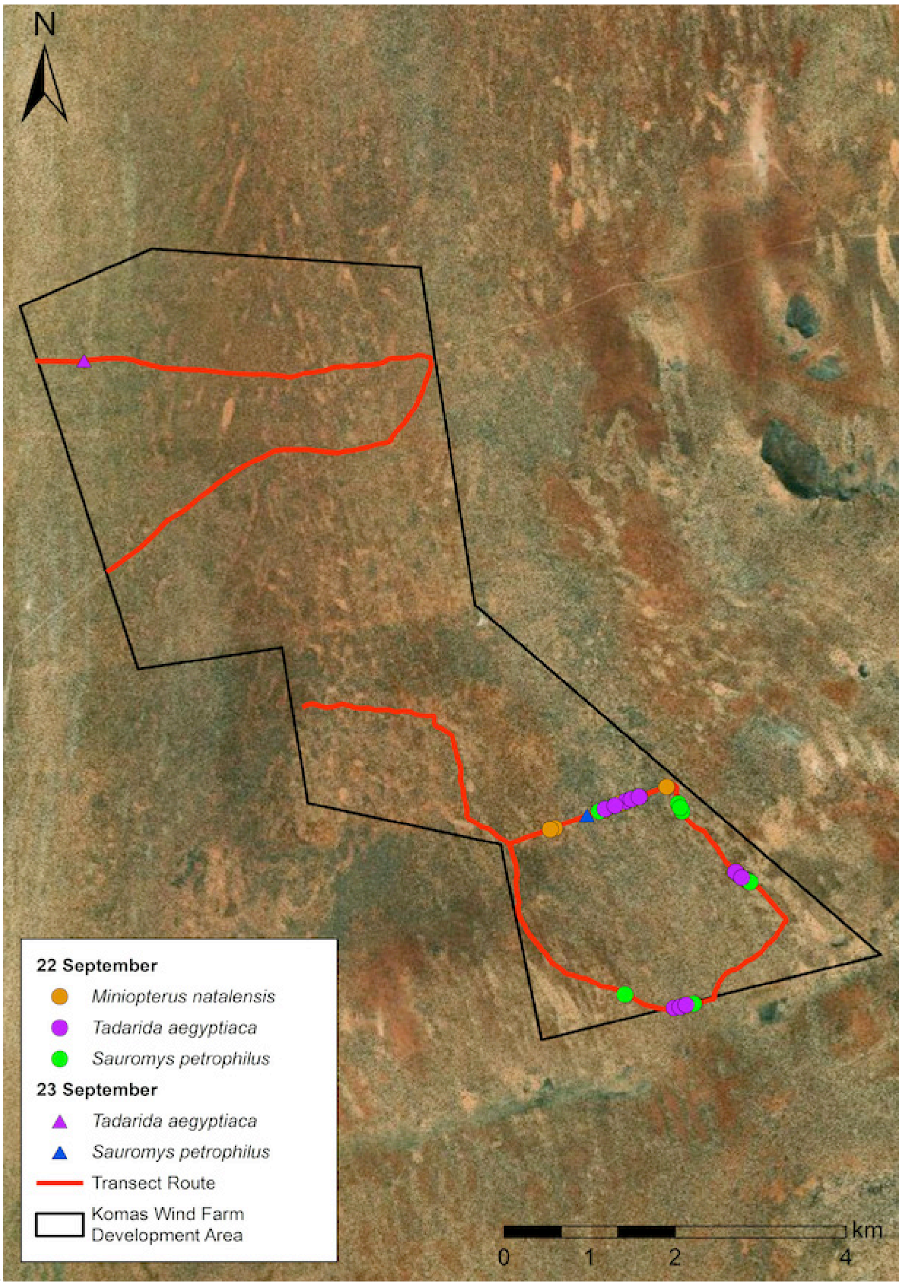


Figure 29: Transects conducted at the proposed Komas WEF site, showing the positions where bats were recorded during September 2020

Table 4: Data collected from transects conducted at the proposed Komas WEF site.

Date	Temperature	Wind	Calibration (dB)	Results
Winter				
9 August 2019	Between 23 °C (start) and 20,48 °C (end)	Between 1,5 m/s and 3,2 m/s	App. -8,29 dB	No bat calls
10 August 2019	Constant around 21 °C	Wind-still	App. -8, 20 dB	No bat calls
Summer				
24 November 2019	Between 24 °C (start) and 17 °C (end)	Wind-still	App. -7,50 dB	No bats calls
25 November 2019	Between 23 °C (start) and 20 °C (end)	Between 0 m/s to 1,8 m/s	App. -8,43 dB	3 X *T. aegyptiaca*
Spring				
22 September 2020	Between 17 °C (start) and 15 °C (end)	Between 0 m/s to 1,5 m/s	App. 8,00 dB	*1 X S. petrophilus* *1 X T. aegyptiaca* *2 X M. natalensis*
23 September 2020	Varies around 15 °C	Between 0 m/s to 1,8 m/s	App. -8,43 dB	*13 X S. petrophilus* *15 X T. aegyptiaca* *5 X M. natalensis*

7. BAT 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 recommendations from SABAA is a 200 m buffer around all potentially bat important features. Figure 30 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 Komas WEF site.

In cases of high bat sensitivity zones, it is recommended these areas constitute no-go development areas, i.e., where turbines or associated infrastructure are not allowed, whereas medium and medium-high sensitivity zones could be developed (turbines and associated infrastructure), but with mitigation.

7.1 No-go zones

The following features, which could be bat conducive, either at present, or in future, have been buffered with a 200 m buffer at the proposed Komas WEF site.

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

- Open water sources, such as water troughs for livestock. Some of these are historic, but could be used in future;

- Reservoirs;
- Dams;
- Diggings and Pans.

In the southern area of the proposed Komas WEF site crevices were discovered with some bat rests, indicating bat presence in the area. Although no bats have been physically observed, these could serve as roosts. The static recorder situated in the south (G) also recorded the highest bat activity if compared to the other monitoring systems on site. The contour of the hilly area in the south, also indicating the border of the proposed Komas WEF site, were followed to create this high sensitivity zone.

7.2 Medium to high sensitivity zones

Originally this zone was classified as medium, but when hourly mean bat activity was calculated taking all monitoring data into account, it was clear that bat activity is higher than the threshold provided by the South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments – Pre-construction (Sowler *et al*, 2017). It seems as if Namaqualand Salt Pans vegetation zone (SANBI, 2012), supports higher bat presence, and the border of this vegetation zone had been used for the sensitivity zone. Due to the high bat activity, if taking the threshold into account, the medium zone was changed to a medium to high zone.

7.3 Medium sensitivity zones

The remaining part of the site was originally classified as Low sensitivity, but when data from the static recorders were considered, the rest of the site was changed to a medium sensitivity zone.

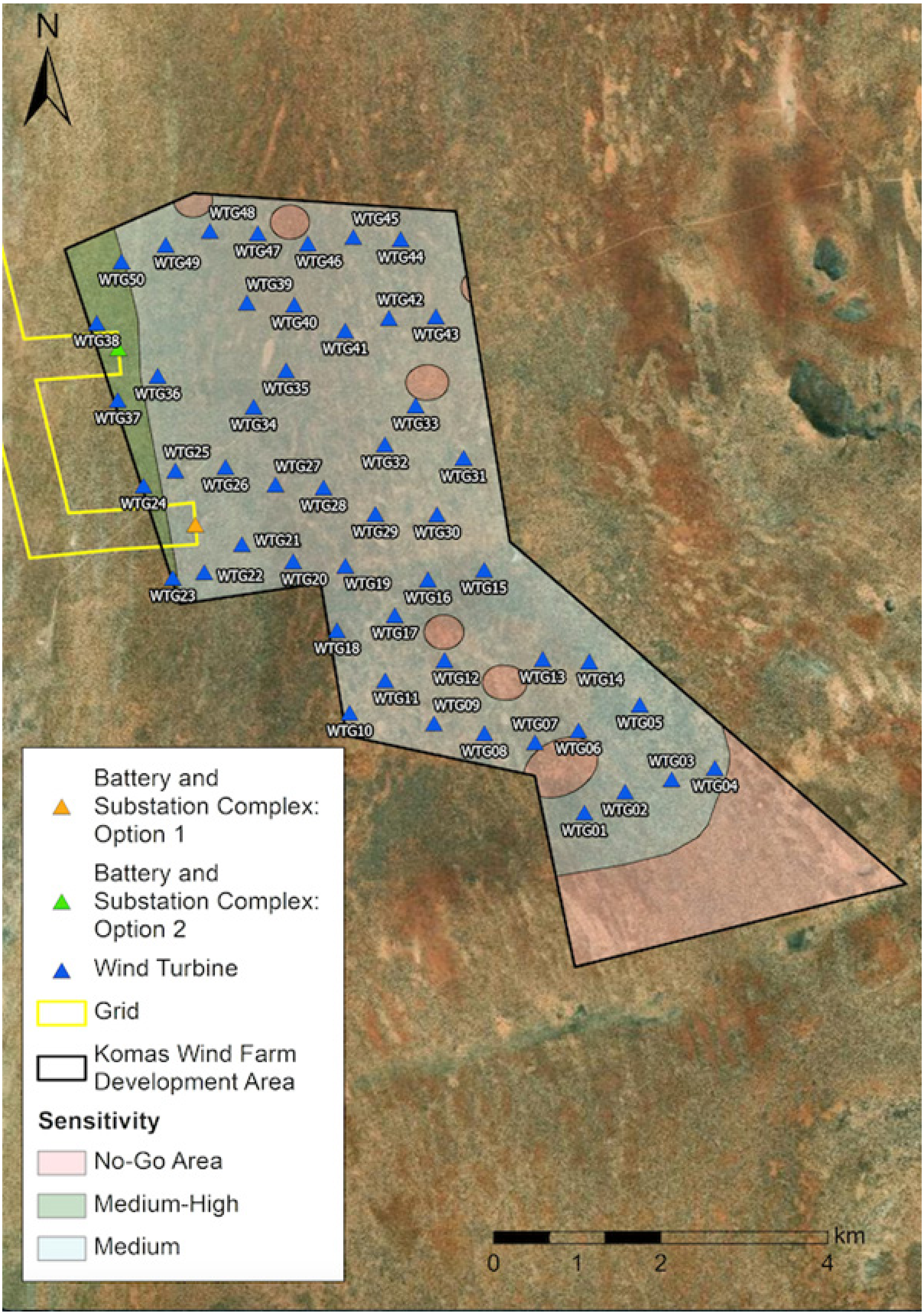


Figure 30: The bat sensitivity zones identified for the proposed Komas WEF site with Option 1 as the preferred site for the Battery and Substation, overlain with the development footprint.

8. CUMULATIVE IMPACT

The estimated development footprint of the proposed Komas WEF and associated infrastructure to date is approximately 90 ha, while the area that was investigated is approximately 2080 ha. This is part of a large cluster of WEFs and solar PV Facilities which are proposed to be developed near Kleinsee in Namaqualand in the Northern Cape (Figure 31). There are currently nine approved WEFs and one approved solar PV facility (and for one the BA process is currently being undertaken) within a 50 km radius of the proposed Komas WEF site. The BA for the proposed Gromis WEF is currently being undertaken, but due to Gromis WEF not being finalised yet, this proposed site is not included in the cumulative discussion. The proposed Komas and Gromis WEFs as well as approved Kap Vley, Namas, Eskom Kleinsee and Zonnequa WEFs are all situated in the 15 214 km2 (1 521 400 ha) Springbok REDZ 8. This broader REDZ area displays suitable topography for high wind speed variability. REDZs are highly localized geographical regions identified for strategic importance of large-scale renewable energy development and electrical grid support to maximise the cumulative wind energy production and minimize the wind power generation profile (Van Vuuren & Vermeulen 2019), see Figure 31.

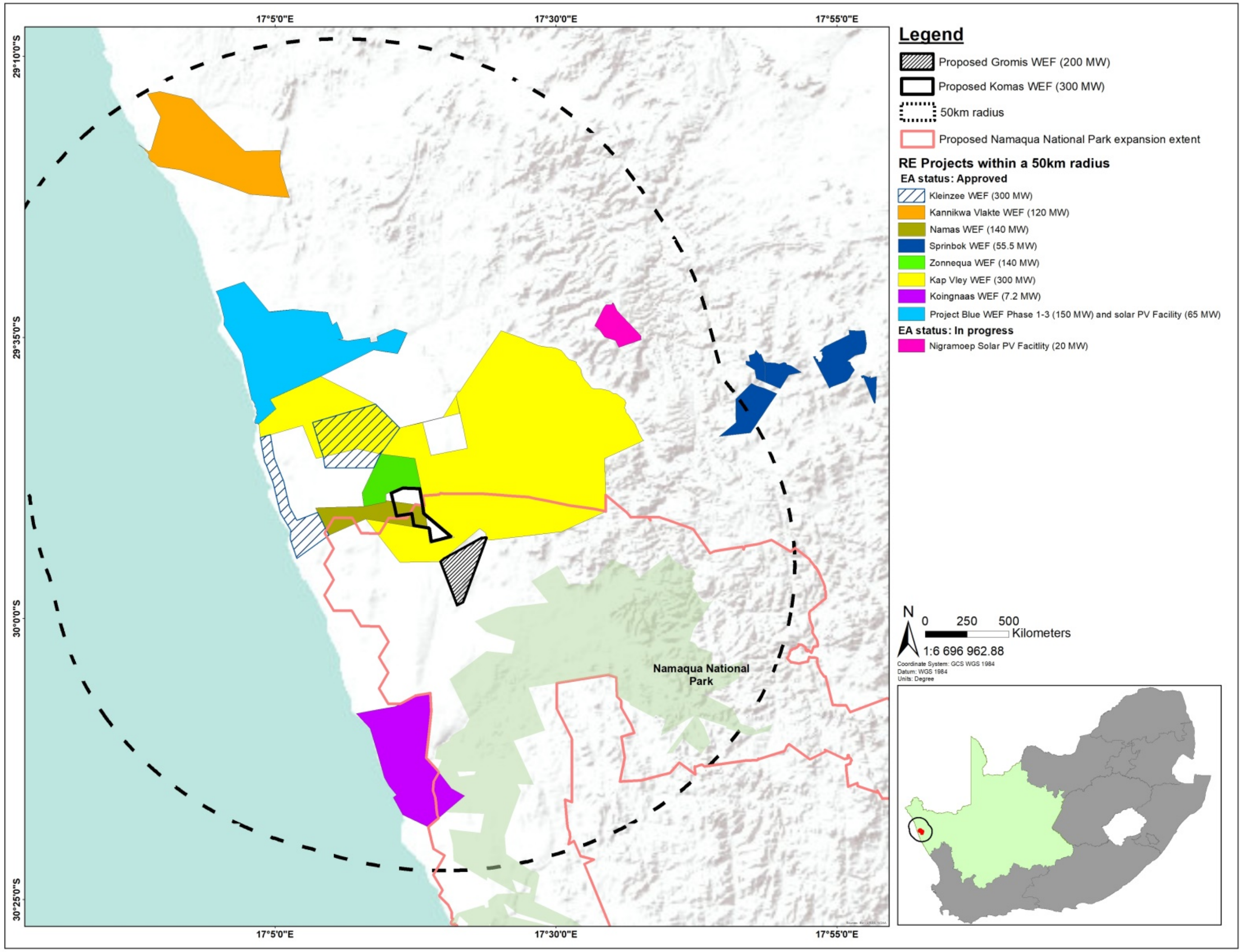


Figure 31: Map of renewable energy facilities (including wind and solar PV facilities) located within a 50 km radius from the proposed Komas WEF site (outlined in black). The proposed Komas WEF is part of a cluster of WEFs (namely Kap Vley, Namas, Eskom Kleinsee and Zonnequa) to be developed in the Springbok REDZ 8.

Table 5 represents the proposed combined approximate electricity generation capacity from the approved renewable energy facilities in the Springbok REDZ. All the wind farms within a 50 m radius are considered for the cumulative effect, as per the Good Practice Guidelines (Sowler, *et al*. 2017) for bats, see Table 6 for details concerning these renewable energy facilities. The approximate combined electricity output generated by the proposed WEFs is 1 212.7 MW. With the output from the proposed Komas WEF added to this, the total combined output will be approximately 1 512.7 MW. We do not have bat mortality estimations for WEFs in the Succulent Karoo as yet, but as soon as statistics become available from operational WEFs in this REDZ, cumulative bat mortality predictions could be calculated.

Table 5: Output from combined approved developments in the Springbok REDZ

	Output in MW
Total approved wind developments	1 212.7
Komas WEF	300
Total approved solar developments	180
Total approved combined solar and wind development	1 692.7

Bat activity was confirmed during specialist field visits at the proposed Komas WEF site and surrounding proposed WEF sites. Bat monitoring information was made available from bat studies undertaken from the adjacent proposed WEFs as indicated in Table 6. Open air forager bats with wing design and echolocation calls adapted to flying fast and high above the vegetation as well as migratory species that fly over these proposed WEF sites, regardless of their foraging behaviour, were recorded at the proposed WEF sites. Due to their mobility, bats could also originate from roosts beyond this cluster of WEFs. Table 6 presents the individual and cumulative features of the cluster of WEFs, with Bat Indexes 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). Some of the project specific risk levels may be low. However, the collective bat impact risk is higher than the high-risk threshold for Succulent Karoo, which is 0,13 (MacEwan, 2017).

Table 6: Bat Indexes of adjacent wind farms

Wind Energy Facility	Highest average Bat passes/hour/year (>40m above ground)	Risk Level (Sowler et al., 2017)
Juwi Kap Vlei WEF	0,03	Low
Genesis Namas Wind	0,04	Low
Eskom Kleinzee	0,60	High
Genesis Zonnequa Wind	0,04	Low
Average without Komas WEF	0,20	High
Komas WEF	0,18	High
Average of combined WEFs with Komas	0,18	High

There is potential for mass loss of locally active and migratory bats due to wind farms 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 to reduce fatality impacts (Arnett & Alay, 2016, in MacEwan, *et al*. 2018).

9. PROPOSED 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. The applicant has already updated the initial turbine layout to exclude turbines or turbine components from the high bat sensitivity zones (see Figure 30).

9.2 Curtailment at specific turbines

Currently, the most reliable and effective mitigation is curtailment (Arnett and May, 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. While 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 reduce potential encounters of bats with wind turbine blades. These relations are presented in Section 5.8 of this report and used to compile the below curtailment schedule.

It should be noted that the bat studies conducted for the adjacent surrounding proposed WEFs show lower bat activity levels compared to the bat activity portrayed at the proposed Komas WEF site. It is speculated that rainfall after a very dry spell, which might have caused higher insect occurrence, could have resulted in increased bat activity. Curtailment is only applied to the turbines situated in the medium to high sensitivity zone, but 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. If 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 is applied during the specified time periods when the relevant high temperatures and low wind speeds prevail (Table 7) for the turbines situated in the medium to high sensitivity zone, namely WTG23, WTG24, WTG37, WTG38 and WTG50. If the developer decides to reduce the number of turbines, the first option, after the wind regime is taken into account, should be to reduce the turbines in the medium to high sensitivity zone. If a substantial number of turbines in the medium sensitivity zone is reduced, it will be at the discretion of the operational bat specialist as to whether some of the curtailment at the medium to high zone could be relieved. Operational monitoring and carcass searches will have to inform this decision.

Fatality risk at the high mast indicate curtailment is required between February and April, as per the threshold for Succulent-Karoo, see highlighted area in Table 7. It is recommended that curtailment is applied between 19:00 and 02:00, when the temperature is between 14°C and 19°C and wind speed between 2.5 m/s and 9 m/s. Although bat activity does not seem to decrease much with higher wind speeds at the proposed Komas WEF site, Section 5.8 indicates that 60% of the *Molossidae* species, the predominant high-risk family at the proposed Komas WEF site, is active during these wind speeds. An increased activity is observed with higher temperature, ranging between 14°C and 19°C.

The bat monitoring undertaken at the proposed Komas WEF site also indicates increased bat activity and subsequent increased fatality risk during September and December, but to a lower extent during January., It is however recommended that operational bat monitoring 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 the listed turbines 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 Komas WEF site. The 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.

Table 7: Time periods and weather conditions (as measured at approximately 116 m height) at the proposed Komas WEF site. Highlighted months indicate periods when listed turbines must be curtailed immediately after installation.

MITIGATION FOR TURBINE NUMBERS WTG23, WTG24, WTG37, WTG38 and WTG50			
Months	**Time periods**	**Temperature (°C)**	**Wind speed (m/s)**
February	19:00 – 02:00	Between 14 and 19 °C	Between 2.5 and 9 m/s
March	19:00 – 02:00	Between 14 and 19 °C	Between 2.5 and 9 m/s
April	19:00 – 02:00	Between 14 and 19 °C	Between 2.5 and 9 m/s

Table 8: Time periods and weather conditions (as measured at approximately 116 m height) at the proposed Komas WEF site, which need to be applied should medium and high estimated true bat mortality be experienced.

MITIGATION FOR TURBINE NUMBERS WTG23, WTG24, WTG37, WTG38 and WTG50			
Months	**Time periods**	**Temperature (°C)**	**Wind speed (m/s)**
September	19:00 – 02:00	Between 14 and 22 °C	Between 2.5 and 9 m/s
December	19:00 – 02:00	Between 14 and 22 °C	Between 2.5 and 9 m/s
January	19:00 – 02:00	Between 14 and 22 °C	Between 2.5 and 9 m/s

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. 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 but will have to 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, Ms Stephanie Dippenaar, is managing one of these WEFs. They are awaiting bat monitoring information to ascertain the effectiveness of the deterrents.

10. IDENTIFICATION OF KEY IMPACTS

The potential impacts to bats identified at the proposed Komas WEF site include:

- Removal of limited roosting space on site, such as rock formations or trees;
- Mortality during the operation of wind turbines;
- Habitat loss due to the operational WEF;
- Change in foraging potential;
- Create new bat conducive habitat amongst the turbines; and
- The cumulative effect of the above together with the surrounding proposed WEFs.

Comments received

SABAA was contacted when the loss of bat data (between December 2019 and May 2020) at the 110 m high monitoring system at the proposed Komas WEF site was established during August 2020. They were contacted again when further data loss occurred until September 2020 due to a technical failure on the high mast. SABAA confirmed that they accept the proposed approach and way forward regarding the bat monitoring at the Komas WEF site (see letters from SABAA in Appendix 2 and further details in Section 5.1).

Comment	Commenter	Date of comment	Response
Letter concerning data loss from the monitoring system at height (between December 2019 and May 2020)	Eleanor Richardson SABAA committee	8 September 2020	SABAA agrees to the proposed approach to supplement the data with the data collected from the other two monitoring systems at the Komas WEF site between 10 and 20 m that were operational at that time. The data can be further supplemented from the 110 m mast at the Gromis WEF site which is in the same type of environment. Further details are

			provided in Section 5.1
Letter concerning data loss from the monitoring system at height (from May 2020 until September 2020)	Eleanor Richardson SABAA committee	20 October 2020	SABAA agrees to the proposed approach to supplement the Komas monitoring data with data from three other masts in the surrounding area. These include the met masts at the proposed Gromis, Namas and Kap Vley WEF sites. Further details are provided in Section 5.1.

10.1 Identification of Potential Impacts

The potential impacts to bats identified at the proposed Komas WEF site are:

10.1.1 Construction Phase

- Potential impact 1: Roost disturbance, destruction and fragmentation due to construction activities.
- Potential impact 2: Creating new habitat amongst the turbines, such as buildings, excavations, or quarries.
- Potential impact 3: Disturbance to bats during the construction activities during night-time.

10.1.2 Operational Phase

- Potential impact 4: Mortality due to direct collision or barotrauma of resident bats.
- Potential impact 5: Mortality due to direct collision or barotrauma of migrating bats.
- Potential impact 6: Loss of bats of conservation value.
- Potential impact 7: Attraction of bats to wind turbines.
- Potential impact 8: Loss of habitat and foraging space.
- Potential impact 9: Reduction in the size, genetic diversity, resilience, and persistence of bat populations.

10.1.3 Decommissioning Phase

- Potential impact 10: Disturbance due to decommissioning activities.

10.1.4 Cumulative impacts of wind farms within 50 km radius

- Potential impact 11: Cumulative Effect of construction activities of several WEFs within 50 km from the proposed Komas WEF site.
- Potential impact 12: Cumulative resident bat mortality of all the WEFs.
- Potential impact 13: Cumulative bat mortality due to direct collisions with the bladesor barotrauma during foraging of migrating bats.
- Potential impact 14: Cumulative Effect of habitat loss over several thousand hectares of all WEFs.
- Potential impact 15: Cumulative reduction in the size, genetic diversity, resilience, and persistence of bat populations.

11. ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

11.1 Construction Phase

A. DIRECT

11.1.1 Potential Impact 1

Nature of impact: The destruction of active bat roosts and/or features that could serve as potential roosts, such as rock formations situated at the southern area and the removal of the limited number of trees on site. The destruction of derelict holes, such as aardvark holes and any fragmentation of woody habitat which include dense bushes. The removal of limited trees and bushes would have an impact on the clutter and clutter-edge foraging groups.

Significance of impact without mitigation measures: Moderate, due to the high possibility that vegetation clearing will happen and might affect bats.

Proposed mitigation measures:

- Construction activities to be kept out of all high bat sensitive areas.
- Rock formations occurring along the ridge lines in the south 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.

Significance of impact with mitigation measures: Low, as there will still be some removal of vegetation, even with all mitigation measures.

11.1.2 Potential Impact 2

Nature of impact: 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.

Significance rating without mitigation measures: Moderate

Proposed mitigation measures:

- Care needs to be taken to completely seal off roofs of new buildings (e.g., substations and site buildings) within the study area to prevent bats from moving in and becoming more prone to contact with the turbines in the surrounding area. Note a small bat species could enter a hole the size of 1 x 1 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 which could attract bats during rainy spells.

Significance of impact with mitigation measures: Very Low

11.1.3 Potential Impact 3

Nature of impact: Construction noise, especially during night-time.

Significance of impact without mitigation measures: Moderate

Proposed 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 lightning 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.

Significance of impact with mitigation measures: Low. Negligible when no night-time construction activities take place.

11.2 Operational Phase

A. DIRECT

11.2.1 Potential Impact 4

Nature of impact: 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 Molossidae species have predominantly been confirmed at the proposed Komas WEF site.

Significance of impact without mitigation measures: High due to the permanent negative impact high bat mortality could have on bat populations, and the recorded bat activity that is above the threshold for Succulent Karoo (Sowler, *et al*. 2017).

Proposed mitigation measures:

- All turbines and turbine components, including the rotor swept zone, should be kept out of all high bat 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 as a whole.
- Mitigation as proposed for medium and medium-high sensitivity zones proposed in Section 9.2, Table 7, must be adhered to as soon as the turbines start operating. Mitigation measures must be adapted by a bat specialist as data is collected during the operational phase.
- nCareful observation should take place during the operational phase and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions.
- 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.
- 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 Komas 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 Komas WEF site.

  Significance of impact with mitigation measures: Moderate, due to high bat activity and high-flying species occurring on the site.

11.2.2 Potential Impact 5

Nature of impact Bat fatality during migration. A limited number of calls similar to *Miniopterus natalensis* (Natal Long-fingered bat), a migration species, have been recorded.

Significance of impact without mitigation measures: Low, due to the low presence of the *M. natalensis,* or any other migratory species.

Proposed mitigation and measures: Mitigation measures as described in the above Section 11.2.1. Care should be taken during post construction monitoring to verify the numbers of this species, especially within the rotor swept area of the turbine blades.

Significance of impact with mitigation measures: Low, if taking in mind the precautionary principle, and the fact that fruit bat rests, most likely that of *Eidolon helvum*, have been found at the Zonnekwa farm dwelling, together with limited *M. natalensis* presence, there is still risk involved.

11.2.3 Potential Impact 6

Nature of impact 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 *Sauromys petrophilus.*

Significance of impact without mitigation measures: Low, only limited activity of bat species of conservation value had been recorded

Proposed mitigation measures: Implement mitigation measures as described in Section 10.2.1. Proven mitigation measures, such as curtailment, should be applied if high numbers of bat passes concerned with bats of conservation value is recorded during post-construction.

Significance of impact with mitigation measures: Low, considering the precautionary principle, and the fact that there will still be some risk involved.

11.2.4 Potential Impact 7

Nature of impact 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.

Significance of impact without mitigation measures: Low, due to no research or information available in South Africa.

Proposed mitigation measures: Mitigation measures such as ultrasonic deterrents might be a viable option, especially for bats of the Molossidae family which are the most active on site.

Significance of impact with mitigation measures: Low, due to the precautionary principle.

11.2.5 Potential Impact 8

Nature of impact: Loss of habitat and foraging space during operation of the wind turbines.

Significance of impact without mitigation measures: High, due to the bat activity that is above threshold for succulent Karoo.

Proposed mitigation and measures: Project specific mitigation should be adhered to, as indicated in Section 11.2.1, especially adhering to the recommended buffer zones and sensitivity areas.

Significance of impact with mitigation measures: Moderate

B. INDIRECT

11.2.6 Potential Impact 9

Nature of impact 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.

Significance of impact without mitigation measures: High, due to the high bat activity on site.

Proposed mitigation and measures: Mitigation measures as described in 11.2.1.

Significance of impact with mitigation measures: Moderate

11.3 Decommissioning Phase

11.3.1 Potential Impact 10

<u>Nature of impact:</u> Bat disturbance due to decommissioning activities and associated noise, especially during night-time.

<u>Significance of impact without mitigation measures</u>: Low

<u>Proposed mitigation and measures</u>: Nightly decommissioning activities should be avoided, or if necessary, minimised to the shortest period possible. Except for compulsory lightning required in terms of civil aviation, artificial lightning during construction should be minimised, especially bright lights or spotlights. Lights should avoid skyward illumination.

<u>Significance of impact with mitigation measures:</u> Low with the recommended mitigation measures applied. Negligible when no night-time construction activities take place.

11.4 Foremost expected cumulative effects during the operational lifetime of the wind farm

It should be noted that even without the construction of the Komas Wind Energy Facility, it is anticipated that the potential cumulative impact will be the same, mainly due to the large areas of development and in particularly the back-to-back WEFs that are approved for development in the Springbok REDZ.

Information from WEFs where the reports are available have been taken into consideration for the potential cumulative impact assessment below.

A. DIRECT

11.4.1 Potential Impact 11

<u>Nature of impact:</u> Cumulative Effect of construction activities of several WEFs within a 50 km radius of the proposed Komas WEF over a period of time, see Section 8.

<u>Significance of impact without mitigation measures</u>: Moderate

<u>Proposed mitigation and measures</u>: 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.

<u>Significance of impact with mitigation measures:</u> Low, if all WEFs adhere to the recommended mitigation measures.

11.4.2 Potential Impact 12

<u>Nature of impact:</u> Cumulative bat mortality due to direct collision with the blades or barotrauma during foraging of resident bats on several WEFs within a 50 km radius of the proposed Komas WEF over a period, see Section 8.

Significance of impact without mitigation measures: High, due to the large area affected and the anticipated bat mortality that has shown to be associated with some WEFs in the Succulent Karoo biome. The main species recorded at the WEFs in the region are species of medium to high risk or high risk of fatality during wind farm operations. The significance of the impact will be amplified across the area if a significant number of bats are killed. Data from only one year of monitoring in semi-desert sporadic climate conditions as well as limited data from impact assessments done a while ago on other wind farms, cause for low confidence level, while the precautionary approach is applied.

Mitigation and Management: Although not enforceable on the applicant it is recommended that the project specific mitigation should be adhered to, especially adhering to 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.

Significance of impact with mitigation measures: Moderate, due to the uncertainty of all WEFs adhering to their mitigation measures. Also, it is anticipated that more WEFs will be constructed within the 50 km radius as the area falls within the Springbok REDZ.

11.4.3 Potential Impact 13

Nature of impact Cumulative bat mortality due to direct collision with blades or barotrauma during foraging of migrating bats on several WEFs within a 50 km radius of proposed Komas WEF over a period of time.

Significance of impact without mitigation measures: Moderate, due to large area, but a fairly low number of migrating species.

Mitigation and Management: Although not enforceable on the applicant it is recommended that the project specific mitigation measures should be adhered to and each WEF should apply specific mitigation measures as recommended in their specific assessments; also adhering to specific buffer zones and sensitivity areas for each renewable energy project. Post construction monitoring as per the relevant Bat Guidelines in South Africa is of crucial importance.

Significance of impact with mitigation measures: Low. Even though the number of migrating species recorded seems to be relatively low, there is low confidence levels due to limited research concerning migrating species and from limited data available from bat assessments and monitoring done years ago on other WEFs.

11.4.4 Potential Impact 14

Nature of impact: Cumulative Effect of habitat loss over several thousand hectares of land to be occupied by WEFs within a 50 km radius of the proposed Komas WEF site over a period of time.

Proposed mitigation and measures: Moderate, as the system will keep on functioning in a modified way.

Significance of impact with mitigation measures: Project specific mitigation should be adhered to, especially adhering to respective buffer zones and sensitivity areas, as identified for each renewable energy project.

Significance of impact with mitigation measures: Moderate, even with mitigation, there will still be habitat loss and effect on the space where bats are active.

B. INDIRECT

11.4.5 Potential Impact 15

Nature of impact Cumulative reduction in the size, genetic diversity, resilience, and persistence of bat populations due to several WEFs.

Significance of impact without mitigation measures: High, due to the large area to be affected and low threshold of Succulent Karoo.

Proposed mitigation and measures: Although not enforceable on the applicant it is recommended that the project specific mitigation should be adhered to and each WEF should apply specific mitigation measures as recommended in their respective Bat Impact Assessments. In addition, the respective buffer zones and sensitivity areas identified for each renewable energy project must be adhered to. Post construction monitoring as per the relevant Bat Guidelines in South Africa is of crucial importance.

Significance of impact with mitigation measures: Moderate

12. IMPACT ASSESSMENT SUMMARY

This section is a repetition of the impact assessment section (Section 11) where findings are summarised in table format.

Table 8: Impact assessment summary table for the Construction Phase

Construction Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Clearing and excavation of natural habitat	Active roost destruction and potential roost destruction	Negative	Site	Permanent	Substantial	Likely	Low reversibility	High Irreplaceable	▪ Keep construction out of high bat sensitive areas ▪ Avoid destruction of rock formations along southern ridge lines ▪ Avoid destruction of trees ▪ Take care before destroying dense bushes to avoid unnecessary roost destruction ▪ All aardvark holes, derelict holes or excavations should be carefully investigated for bat roosts before destruction	Moderate	Low	4	Medium
Excavation and building new structures	Creating new habitat amongst the turbines which might attract bats. This includes buildings with roofs that could serve as roosting space or open water sources from quarries or excavation where water could accumulate.	Negative	Site	Long-term	Substantial	Likely	High Reversibility	Replaceable	▪ 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 one-by-one centimeters. ▪ 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.	Moderate	Very Low	5	High
Construction activities	Construction noise, especially during night-time	Negative	Site	Short term	Low	Likely	Reversible	Replaceable	▪ Nightly construction activities should be avoided, or if necessary, minimised to the shortest period possible. ▪ With the exception of compulsory civil aviation lightning, artificial lightning 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.	Moderate	Low	4	High

Table 9: Impact assessment summary table for the Operational Phase

Operational Phase												
Direct Impacts												
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Turning of the turbine blades	Fatality of resident bats through direct collision or barotrauma	Negative	Local	Long-term	Substantial	Very likely	Low	Low	▪ All turbines and turbine components, including the rotor swept zone, should be kept out of all high bat sensitivity areas. ▪ Mitigation as proposed in Section 9.2, Table 7, should be applied from the start of the turbines for the site as a whole. ▪ Mitigation as proposed for Medium to high sensitivity zones, Section 9.2, Table 8, must be adhered to as from the start of the turbines ▪ Careful observation should take place during post-construction and mitigation should be discussed between the bat specialist and developer. Mitigation should be adapted and implemented without delay. Where high bat mortality occurs, those turbines should be mitigated, using Section 9.2, Table 8, as a starting point for discussions. ▪ With the exception of 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. ▪ At least two years of post-construction bat monitoring is to be conducted and must be performed according to the South African Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy facilities (Aronson, et.al., 2020) or later versions 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 monitoring equipment for bats 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 fatality records of the wind farm; therefore, the installation of more than one monitoring system at height, will be recommended. ▪ Ultrasound should be investigated for use at turbines displaying high mortality.	High	Moderate	3	Medium
Turning of the turbine blades	Bat fatality of migratory species	Negative	Site	Long-term	Moderate	Likely	Moderate	Moderate	Mitigation measures as described in Section 11.2.1.	Low	Low	4	Low
Turning of the turbine blades	Loss of bats of conservation value	Negative	Site	Long-term	Moderate	Likely	Moderate	Moderate	Mitigation measures as described in Section 11.2.1. Further mitigation measures should immediately be applied when mortality of bats with high conservation value occur.	Low	Low	4	Medium

Turning of the turbine blades	Bat fatality due to the attraction of bats to turbine blades	Negative	Site	Long-term	Moderate	Likely	Moderate	Moderate	Investigate ultrasonic deterrents and implement at turbines with high fatality	Low	Low	4	Low
Turning of the turbine blades	Loss of habitat and foraging space during operation of the wind turbines	Negative	Local	Long-term	Substantial	Very likely	High	High	Mitigation measures as described in Section 11.2.1	High	Moderate	3	High

Operational Phase													
Indirect Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Turning of the turbine blades	Reduction in size, genetic diversity, resilience, and persistence of bat populations	Negative	Local	Long-term	High	Likely	Low	Low	Mitigation measures as described in Section 11.2.2	High	Moderate	3	Medium

Table 10: Impact assessment summary table for the Decommissioning Phase

Decommissioning Phase													
Direct Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Removal of turbines	Decommissioning activities and noise, especially at night-time	Negative	Site	Short term	Low	Very Likely	High	High	▪ Nightly decommissioning activities should be avoided, or if necessary, minimised to the shortest period possible. ▪ Artificial lightning during decommissioning should be minimised, especially bright lights or spotlights. ▪ Lights should avoid skyward illumination.	Low	Very Low	5	High

Table 11: Cumulative impact assessment summary table

Cumulative Impacts													
Construction phase (Direct)													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Construction activities	Cumulative effect of destruction of active roost of several wind farms as well as features that could serve as potential roosts	Negative	Regional	Long-term, until all wind farms are decommissioned	Substantial	Likely	Low	High	▪ Project specific mitigation should be adhered to, especially adhering to buffer zones and sensitivity areas and recommended mitigation, for each renewable energy project. ▪ Post construction monitoring as per the relevant South African guidelines.	Moderate	Low	4	Low

Cumulative Impacts													
Operational Phase (Direct)													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Several thousand hectares containing turning turbine blades	Cumulative bat mortality of resident bats due to direct blade impact or barotrauma during foraging of migrating bats on several wind farms	Negative	Regional	Long-term, until all wind farms are decommissioned	Severe	Likely	Low	Moderate	▪ Although not enforceable on the applicant it is recommended that the project specific mitigation should be adhered to and each wind farm should apply specific mitigation measures as recommended. ▪ Although not enforceable on the applicant it is recommended that the buffer zones and sensitivity areas should be adhered to and recommended mitigation, for each renewable energy project. Post construction monitoring as per the relevant guidelines in South Africa. ▪ Post construction monitoring as per the relevant guidelines in South Africa.	High	High	2	Low
Several thousand hectares containing turning turbine blades	Cumulative bat mortality of migrating bats due to direct blade impact or barotrauma during foraging of migrating bats on several wind farms	Negative	Regional	Long-term, until all wind farms are decommissioned	Substantial	Likely	Low	Moderate	▪ Although not enforceable on the applicant it is recommended that the project specific mitigation should be adhered to and each wind farm should apply specific mitigation measures as recommended. ▪ Although not enforceable on the applicant it is recommended that the buffer zones and sensitivity areas should be adhered to and recommended mitigation, for each renewable energy project. Post construction monitoring as per the relevant guidelines in South Africa. ▪ Post construction monitoring as per the relevant guidelines in South Africa.	Moderate	Low	4	Low
Several wind farms stretching over thousands of hectares	Habitat loss over several wind farms	Negative	Regional	Long-term, until all wind farms are decommissioned	Substantial	Very Likely	High	Low	▪ Although not enforceable on the applicant it is recommended that the project specific mitigation should be adhered to, especially adhering to buffer zones and sensitivity areas and recommended mitigation, for each WEF. ▪ Post construction monitoring as per the relevant guidelines in South Africa.	Moderate	Low	4	Low

Cumulative Impacts													
Operational Phase (Indirect)													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Several wind farms with the associated bat mortality over the lifespan of wind energy facilities	Cumulative reduction in the size, genetic diversity, resilience and persistence of bat populations	Negative	Regional	Long-term, until all wind farms are decommissioned	Substantial	Likely	Low	Moderate	▪ Although not enforceable on the applicant it is recommended that the project specific mitigation should be adhered to and each wind farm should apply specific mitigation measures as recommended. ▪ Although not enforceable on the applicant it is recommended that the buffer zones and sensitivity areas should be adhered to and recommended mitigation, for each renewable energy project. Post construction monitoring as per the relevant guidelines in South Africa. ▪ Post construction monitoring as per the relevant guidelines in South Africa.	High	Low	4	Low

13. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
DESIGN PHASE					
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. Maintain buffers around these sensitive areas	Ensure that high sensitivity areas are identified and excluded from turbine placement and sensitive areas should be avoided to as No-go areas during the planning and design phase.	Prior to construction during design and planning phase.	Project Developer
	Mitigate impacts leading to bat population decline in future project phases	Conduct one year of bat monitoring at height.		Prior to construction	Project Developer
	Prevent bat activity in sensitive areas.	Minimise artificial light at night.	Choice of lights and light placement is crucial.	Final design	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 250m apart from blade tip to blade tip.	Final layout design	During design and Prior to construction commences.	Project Developer
	Avoid Habitat loss and destruction caused clearing vegetation for the working areas, construction and landscape modifications.	▪ Appoint an ECO to oversee the EMPr is adhered to. ▪ Clearing and removal of natural vegetation should be kept to a minimum. ▪ Provide sufficient drainage along access roads to prevent erosion and pollution. ▪ Use existing road networks as far as possible and ensure no off-road driving.	▪ Monitor the efficiency of the EMP. ▪ Monitor whether proposed measures are adhered to. ▪ ECO should be trained to recognize bat species and roost locations. ▪ If buildings, trees or structures providing potential roosts need to be demolished, a specialist visit is required prior to commencement of the works.	▪ During construction phase. ▪ ECO should be trained before construction commences. ▪ Erosion and pollution monitoring during construction phase. ▪ Monitoring of off-road driving	▪ Project Developer ▪ Bat specialist should train the ECO.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
				during construction phase. ▪ Natural vegetation removal monitoring during construction phase.	
CONSTRUCTION PHASE					
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 along southern ridge lines ▪ Avoid destruction of trees ▪ Take care before destroying dense bushes to avoid unnecessary roost destruction. ▪ All aardvark holes, derelict holes or excavations should be carefully ▪ investigated for bat roosts before destruction.	▪ Adhere to No-go areas incorporated into the Final Layout. ▪ Appoint an independent ECO to oversee that the EMP is being adhered to. ▪ Bat specialist to train ECO, if necessary, to identify possible bat roosts or signs of bat presence. ▪ Clearance and removal of natural vegetation should be kept to a minimum. ▪ Avoid pollution of water courses. ▪ No off-road driving.	Visual inspection and continuous monitoring of high sensitivity areas, erosion prevention, chemical pollution and vehicle activity to prevent habitat destruction.	▪ Throughout construction ▪ ECO to be present during all site clearance activities ▪ Access to bat specialist if ECO needs information or confirmation concerning bat presence	▪ Project Developer. ▪ Holder of EA to appoint ECO. ▪ Appointed bat specialist to train the ECO, if necessary.
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.	Prevent bats from roosting in high-risk areas close to turbines and infrastructure.	Inspect all buildings and infrastructure for possible roosting opportunities.	Seal off roofs of buildings to prevent bat roosting.	Throughout construction phase	Project Developer and ECO.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
Construction noise, especially during night-time.	Prevent disturbance to bat activity and behaviour.	Noise levels should be prevented as far as possible.	▪ Monitor construction to reduce noise and minimise disturbance in bat sensitive areas. ▪ Avoid construction activities at night.	Throughout construction phase.	Project Developer and all on-site personnel.
OPERATIONAL PHASE					
Fatality of resident bats through direct collision or barotrauma.	Monitor potential impacts on bats during operation of wind farm.	Maintain a register of action taken regarding bat mortality/injury as well as queries or complaints.	Monitoring reports.	Throughout operation.	Project Developer
Bat fatality of migratory species.	Prevent activities that will attract bats to high-risk areas on site.	Lighting of WEF should be kept to a minimum and directed downwards.	Monitor bat fatalities.	During operation.	Project Developer
		Post-construction bat monitoring to determine the most effective cut-in speed for turbines on site. Implement curtailment and feathering mitigation measures and select the cut-in speed that demonstrates a significant reduction in bat mortality as the default cut-in speed during periods of peak bat activity on site.	Monitoring reports and schedules.	During operations.	Project Developer
Loss of bats of conservation value.	Monitor potential impacts on bats during operation of wind farm. Prevent activities that will attract bats to high-risk areas on site.	Bat fatalities should be monitored by fatality searches and a record kept of date, time, location, sex, cause of death. Carcasses should be photographed to be used for searcher efficiency and carcass removal trails.	Bat carcass records.	During operations.	Project Developer
Bat fatality due to the attraction of bats to turbine blades.	Prevent activities that will attract bats to turbines.	Develop an adaptive mitigation plan based on results from post-construction monitoring to modify the cut-in speed and hours of curtailment of selected turbines.	Adaptive mitigation plan.	Monthly during operations.	Project Developer
Loss of habitat and foraging space during operation of the wind turbines.	Monitor potential impacts on bats during operation of wind farm. Prevent activities that will attract bats to high-risk areas on site.	Buffer sensitive habitat and foraging areas and where possible minimise lighting on turbines that could attract insects and bats.	Adaptive mitigation plan.	During operations.	Project Developer and ECO
Reduction in size, genetic diversity, resilience, and	Monitor potential impacts on bats during operation of wind	Follow mitigation recommendations to prevent bat population reduction during operation phase.	Adaptive mitigation plan.	During operations.	Project Developer and ECO.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
persistence of bat populations.	farm. Prevent activities that will attract bats to high-risk areas on site.				
DECOMMISSIONING PHASE					
Decommissioning activities and noise, especially at night-time.	Mitigate disturbance due to decommissioning activities.	Develop a decommissioning and remedial rehabilitation plan and adhere to compliance monitoring plan.	Implement the decommissioning and rehabilitation plan to reduce the footprint of the development to pre-construction state.	During decommissioning phase.	Project Developer and commitment from all levels of management.

14. CONCLUSION AND RECOMMENDATIONS

Twelve bat species have distribution ranges overlapping with the proposed Komas WEF development area. Seven of these were detected on the proposed Komas WEF site itself or the surrounding area and were confirmed with static bat monitoring systems during specialist visits. These include *Miniopterus natalensis, Neoromicia capensis, Eptesicus hottentotus, Sauromys petrophilus, Tadarida aegyptiaca, Nycteris thebaica* and *Rhinolophus clivosus*. The bat specialist observed *Cistugo seabrae* just north east of Kleinsee, which confirms its presence in the wider area. Fruit bats were not considered a risk in the dry Kleinsee area, but due to the droppings found at the Zonnekwa farm dwelling, are now considered to be a risk species in the area.

Four static monitoring systems were deployed at the proposed Komas WEF site, two at the Met mast, one at 110 m and one at 20 m, and two temporary masts of 10 m. Passive monitoring data was collected between 10 August 2019 and 23 September 2020, representing the four seasons of the year. Seasonal transects were conducted, but limited bat activity was recorded during transect sessions.

According to the likelihood of fatality risk, as indicated by The South African Good Practice Guidelines for Surveying Bats in Wind Farm Development - Pre-construction (Sowler et. al. 2017), *Tadarida aegyptiaca* (Egyptian free-tailed bat of the *Molossidae* family) is the most dominant species on site, with nearly all the calls recorded at the high monitoring system, situated within the rotor swept area of the proposed turbine blades. These are high risk bats as they are adapted to foraging at high altitudes. Limited activity has been recorded by *M. natalensis*; the only red data species noted at the proposed Komas WEF site. Although the Molossidae species, *T. aegyptiaca* and *S. petrophilus*, have a conservation status of Least Concern, abundant species are valuable to local ecosystems as their contribution to ecological services is greater due to their high numbers.

The extent to which bats may be affected by the proposed Komas wind farm will depend on the extent to which the proposed development area is used for foraging or as a flight path by local bats. The most important aspect of the project that would affect bats adversely is the wind turbines themselves, and direct collisions and barotrauma because of operational turning blades. Some of the other main potential negative impacts to bats include loss of foraging habitat, loss of existing and potential roosts and attracting bats by artificially creating new bat conducive areas.

During the pre-construction monitoring period, the nightly mean bat activity was higher than the highest threshold figures for Succulent Karoo for the site as a whole. Therefore, bat populations might be severely negatively impacted upon by the proposed Komas WEF development, should the development progress without the implementation of the recommended mitigation measures. The monitoring system stationed at high altitude (110 m) was used to plot bat activity and weather conditions to describe the relationship between bats and weather conditions on site, in particular the activity within the rotor swept area of the turbine blades. This information was used to develop a mitigation scheme for the proposed Komas WEF.

The mean number of bats per hour per year for the combined proposed Komas WEF as well as the surrounding authorised wind farms, are calculated at 0,18. According to the threshold levels of The South African Good Practice Guidelines for Surveying Bats in Wind Farm Development - Pre-construction (Sowler *et al*., 2017), this Bat Index is classified as high. More so if one considers that most bats are high risk species. It is therefore evident that due to the large area and the bat activity for the Succulent Karoo biome, the cumulative effect would be high. If mitigation is diligently conducted at all wind farms, this impact could be reduced.

All bat species observed at the proposed Komas WEF site were more active between February and May, with a peak in activity around March 2020. High bat activity was also observed in September 2020, during spring. The highest bat activity was recorded in the southern section of the farm. In general, bats seem to be active from about two hours after sunset, while a gradual decline of activity is shown from 0:00 to sunrise.

All turbines components should be excluded from the no-go these areas as indicated on the bat sensitivity map. The revised turbine layout avoids these areas. Mitigation is recommended, as per Section 9.2, for the turbines situated within the medium-high zones. The remainder of the proposed Komas WEF site is classified as of medium sensitivity and it is recommended that mitigation measures (such as feathering of blades parallel with wind direction) are applied so that blades turn at very low rotation and minimal movement (not complete standstill) to prevent bat fatalities during conditions when power is not generated.

The following mitigation measures are proposed:

- Curtailment to be implemented as specified in Section 9.2, Table 7 immediately from the onset of the turbines situated within the medium-high 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 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 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, but due to the general high Bat Index, it is likely that more stringent mitigation might need to be implemented.

The turbine layout was updated following specialist input to avoid environmentally sensitive areas. Alternatives have been provided for the proposed on-site substation and Battery (BESS) complex laydown areas for the proposed Komas WEF (Option 1 and Option 2), with Option 1 selected as the preferred option from a bat perspective.

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. These changes could result in changes in the bat activity and occurrence which have not been accounted for in this report. If the proponent adheres to the proposed mitigation measures, the potential impact on bats from the proposed Komas Wind Farm is predicted to be Negative and of Moderate significance. **It is therefore the opinion of the bat specialist, based on the one-year pre-construction monitoring undertaken at the proposed Komas WEF site, that EA may be granted to the proposed Komas WEF development.**

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APPENDIX 1: PROJECTS CONSIDERED FOR THE CUMULATIVE ASSESSMENT

Renewable energy developments proposed within a 50 km radius of the proposed Komas WEF development

DEA REFERENCE NUMBER	PROJECT TITLE	APPLICANT	EAP	TECHNOLOGY	MEGAWATT	STATUS
12/12/20/2331/1 12/12/20/2331/1/AM1 12/12/20/2331/2 12/12/20/2331/3	Project Blue Wind Energy Facility Near Kleinsee within the Namakwa Magisterial District, Northern Cape Province. (Phase 1-3)	Diamond Wind (Pty) Ltd	Savannah Environmental Consultants (Pty) Ltd	Wind and Solar PV	150 MW Wind 65 MW Solar PV	Approved
12/12/20/2212	Proposed 300 MW Kleinzee WEF in the Northern Cape Province.	Eskom Holdings SOC Limited	Savannah Environmental Consultants (Pty) Ltd	Wind	300 MW	Approved
14/12/16/3/3/2/1046	The proposed Kap Vley WEF and its associated infrastructure near Kleinzee, Nama Khoi Local Municipality, Northern Cape Province.	Kap Vley Wind Farm (Pty) Ltd	Council for Scientific and Industrial Research	Wind	300 MW	Approved
14/12/16/3/3/1/1971	Proposed Namas Wind Farm near Kleinsee, Namakwaland Magisterial District, Northern Cape.	Genesis Namas Wind (Pty) Ltd	Savannah Environmental Consultants (Pty) Ltd	Wind	140 MW	Approved
14/12/16/3/3/1/1970	Proposed Zonnequa Wind Farm near Kleinsee, Namakwaland Magisterial District, Northern Cape.	Genesis Zonnequa Wind (Pty) Ltd	Savannah Environmental Consultants (Pty) Ltd	Wind	140 MW	Approved
12/12/20/2154	Proposed construction of the 7.2 MW Koingnaas Wind Energy Facility Within The De Beers Mining Area on the Farm Koingnaas 745 near Koingnaas, Northern Cape Province.	Just PalmTree Power Pty Ltd	Savannah Environmental Consultants (Pty) Ltd	Wind	7.2 MW	Approved
12/12/20/1807	Proposed establishment of the Kannikwa Vlakte wind farm.	Kannikwa Vlakte Wind Development Company Pty Ltd	Galago Environmental cc	Wind	120 MW	Approved
12/12/20/1721	The proposed Springbok Wind	Mulilo Springbok	Holland &	Wind	55.5 MW	Approved

DEA REFERENCE NUMBER	PROJECT TITLE	APPLICANT	EAP	TECHNOLOGY	MEGAWATT	STATUS
12/12/20/1721/AM1 12/12/20/1721/AM2 12/12/20/1721/AM3 12/12/20/1721/AM4 12/12/20/1721/AM5	Energy facility near Springbok, Northern Cape Province.	Wind Power (Pty) Ltd	Associates Environmental Consultants			
TBA	The proposed Gromis WEF and associated infrastructure near Kleinsee in the Northern Cape Province.	Genesis ENERTRAG Gromis Wind (Pty) Ltd	Council for Scientific and Industrial Research	Wind	200 MW	In process
14/12/16/3/3/1/416	Nigramoep Solar PV Solar Energy Facility on a site near Nababeep, Northern Cape.	South African Renewable Green Energy (Pty) Ltd	Savannah Environmental Consultants (Pty) Ltd	Solar PV	20 MW	In process

APPENDIX 2: FEEDBACK FROM THE SOUTH AFRICAN BAT ASSESSMENT ASSOCIATION (SABAA) RELATING TO THE LOSS OF BAT DATA AT THE KOMAS WEF SITE AT HEIGHT (110 M MET MAST)

The South African Bat Assessment Association

8th September 2020

Stephanie Dippenaar
Stephanie Dippenaar Consulting
Stellenbosch, 7600
sdippenaar@snowisp.com
Mobile: +27 82 2005244

Dear Stephanie,

DATA LOSS AT KOMAS WIND ENERGY FACILITY (WEF) AT HEIGHT DURING BAT MONITORING

In response to your query about the loss of data between December 2019 and May 2020 from the 110 m met mast monitoring station at Komas WEF (during the COVID-19 lockdown), SABAA agrees it is not necessary to delay the Basic Assessment process providing the following data be taken into consideration to compile the bat monitoring report:

- data from the three other monitoring systems, monitoring at heights between 10 m and 20 m, which were fully functional at the proposed Komas WEF site
- data from the 110 m met mast microphone, situated 2.8 km from the Komas WEF site border, in the same biotope and running concurrently with the Komas WEF bat monitoring
- data from the 2018 Kap Vley WEF bat monitoring, where the met mast was situated within 1 km south of the southern border of the Komas WEF site

Provided these data are complete and available they should be sufficient to make an informed decision on the sensitivity of the site.

We understand the client has agreed that the system recording at 110 m on the Komas WEF met mast can continue to collect data as the met mast will not be dismantled. This extra data will then be collected from height and will not replace the lost autumn data, but will feed into the EMPR and operational protocol.

SABAA would like the opportunity to review the BA and specialist reports as an I&AP before the authorisation is granted.

Best wishes,

Kate Richardson

email: ejrichardson@worldonline.co.za

The South African Bat Assessment Association (SABAA) is non-governmental organization of specialist consultants, academics, related NGO representatives, regulatory authorities and an industry representative to ensure that development in South Africa has the least possible impact on bats and that bat assessments are of a high scientific standard.

www.sabaa.org.za *52 Bowen Ave, Glenmore, Durban 4001* *info@sabaa.org.za*

The South African Bat Assessment Association

20th October 2020

Stephanie Dippenaar
Stephanie Dippenaar Consulting
Stellenbosch, 7600
sdippenaar@snowisp.com
Mobile: +27 82 2005244

Dear Stephanie,

DATA LOSS AT KOMAS WIND ENERGY FACILITY (WEF) AT HEIGHT DURING BAT MONITORING

In response to your query about the loss of data between December 2019 and May 2020 from the 110 m met mast monitoring station at Komas WEF (during the COVID-19 lockdown), and the additional loss until September 2020 (due to equipment failure), SABAA agrees it is not necessary to delay the Basic Assessment process providing the following data be taken into consideration to compile the bat monitoring report:

1. Data from the three other monitoring systems, monitoring at heights between 10 m and 20 m, which were functional at the proposed Komas WEF site.
2. Data from the 110 m met mast at the Gromis WEF site, 13.7 km south of the Komas met mast and 6.5 km from the Komas WEF southern border.
3. Data from the 2018 Namas WEF met mast, situated approximately 9.7 km west of the Komas met mast and in the same biotope as the Komas met mast.
4. Data from the 2018 Kap Vley WEF met mast, situated approximately 8 km south east of the Komas met mast.

Provided these data are complete to the level required by the South African Bat Assessment Guidelines for Pre-Construction Monitoring (http://www.sabaa.org.za/documents/SABAA_Pre-construction_Bat_Monitoring_Guidelines_5thEd_June2020.pdf) and available to use they should be sufficient to make an informed decision on the sensitivity of the site.

We understand the client has agreed that the system recording at 110 m on the Komas WEF met mast can continue to collect data as the met mast will not be dismantled. This extra data will then be collected from height and will not replace the lost autumn data, but will feed into the EMPR and operational protocol.

SABAA would like the opportunity to review the BA and specialist reports as an I&AP before the authorisation is granted.

Best wishes,

Kate Richardson

email: ejrichardson@worldonline.co.za, info@sabaa.org.za

The South African Bat Assessment Association (SABAA) is non-governmental organization of specialist consultants, academics, related NGO representatives, regulatory authorities and an industry representative to ensure that development in South Africa has the least possible impact on bats and that bat assessments are of a high scientific standard.

www.sabaa.org.za *52 Bowen Ave, Glenmore, Durban 4001* *info@sabaa.org.za*

APPENDIX 3: SPECIALIST DECLARATION

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

Basic Assessment for the proposed Komas Wind Energy Facility and associated infrastructure near Kleinsee in the Northern Cape Province

Kindly note the following:

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

Departmental Details

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

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

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

1. SPECIALIST INFORMATION

Specialist Company Name:	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 C Dippenaar			
Specialist Qualifications:	MEM (Masters in Environmental Management)			
Professional affiliation/registration:	SAIEES (Southern African Institute for Ecologists and Environmental Scientists)			
Physical address:	8 Florida Street, Stellenbosch			
Postal address:	8 Florida Street, Stellenbosch			
Postal code:	7600		Cell:	082 200 5244
Telephone:	082 200 5244		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:

6 October 2020

Date

Details of Specialist, Declaration and Undertaking Under Oath

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

6 October 2020

Date

Sgt.

Signature of the Commissioner of Oaths

SUID-AFRIKAANSE POLISIEDIENS
STASIE BEVELVOERDER
STELLENBOSCH
2020 -10- 06
STELLENBOSCH
STATION COMANDER
SOUTH AFRICAN POLICE SERVICE

2020-10-06

Date

APPENDIX 4: BAT SPECIALIST CV

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

Member of the Southern African Institute of Ecologists and Environmental Scientists (SAIEES), since 2002.

SACNASP registration in process.

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, contracted by Voice of America, 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.
- 2011 onwards: Sole proprietor private consultancy;
- 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.

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 Patatskloof, Ceres	Bat specialist
In progress	Preconstruction Bat monitoring at Kareerivier, Ceres	Bat specialist
In progress	Operational bat monitoring at Excelsior wind energy facility	Bat specialist
In progress	Preconstruction Bat monitoring at Koup 1 and Koup 2	Bat specialist
In progress	Preconstruction bat monitoring for two wind energy facilities at Kleinzee	Bat specialist
In progress	Preconstruction bat monitoring at Komas and Gromis Wind Farms, Kleinsee	Bat specialist
In progress	Preconstruction Bat monitoring at Kappa 1 and 2 Wind Farms, Touwsrivier	Bat specialist
2020	Operational bat monitoring at Khobab Wind Farm, Loeriesfontein	Bat specialist
2020	Operational bat monitoring at Loeriesfontein 2 Wind Farm	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	Bat specialist
2019	Preconstruction bat impact assessment for the Bosjesmansberg WEF, Copperton	Bat specialist
2018	Preconstruction Bat Monitoring at the Tooverberg Wind Energy Facility, Touwsrivier	Bat specialist
2016	Bat “walk through” for the Hopefield Powerline associated with the Hopefield Community WEF	Bat specialist
2016	Environmental Management Plan for Elephants in Captivity at the Elephant Section, Camp Jabulani, Kapama Private Game Reserve.	Project Manager
2016	Environmental Management Plan for Hoedspruit Endangered Species Centre, Kapama Game Reserve.	Project Manager
2012-2013	Bat impact assessment for the Karookop Wind Energy Project EIA.	Bat specialist
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

Completion	Project description	Role
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✞
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

- Member of the South Africa Bat Assessment Association.
- 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, May2010.

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.

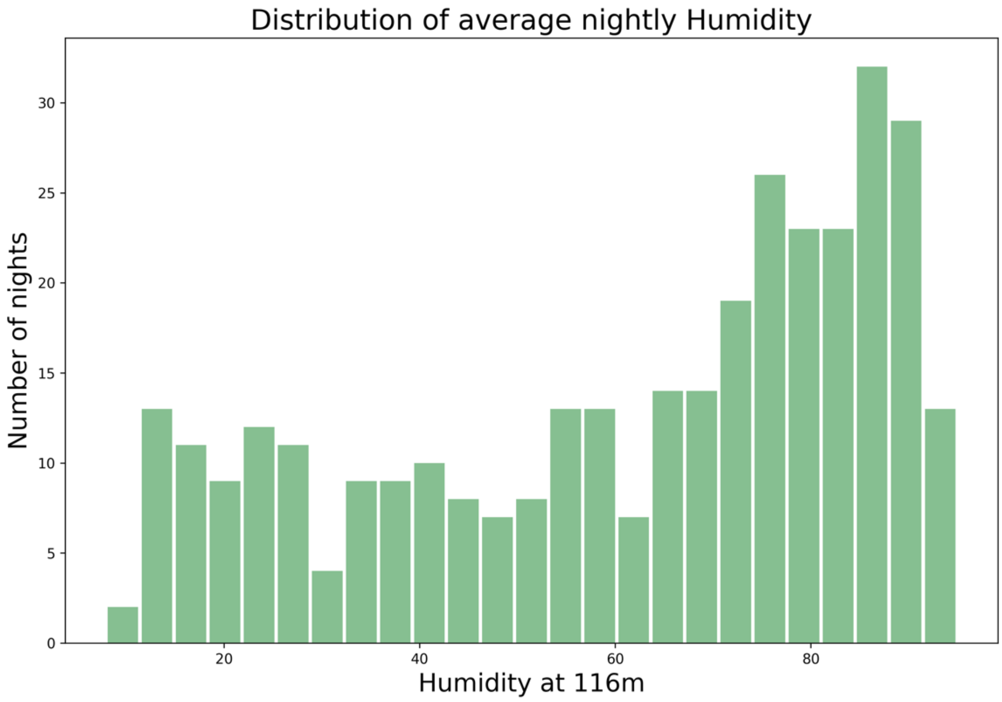
REFERENCES

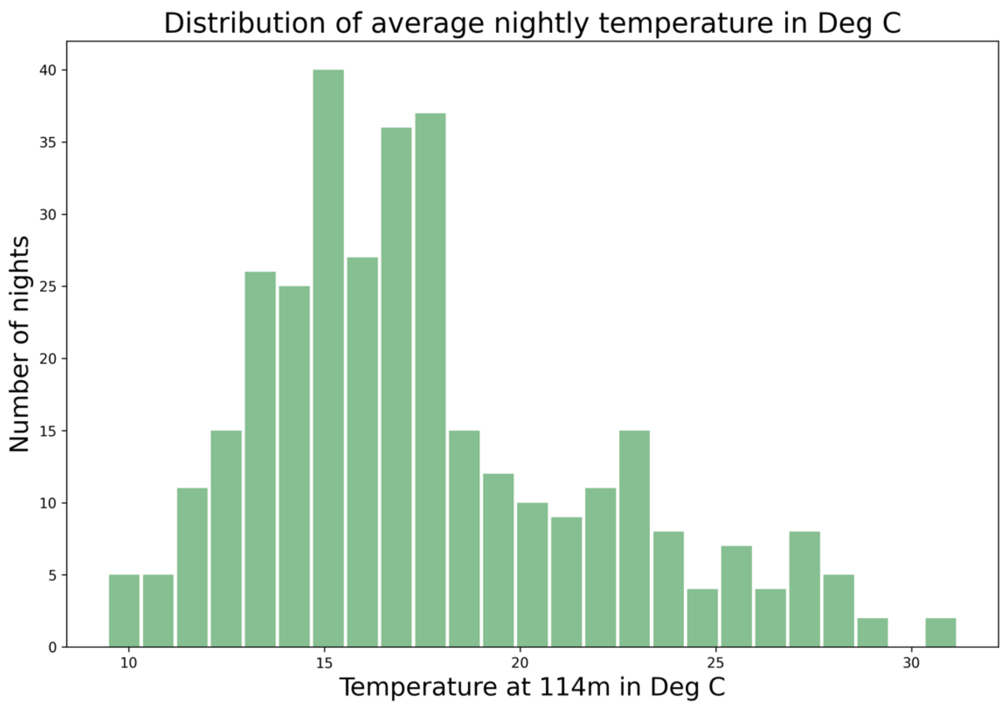
Chris van Rooyen **Bird specialist: Director of Afrimage Photography trading as Chris van Rooyen Consulting** ***Contact Details:*** **Email: vanrooyen.chris@gmail.com** **Mobile: +27824549570**	*Brent Johnson* **Vice President: Environment at Dundee Precious Metals** ***Contact Details:*** **email: b.johnson@dundeeprecious.com** **Office: +264672234201** **Mobile: +264812002361**

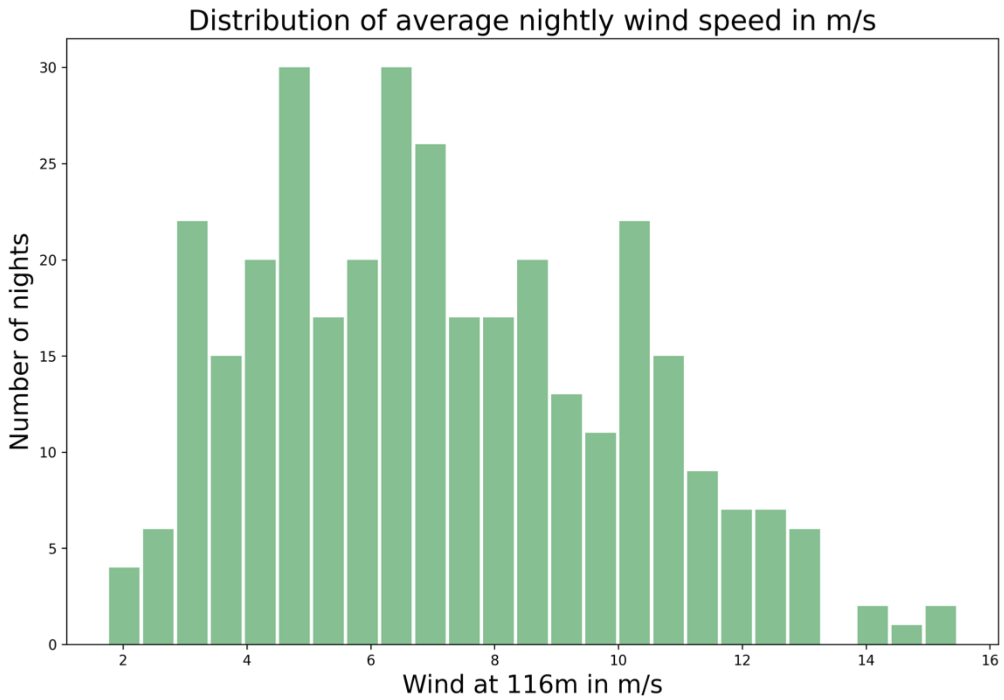
APPENDIX 5: WEATHER DISTRIBUTION GRAPHS

Weather at the Komas WEF site: Weather distribution graphs

Inus Grobler




Distribution of average nightly temperature in Deg C
Number of nights
Temperature at 114m in Deg C
0
5
10
15
20
25
30
35
40
10
15
20
25
30


Distribution of average nightly wind speed in m/s
Number of nights
Wind at 116m in m/s
0
5
10
15
20
25
30
2
4
6
8
10
12
14
16

Weather Summary Statistics:

Total of 339 days between 09/08/2019 and 12/07/2020.

	Mean (Average)	Min	Max	Median
humidity_116m	61.52%	7.91%	94.98%	70%
temp_114m	17.58 Deg C	9.45 Deg C	31.18 Deg C	16.77 Deg C
wind_116	7.15 m/s	1.74 m/s	15.48 m/s	6.8 m/s

APPENDIX 6: SITE SENSITIVITY VERIFICATION

This site sensitivity verification was undertaken in terms of Part A of the Assessment Protocols published in Government Notice NO. 320 in Government Gazette NO. 43110 on 20 March 2020.

This report serves as the Site Sensitivity Verification for Bats for the Basic Assessment (BA) for the proposed development of the Komas Wind Energy Facility and associated Infrastructure near Kleinsee in the Northern Cape Province. The site sensitivity verification was undertaken in order to confirm or dispute the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (Screening Tool).

The details of the site sensitivity verification are noted below:

Date of Site Visit	9-11 August 2019, 23-25 November 2019, 21 - 24 September 2020
Specialist Name	Stephanie Dippenaar
Professional Registration and Number	Professional member of Southern African Institute for Ecologists and Environmental Scientists
Specialist Affiliation / Company	Stephanie Dippenaar Consulting

It should be noted that only the area that were to be developed by wind energy was investigated; Thus, the north western corner, not earmarked for wind development, was not part of the bat study area and cannot be verified.

<u>Methodology</u>

The screening tool was applied to the study area and the greater part of the site was classified as an area of medium bat sensitivity (Figure A). In order to verify this classification, the following methods were applied during the 13-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 13 months from four static monitoring points, which were positioned amongst the proposed turbine blades as well as at 10 m altitude. The latter was positioned in all the different biotopes.
- Interviews with landowners and investigations of farm dwellings were conducted.

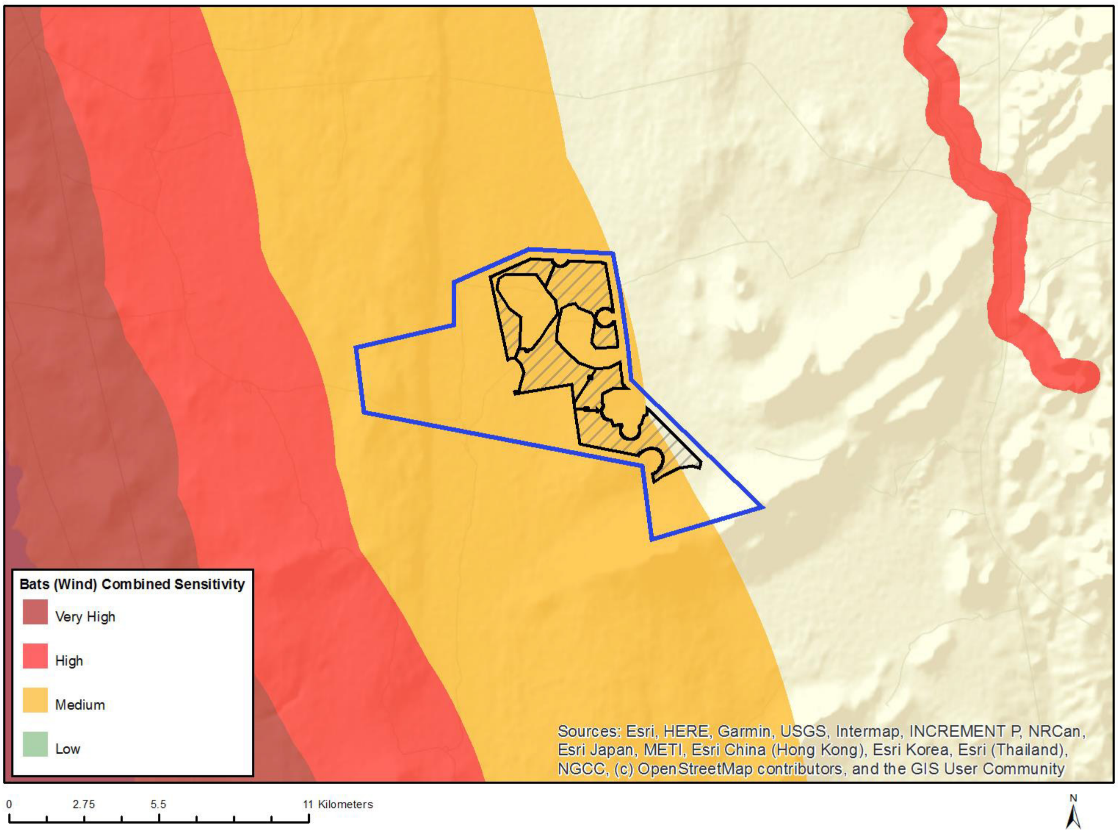


Figure A: Parts of the proposed Gromis WEF site are identified to be of Medium bat sensitivity (National Web-Based Environmental Screening Tool).

Outcome of the Site sensitivity verification

While Medium sensitivity is appropriate for the greater part of the site; areas in the south, associated with the koppies, indicate wide spread bat presence and were classified as no-go areas. Open water sources, such as reservoirs and livestock drinking troughs, are also classified as small pockets of no-go, as these are used by bats to drink water. A small section of the north western area portrays relative higher bat activity, associated with Namaqualand Salt Pans vegetation zones (SANBI, 2012), and was classified as medium-high. See Figure B below, Section 3.6.2 for photos indicating bat conducive features and bat presence.

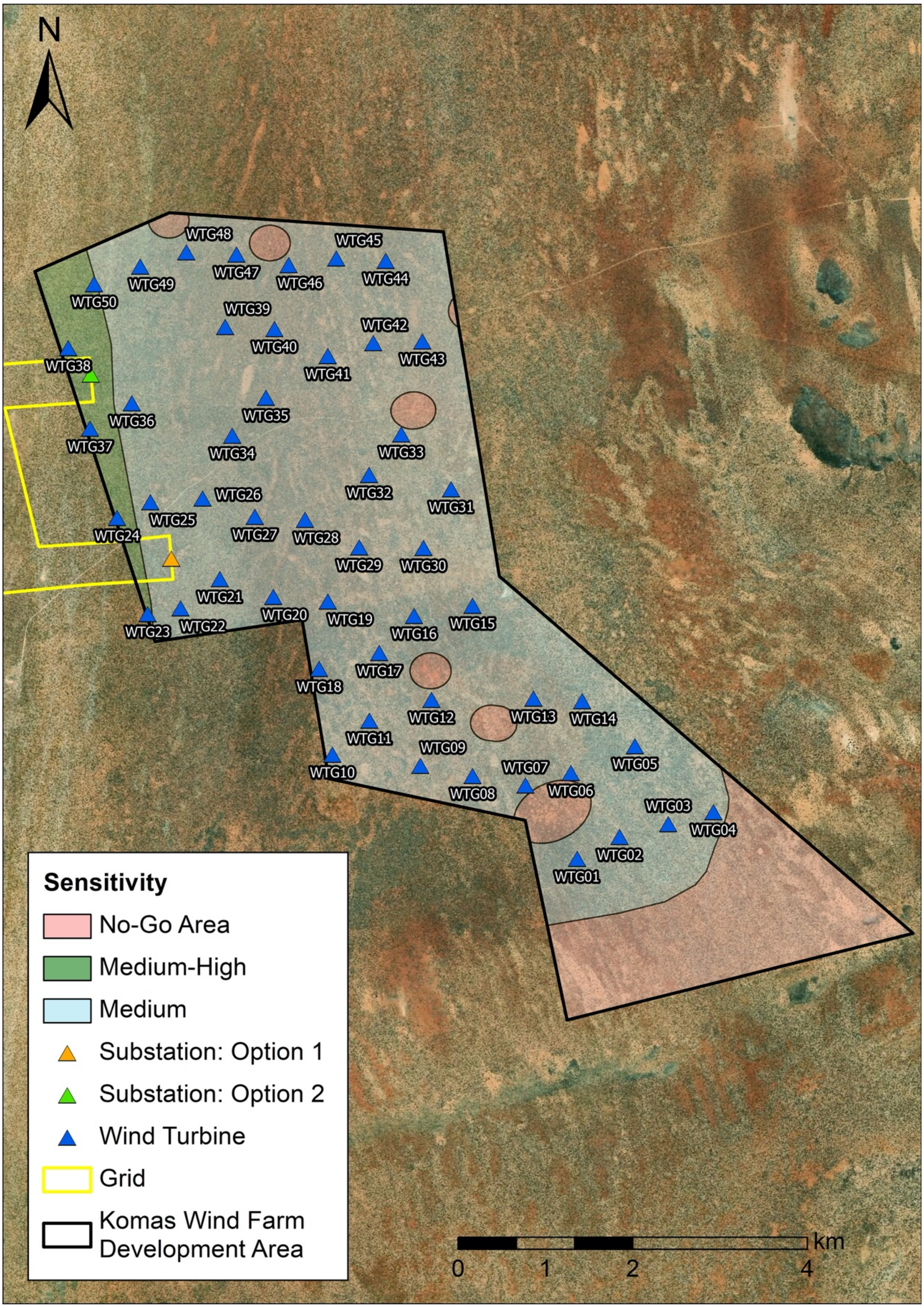


Figure B: Bat sensitivity identified in the Bat Impact Assessment for the proposed Komas WEF

Conclusion

The Screening Tool sensitivity is thus correct for the greater part of the site (i.e. mostly Medium) but is inaccurate in the southern part and the north western corner which have been identified respectively as areas of No-go and Medium-High sensitivity in this Bat Impact Assessment. A more in-depth discussion supporting this conclusion, is presented in Section 7 of the present report.