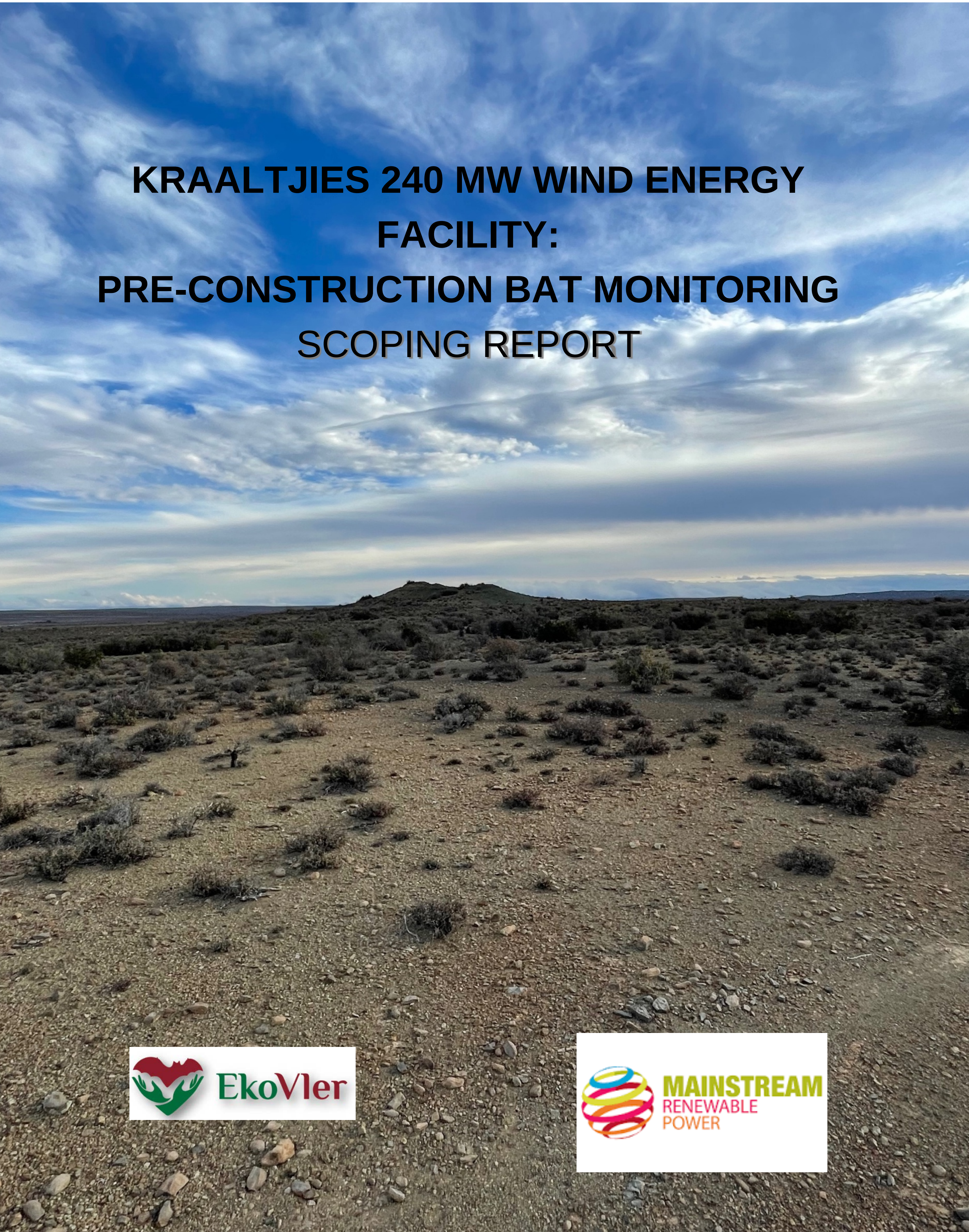
KRAALTJIES 240 MW WIND ENERGY FACILITY:

PRE-CONSTRUCTION BAT MONITORING

SCOPING REPORT



EkoVler

MAINSTREAM RENEWABLE POWER

KRAALTJIES 240 MW WIND ENERGY FACILITY: PRE-CONSTRUCTION BAT MONITORING

BAT SCOPING REPORT

October 2022

Prepared for: **South Africa Mainstream Renewable Power Developments (Pty) Ltd**
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EXECUTIVE SUMMARY

Stephanie Dippenaar Consulting, trading as EkoVler, has been appointed by South Africa Mainstream Renewable Power Developments (Pty) Ltd to conduct a 12-month bat study for the proposed Kraaltjies Wind Energy Facility (WEF). The project site is located on Portion 10 and Portion 25 of the Farm Brits Eigendom No. 374, within the Beaufort West Local Municipality in the Central Karoo District Municipality. The site is located east of the N12 national road, *en* route to Beaufort West in the Western Cape Province. A 240 MW WEF with an estimated 60 turbines and associated infrastructure is proposed, covering a study area of 3 994.9 ha with a current buildable area of 735 ha.

Bat monitoring started in August 2021, when the Met mast was installed, and the last data was collected on 10 November 2022. This report details the data collected between 15 August 2021 and 27 April 2022 at the proposed Kraaltjies WEF. The monitoring systems deployed within the study area consist of four Wildlife Acoustics SM4BAT full spectrum bat detectors, recording data from the met mast at 98 m, 52 m and 8 m, as well as from a temporary 10 m mast. This allows for coverage of all the biotopes in the area. The terrain is vast, and it is thus not possible to identify all roosts. However, during fieldwork, physical surveys are conducted to identify the location of possible roosts. Interviews were also conducted with people staying on-site or close to the site, to establish if they are aware of any roosts in the vicinity, or general bat occurrences. Bat droppings were observed at the Silver Karoo farm dwelling, indicating the presence of bats.

No formal protected areas are situated in the immediate vicinity of the Kraaltjies 240 MW WEF site. The vegetation of the area is uniformly part of the broad Gamkwa Karoo vegetation unit (SANBI, 2021). Many bat conducive features are present on site, such as derelict buildings, open water sources, rock formations on low hilly areas and relatively dense Karoo riverine vegetation.

Of the 12 species with distribution ranges that include the proposed development area, four have a conservation status of Near Threatened in South Africa and one Vulnerable, while three have a global conservation status of Near Threatened. *Eptesicus hottentotus* (the Long-tailed serotine) and *Cistugo seabrae* (the Angolan wing-gland bat) are endemic to Southern Africa and have limited suitable habitat left, mainly due to agricultural activities. *Tadarida aegyptiaca* (Egyptian free-tailed), *Sauromy petrophilus* (Roberts's flat-headed bat), *Miniopterus natalensis* (Natal long-fingered bat) and *Neoromicia capensis* (Cape serotine) have a high risk of fatality and barotrauma from turbine blades due to their foraging preferences. Three more species, *Myotis tricolor* (Temminck's myotis bat), and two fruit bat species, *Eidolon helvum* (African straw-coloured fruit bat) and *Rousettus aegyptiacus* (Egyptian rousette) have a medium to high risk of fatality.

Calls similar to five of the 12 species that have distribution ranges overlaying the proposed development site were recorded by the static recorders. 73% of the calls were made by *T. aegyptiaca*, which is the dominant species on site. *T. aegyptiaca* is physiologically adapted to flying high and is thus a species at high risk of collision with turbine blades, as well as barotrauma. The second highest percentage of calls was made by *N. capensis (14%),* followed by *S. petrophilus (12%).* 1% of the globally as well as regionally Near Threatened *M. natalensis* and a statistically insignificant number of the endemic *E. hottentotus* have also been observed at the development site.

While a similarity was observed in species diversity between the systems situated at 98 m (N) and 52 m (O), the activity was significantly higher at 52 m. A higher occurrence of *N. capensis* was observed at the 8 m

systems. 2% of the calls recorded at System Q, situated at an open reservoir in a valley bed, were that of the endangered *M. natalensis.* System Q recorded significantly higher activity than the other systems.

The total number of nightly bat passes per hour for the monitoring period provides insight into the general distribution of bat activity during each night, from sunset to sunrise. As expected, higher activity was recorded three to four hours after sunset, while activity gradually declined from approximately five hours before sunrise.

There was a gradual increase in monthly bat activity from September, with a peak in February and a slight decline in activity during March. Thereafter a decline was observed in April. It is expected that a further decline will be experienced in the winter months, as the colder weather sets in. This must be confirmed when more data are available.

A transect was conducted during November 2021, in optimal weather conditions, but no bats were recorded during the transect session.

Potential impacts on bats are summarised as follows:

Construction phase:

- Loss of existing roosts and/or potential roosts
- Bats attracted onto the site by the artificial creation of new potential roosting areas

Operational phase:

- Direct collisions with rotating turbine blades
- Fatalities from barotrauma
- Loss of foraging habitat

Based on available data, the following can be concluded. High bat activity was experienced from the middle of summer to early autumn. In general, there are no red flags at this stage that suggest the development could not progress to the next phase. However, development must not take place in certain sensitive areas of the proposed WEF, such as the riverbeds and valley hills, where high activity was observed. A sensitivity map, indicating these areas to be avoided, will be provided and possible mitigation measures will be recommended in the final bat monitoring report.

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Glossary of Terms

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	Songmeter - Wildlife Acoustics' full spectrum ultrasonic bat monitoring recorder
SMMU2	Wildlife Acoustic's ultrasonic Songmeter microphones for recording bat sounds
Threshold	Bat activity threshold as provided by SABAA

List of Abbreviations

BA	Basic Assessment
BESS	Battery Energy Storage System
CA	National Competent Authority
COD	Commercial Operation Date
CSIR	Council of Scientific and Industrial Research
CDF	Cumulative Distribution Function
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilovolt (s)
MET	Meteorological
ms	milliseconds
MW	Megawatt(s)
REDZ	Renewable Energy Development Zone
WEF	Wind Energy Facility
SABAA	South African Bat Assessment Association
SSVR	Site Sensitivity Verification Report

1. INTRODUCTION

Stephanie Dippenaar Consulting, trading as EkoVler, has been appointed to conduct a minimum of 12 months' bat study for the proposed Kraaltjies 240 MW Wind Energy Facility (WEF) by **South Africa Mainstream Renewable Power Developments (Pty) Ltd** (hereafter called Mainstream). The project site is located on Portion 10 and Portion 25 of the Farm Brits Eigendom No. 374 within the Beaufort West Local Municipality in the Central Karoo District Municipality, *en* route to Beaufort West, in the Western Cape Province. A 240 MW WEF with an estimated 60 turbines and associated infrastructure is proposed, covering a current buildable area of 735 ha within a larger study area of 3 994.9 ha.

Bat monitoring started in August 2021, when the Met mast was installed, and the last data was collected on 10 November 2022. This report provides an overview of the scoping exercise and progress of the bat monitoring programme at the Kraaltjies Wind Energy Facility, hereafter referred to as Kraaltjies WEF, from 15 August 2021 to 27 April 2022. More detailed statistical analysis of bat activity, such as results plotted against weather conditions, will be included in the final bat monitoring report.

The report is structure as follows:

- Section 1: An introduction with Terms of References and Methods used for the bat monitoring;
- Section 2: Background Information pertaining to the proposed development and the site;
- Section 3: Discussion of the Results, including data from static recorders; and
- Section 4: Conclusion.
- The CV for the bat specialist, the Specialist Declaration of Independence and the Site Sensitivity Verification are included in Appendix 1 to 3.

1.1. TERMS OF REFERENCE FOR THE BAT MONITORING

The *South African Best Practice Guidelines for Pre-construction Monitoring of Bats at Wind Energy Facilities* (MacEwan, et al., 2020) guided the monitoring process. Based on these guidelines, acoustic monitoring of the echolocation calls of bats was used to determine the seasonal and diurnal activity patterns of bats at the proposed Kraaltjies WEF. The following South African guideline documents were used in conjunction with the Pre-Construction Guidelines:

- Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (Aronson, et al., 2020);
- Mitigation Guidance for Bats at Wind Energy Facilities in South Africa (Aronson, et al., 2018); and
- South African Bat Fatality Threshold Guidelines (MacEwan, et al., 2018).

The following Terms of Reference are applicable to the monitoring exercise, as informed by the most current Pre-Construction Guidelines:

- Gathering information on bat species that inhabit the site, noting higher, medium, or lower risk species groups; as indicated in Table 4, p16, of the Guidelines (MacEwan, et al., 2020);
- Recording relative frequency of use by different species throughout the monitoring 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.

1.2. METHODS

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

1.2.1. Desktop investigation of the development area as well as the surrounding environment

A desktop study was undertaken of the site, using the ~information provided by Mainstream as the developer**,** as well as information gathered through a literature review. Literature reviewed included existing reports and other studies for the area, as well as the SANBI GIS database. Conservation areas in the vicinity were investigated and information from other developments in the area, particularly renewable energy projects and wind farms were noted to understand cumulative effects. Relevant guidelines and legislation were also consulted. The study area was visited to further inform the background assessment of the site. During seasonal fieldwork sessions, physical surveys were conducted to identify the location of possible roosts. Interviews were also conducted with people staying on site or close to the site, to establish if they are aware of any roosts in the vicinity, or general bat occurrences.

1.2.2. Static Acoustic Monitoring

Static monitoring, using automated bat detector systems, provided invaluable data about the bats present on the site. The number of detectors required was calculated based on the surface area of the proposed site (3 995 ha). Measurements were taken at various fixed locations and varying altitudes, as representative of the area in general and of each biotope present within the proposed study area. Static monitoring is essential in assessing the relative importance and temporal changes of features, locations, and potential migratory routes (MacEwan, et al., 2020). The monitoring systems deployed in the study area included four Wildlife Acoustics SM4BAT full spectrum bat detectors powered by 12V 7 Amp-h sealed lead acid batteries replenished by photovoltaic solar panels Table 1. Two SD memory cards, class 10 speed, with a capacity of 64GB each, or one 128GB were utilized in 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 Kraaltjies WEF.

Detector	Situation	Coordinates	Micro-phone	Division ratio	High pass filter	Gain	Format	Trigger window	Calibration (on chirp) at the microphone when deployed
SM4BAT (Met N)	Met mast: mic at 98 m	32º50'49,05" S 22º34'29,96" E	SMM-U2	8	16k Hz	12 dB	FS, WAV@ 384 kHz	1 sec	Calibrated when installed by Windhunter
SM4BAT (Met O)	Met mast: mic at 52 m	32º50'49,05" S 22º34'29,96" E	SMM-U2	8	16k Hz	12 dB	FS, WAV@ 384 kHz	1 sec	Calibrated when installed by Windhunter
SM4BAT (Met P)	Temporary mast: mic at 8 m	32º50'49,05" S 22º34'29,96" E	SMM-U2	8	16 kHz	12 dB	FS, WAV@ 384 kHz	1 sec	Drop to approximately -8,8dB at the microphone
SM4BAT (Mast Q)	Temporary mast: mic at 10 m	32º53'41,62" S 22º34'40,26" E	SMM-U2	8	16k Hz	12 dB	FS, WAV@ 384 kHz	1 sec	Drop to approximately -7,90dB at the microphone

Each detector was set to operate in continuous trigger mode from dusk each evening until dawn. Times were correlated with latitude and longitude, to trigger half an hour before sunset. The trigger mode setting for the bat detectors, which record frequencies exceeding 16kHz and -18dB, was set to record for the duration of the sound, and 1000 ms after the sound ceased. This period is known as the trigger window.

The data from these recorders was downloaded every two to three months and analysed to provide an approximation of the bat frequency and diversity of species that visit and/or inhabit the site.

The position of the Met mast was determined by the developer and the bat monitoring systems on the Met mast represent the biotope associated with the plains of the Gamkwa Karoo (SANBI, 2012) vegetation type. A number of factors informed the positions of temporary masts for the bat monitoring equipment. This included representation of the different biotopes on site, proximity to possible bat conducive areas and accessibility for installation of a mast.

The location of the monitoring systems is shown in Figure 1, and the monitoring equipment on the Met mast is depicted in Figure 2. The position of Systems N, O and P (Figure 3), represents the northern part of the wind farm. System Q (see Figure 3) is situated next to an open farm dam, which might attract bats while there is water in the dam. The farm is grazed by livestock, and the droppings of the animals might attract some flies, which could serve as a food source for bats.

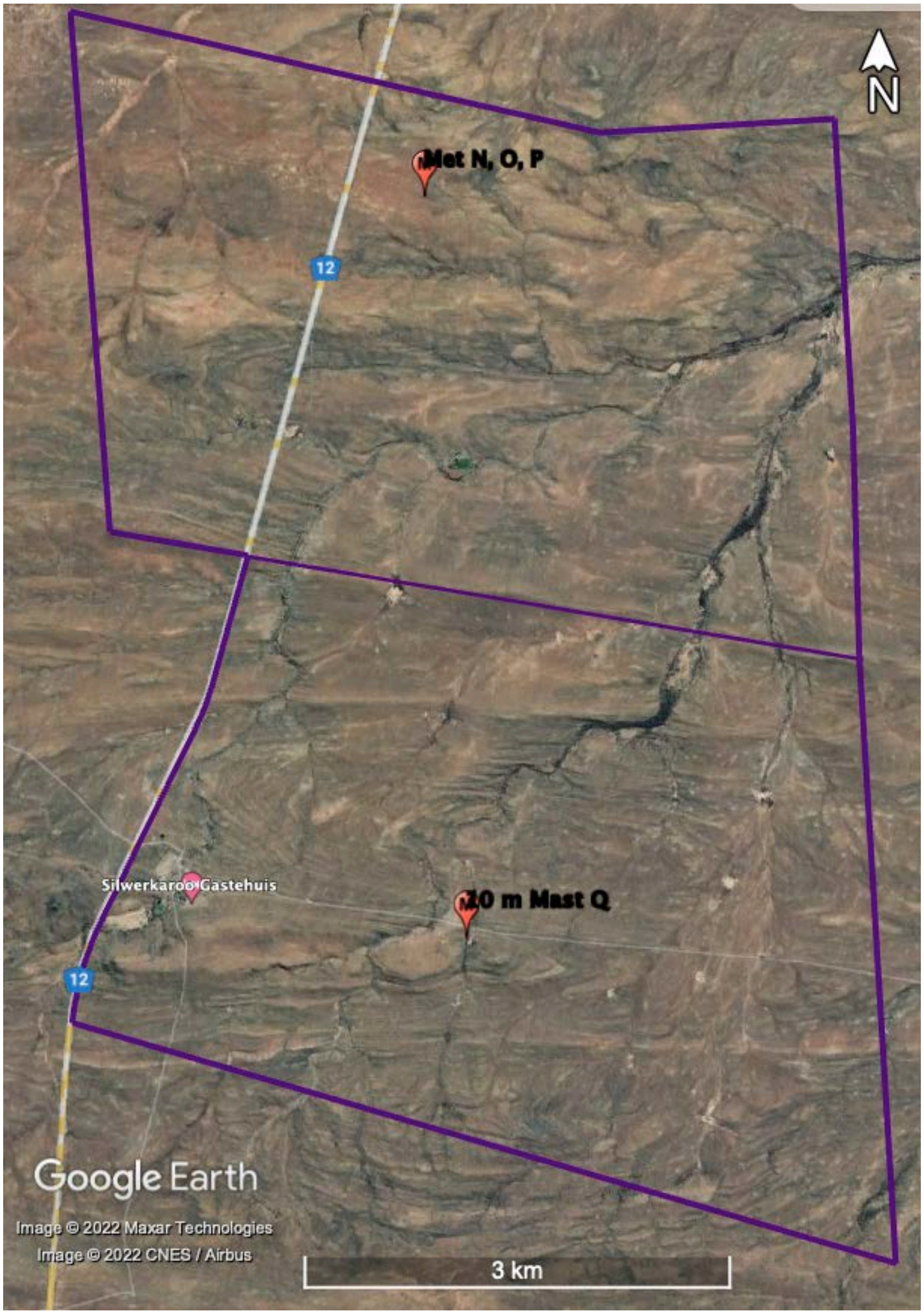

Figure 1: Position of bat monitoring systems

Figure 2: Bat monitoring equipment on the met mast

Figure 3: 10 m mast situated close to relatively large trees and an open water source

1.2.3. Roost Surveys

Roost surveys were conducted when the bat specialist visited the site, and any known roosts were inspected. While areas, where possible roosts could be situated, were investigated, all roosting areas were not accessible, as bats sometimes roost in crevices or roofs with limited ceiling space. When day roosts are identified, bat counts are conducted at sunset and if deemed necessary, detectors are installed for short periods at point sources to monitor roosts. It should be noted that the site was large and within the time span and limitations of the bat monitoring study, searching the whole site for roosts was not possible. The results of roost searches are discussed in Section 3.

1.2.4. Manual Surveys - Driven transects

Manual activity surveys, such as driven transects, are necessary to gain a spatial understanding of the bat species utilising the site. This is especially the case for the identification of key features, potential commuting routes and overall activity within and surrounding the site. Transects complement static monitoring surveys in terms of spatial coverage.

Depending on the season, some transects were performed during field visits. A SM4BAT full spectrum recorder with the microphone mounted on a pole was used for transects. 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. As far as possible, transect routes were kept the same to allow for the comparison of data. See Section 3.2 for the discussion of transect surveys at Kraaltjies WEF.

1.2.5. Data Analysis

Data were downloaded manually approximately once every three to four months. Acoustic files downloaded from the detectors were analysed for bat activity with respect to the bat activity and the bat species. The latest version of Wildlife Acoustics Kaleidoscope Pro was used for analysing large quantities of data. In cases where there is uncertainty about details of a call (which is confirmed as a bat calling), the call was classified as Unclear.

1.3. ASSUMPTIONS AND LIMITATIONS

Although it is an internationally accepted method for presenting bat data, the use of detectors for bat monitoring has its limitations. It is not possible to determine true bat numbers from acoustic bat activity data. Echolocation operates over ranges of metres, and depending on species and recording distance, is influenced by the intensity of the bat call as well as the weather conditions. Any monitoring based on echolocation samples covers only a limited area, depending on the type and intensity of the call. The accuracy of species identification is also dependent on the quality of the calls. The same bat could pass the recorder more than once, which could lead to potential double-counting. Furthermore, due to overlap of calls, it is not possible to provide an exact number of bats passing the recorder. Therefore, the number of bats passing is not an exact count but is as close as possible under the given circumstances and within the limitations of the survey technique available.

Bats do not echolocate in a uniform, monotonous way. For example, when bats go on a feeding frenzy, it is difficult to identify a species from a call. Sometimes a species could also echolocate at a frequency somewhat higher or lower than the normal identifiable frequency. These calls could then be closer to the range of another species. For the purpose of this study, bat calls from unidentifiable species were recorded as 'unclear'. These calls were identified as a bat, although uncertainty exists regards their identification.

Transects only provide a snapshot in time and do not inform the spatial distribution on the site, although areas of high activity or nights with high activity could be identified.

It was not possible to search the entire WEF site as well as the wider neighbouring area for bat roosts. However, the site was assessed from a vehicle and on foot in as much detail as possible, bearing in mind the time constraints of an environmental assessment.

2. BACKGROUND INFORMATION

2.1. LOCATION

The Kraaltjies site is located on farmland in the Central Karoo in the Beaufort West Local Municipality, in the Western Cape Province (Figure 4). The site lies to the east of the N12 national road, approximately 60 km south of the town of Beaufort West and 63 km east of Prince Albert, as the crow flies (32º54'53.66" S; 22º33'01.10" E - Google Maps, 2022). The Swartberg Mountain Range lies to the south of Kraaltjies Farm and the Nuweveldberge are located to the north. The proposed project will cover an area of approximately 3 995 ha, with a development footprint of 725 ha.

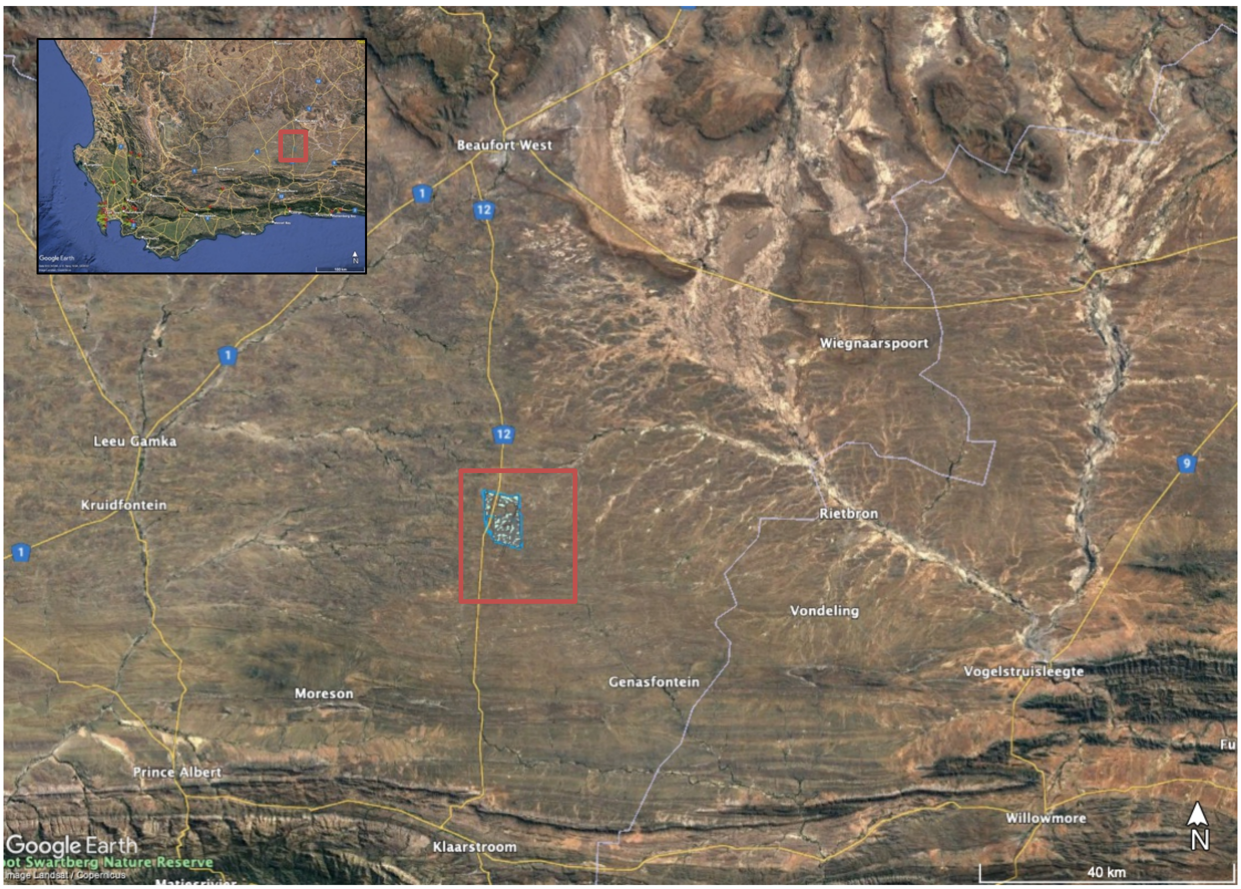

Figure 4: Locality map for the Kraaltjies WEF (Google Earth)

2.2. PROJECT DESCRIPTION

Mainstream proposes to construct and operate up to a 240 MW WEF and associated infrastructure, with a grid connection to the Eskom grid. The following project details are proposed for the development, see Figure 5:

- 120 m to 200 m hub height;
- Up to 200 m rotor diameter;
- Up to 60 turbines;

- Road servitude of 8 m;
- One new 11 kV - 33/132 kV on-site substation (including IPP & Eskom portions);
- A Battery Energy Storage System;
- One construction laydown/staging area of up to approximately 3 ha is to be located on the site identified for the substation; and
- Operation and Maintenance buildings.

The grid connection infrastructure will consist of an overhead power line up to 132 kV and a 33 kV/132 kV project on-site substation. The BESS, IPP and Eskom on-site substation will comprise a surface area of up to 25 ha. The 132 kv grid connection and Eskom switchyard portion will form part of a separate Basic Assessment (BA) process and is therefore not included in the WEF and associated infrastructure EIA application. The bat assessment will focus on the turbine layout as this is the aspect of the proposed project that impacts bats specifically. The turbine layout will however only be available for the impact phase of the EIA process and is not available in this scoping report. The buildable area has been considered however assuming suitable placement for the wind turbines.

The proposed development is informed by 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).

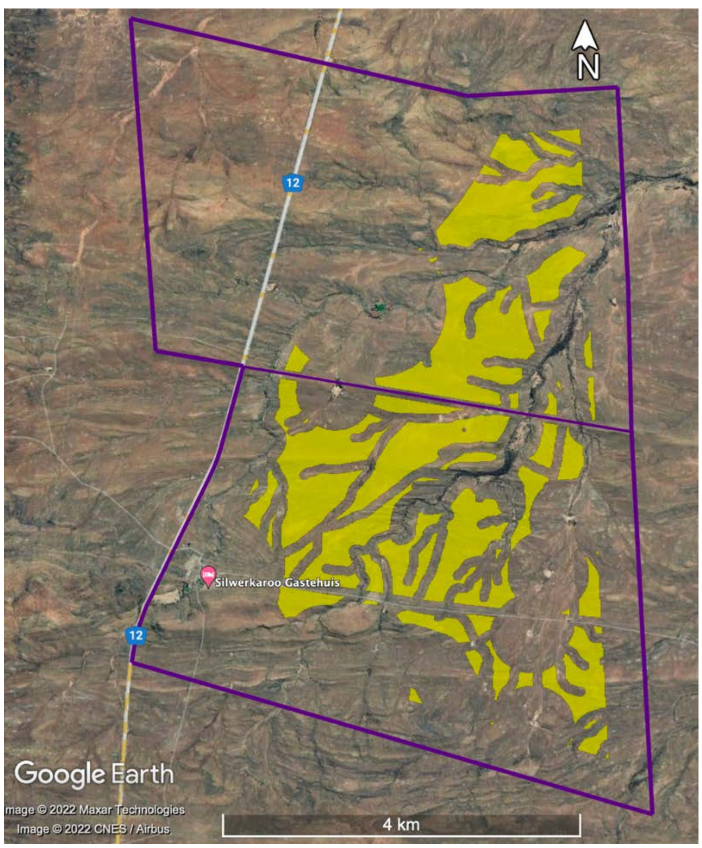

Figure 5: Preliminary buildable areas at the Kraaltjies WEF

2.3. REGIONAL VEGETATION AND CLIMATE

2.3.1. Climate

The weather details are provided for Beaufort West, situated approximately 57 km, as the crow flies, from the terrain (Meteoblue, 2022; Weather Spark, 2022).

The summers in the area are hot and the winters are cold, dry, and windy, with average temperatures varying from 4 °C to 33 °C (Figure 6). The hottest months of the year are January and February, while the coldest months of the year are June and July. While it is mostly dry and clear year-round, rain can fall throughout the year. Highest rainfall on average is in March, with lowest average rainfall in July (Meteoblue, 2022). Humidity levels are consistently low throughout the year. The highest windspeeds are experienced from September to March, with average wind speeds of more than 13 km/hour. The windiest month of the year is December, with an average hourly wind speed of 15 km/hour.

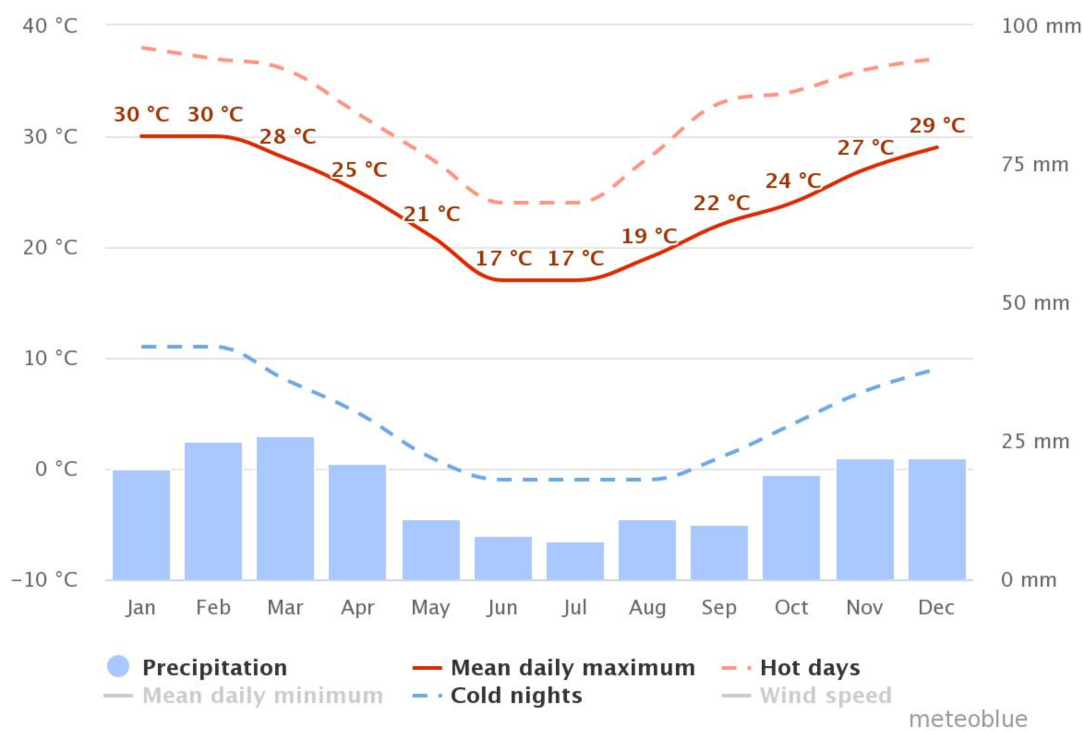

Figure 6: Climate of Beaufort West (Modified after Meteoblue, 2022)

2.3.2. Vegetation

The proposed study area falls within the Nama Karoo Biome and regionally within the Lower Karoo Bioregion, with Gamka Karoo (Figure 7) being the single dominant vegetation type found within the study area (SANBI, 2012). The Gamka Karoo vegetation unit occurs mainly in the Western and Eastern Cape Provinces, between the Great Escarpment (Nuweveld Mountains) in the north and the Cape Fold Belt mountains (mainly the Swartberg Mountains) in the south. The landscape is comprised of slightly undulating plains, covered with dwarf spinescent shrubland and low trees. Following good rains, drought-resistant grasses may dominate on the sandy basins. Being located in the rain shadow of the Cape Fold Belt, the Gamka Karoo is considered as one of the most arid units of the Nama Karoo Biome. Rainfall occurs mainly in summer and autumn, with a peak in March/April. Although only 2% of this vegetation type is formally conserved in the Karoo National Park, very little is transformed and is therefore considered Least Threatened (Mucina and Rutherford, 2012).

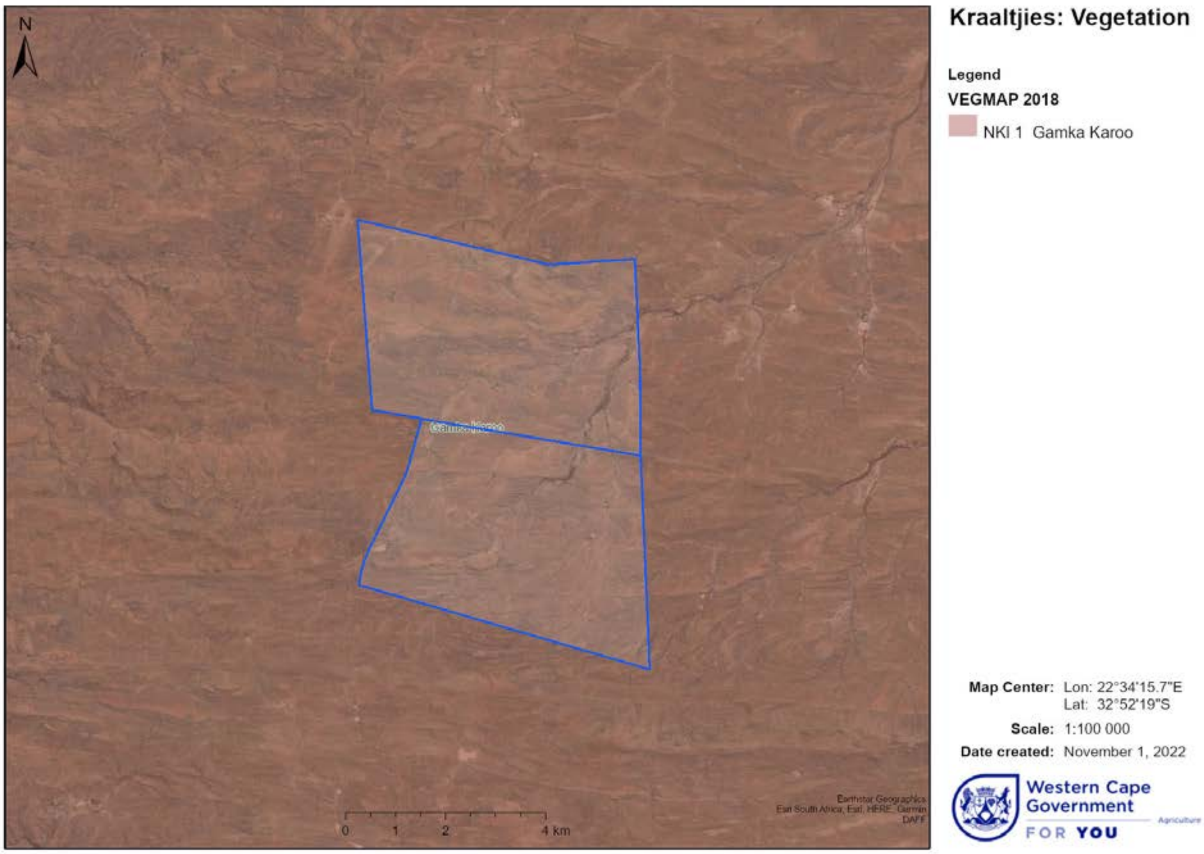

Figure 7: Kraaltjies WEF Vegetation Zones (WCG 2021)

2.3.3. Protected Areas

Although not situated close to any formally protected areas, various protected areas are located towards the south of the site, in the vicinity of the Swartberg mountains (Figure 8). As the crow flies, the Henry Kruger Private Reserve, the nearest registered reserve, is situated within 60 km to the northwest and the Karoo National Park is situated approximately 70 km to the north. There is a large Critical Biodiversity Area (CBA) to the south and southeast of the Kraaltjies WEF site, but no CBA on the actual WEF site itself.

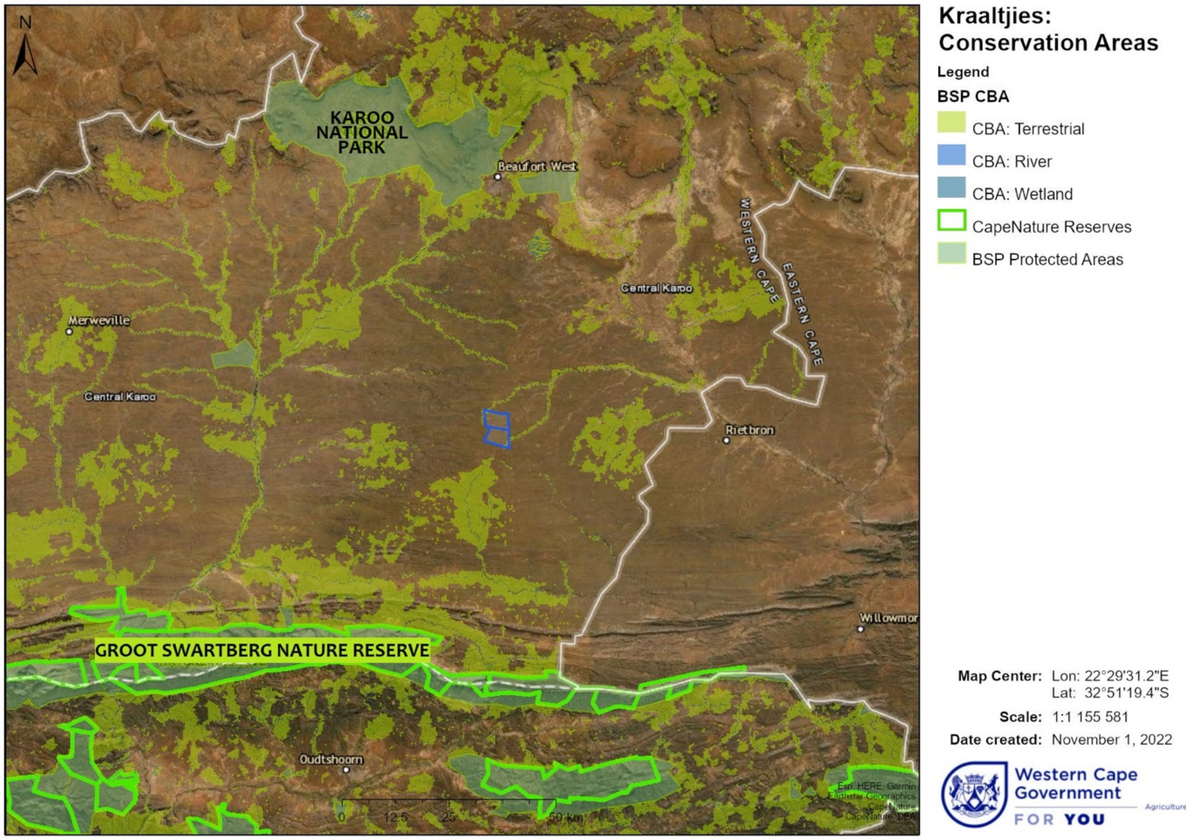

Figure 8: Protected areas in the vicinity of Kraaltjies WEF (WCG, 2021)

2.3.4. Land use

Because of the low average annual rainfall, the carrying capacity in the Kraaltjies area is low, resulting in large farm units (

Figure 9). The soil on site is bluish-coloured shallow shale. This fine-grained sedimentary rock supports thinly dispersed and stunted vegetation. Merino and Dorper sheep and Angora goats are the most common livestock in the area, as the vegetation can sustain small livestock numbers. Many of the farmers now concentrate on game (Karoo-South Africa, 2019). The towns in the areas are spread-out and the area supports large, dispersed farm units.

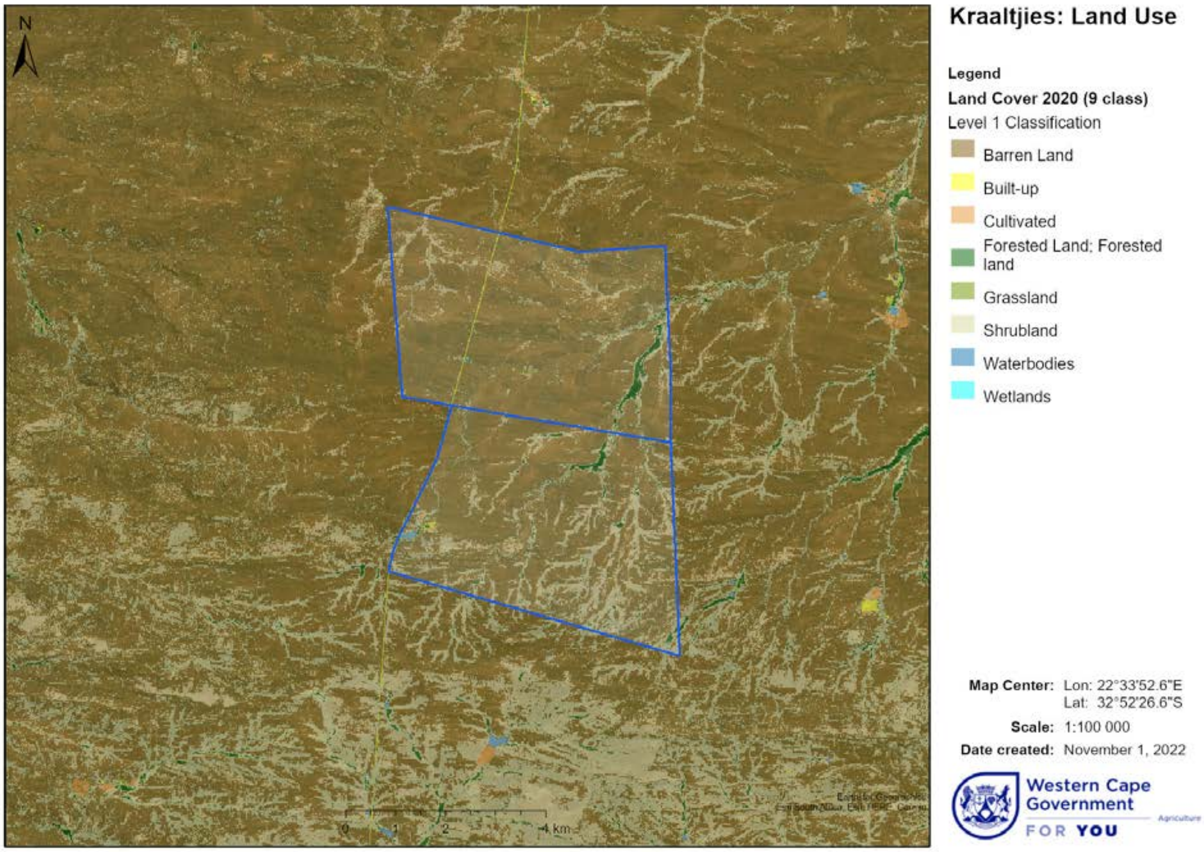

Figure 9: Land use in the Kraaltjies WEF study area (WCG, 2021)

2.3.5. Water resources

Although there are no permanent waterbodies on the development terrain, there are numerous dry water courses and non-perennial water bodies, see Figure 10. During rainy spells, water collects in these non-perennial ditches, depressions, and farm dams. Not only could these temporary open water sources provide water to drink to bats, but stagnant water could be a breeding ground for insects, which in its turn attracts bats.

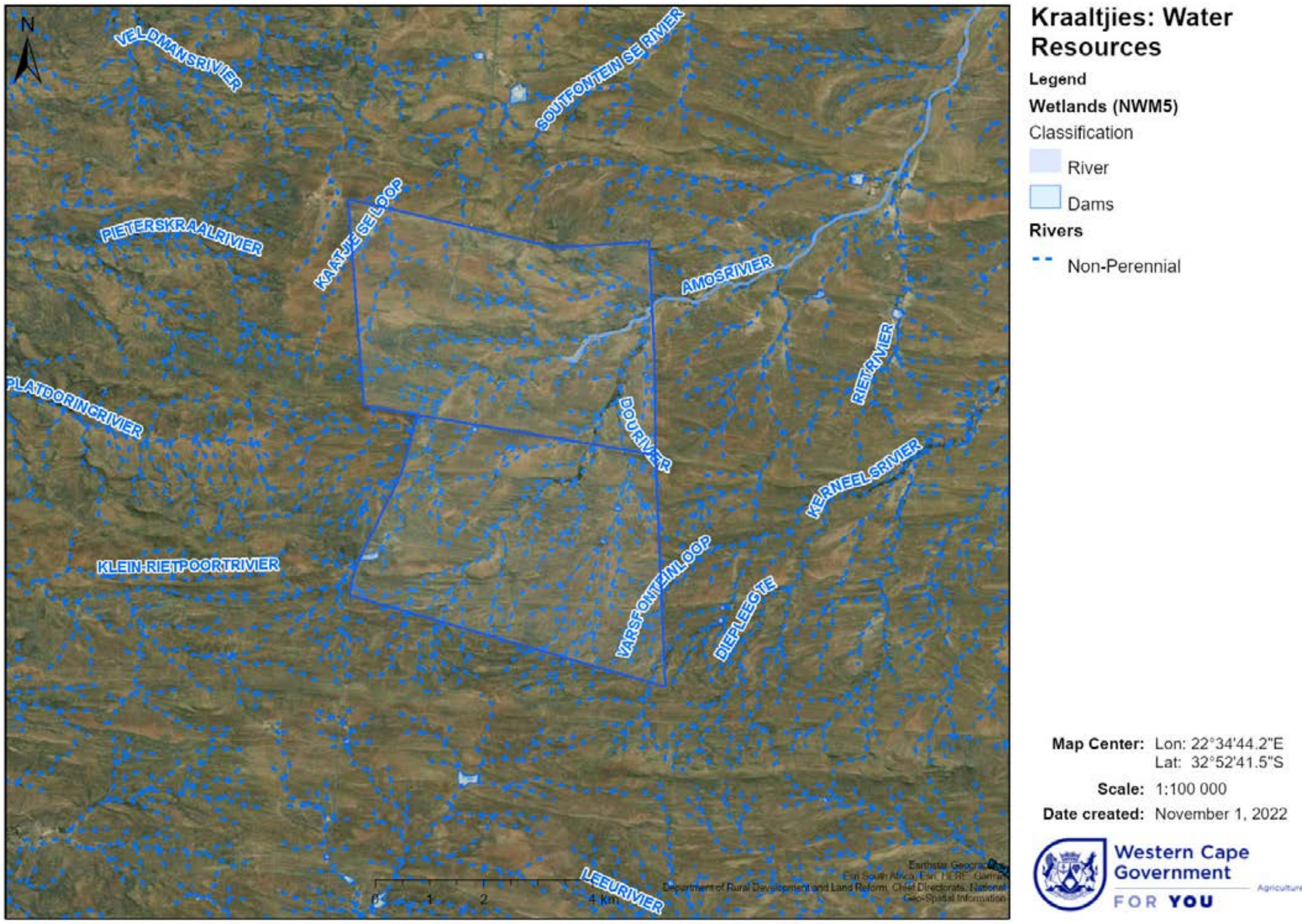

Figure 10: Natural non-perennial water courses

2.4. FEATURES CONDUCIVE TO BATS AT THE KRAALTJIES WEF

Bats are dependent on suitable roosting sites provided by vegetation, exfoliating rock, rocky outcrops, derelict mines and aardvark holes, caves, and human structures, (Monadjem, et al., 2020). The foraging utility of a site is further determined by water availability and the availability of food. Thus, the vegetation, geomorphology and geology of an area are important predictors of bat species diversity and activity levels.

2.4.1. Vegetation

Although most of the site is covered in Gamka Karoo vegetation typical of the area, trees situated in the non-perennial riverbeds could provide roosting opportunities for bats that prefer roosting in vegetation or under the bark of trees (Figure 11).

Figure 11: Relatively dense vegetation along the dry riverbeds

2.4.2. Rock formations rock faces and animal burrows

Rock formations along the hilltops and along the river valleys provide ample roosting opportunities for bats. Bats can also make use of abandoned burrows as roosts. Figure 12 depicts examples of rock formations and a derelict aardvark hole is shown in Figure 13.

Figure 12: Rock formations along the hill tops

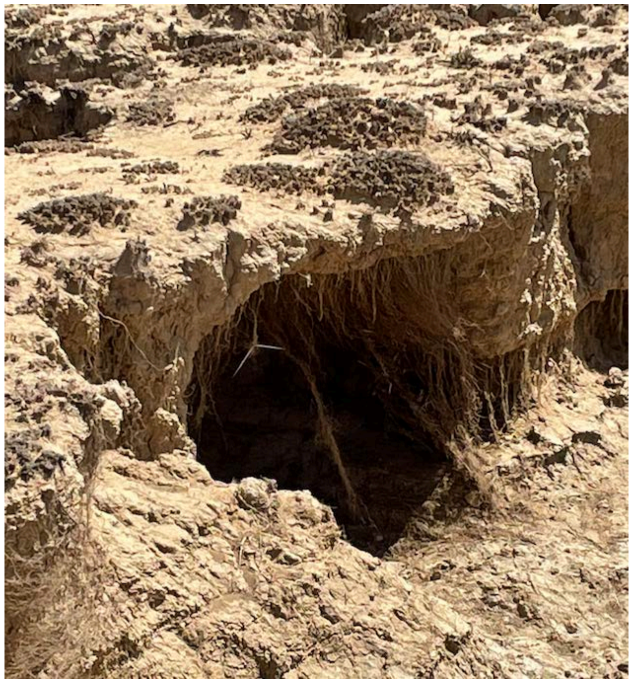

Figure 13: Animal burrows or possible aardvark hole that could provide roosting opportunities for bats

2.4.3. Human dwellings and building structures

Where roofs are not sealed off, human dwellings could provide roosting space for some bat species. Evidence of bats was found at the farm dwellings, especially at the Silver Karoo farm, where bat droppings were discovered at some of the farm buildings (Figure 14). Culverts and stone walls also provide possible roosting opportunities (Figure 15 and

Figure 16), although no signs of bats were found at the culverts occurring at the

proposed terrain.

Figure 14. Signs of bat roosts at the farm dwelling of Silver Karoo

Figure 15: Culverts which could provide roosting opportunities

Figure 16: Stone walls at the farmhouse providing roosting opportunities for bats

2.4.4. Open water and food sources

During the spells of rain, stagnant water that usually collects in small pans and dry ditches could serve as breeding grounds for insects which could serve as food for bats. High insect activity results in higher bat presence after sporadic rainy periods. Livestock also attracts flies, which in turn could serve as a food source for bats. Water troughs for the livestock and open dams and cement reservoirs provide permanent, open water sources for bats throughout the year (Figure 17). In the dry Nama-Karoo environment, these manmade water resources play an important role in bat activity on site.

Figure 17: Permanent, open water source.

2.5. BACKGROUND TO BATS IN THE AREA

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

A summary of bat species distribution, their feeding behaviour, preferred roosting habitat, and conservation status is presented in *Table 2*. The bats identified in *Table 2* have distribution ranges that include the Kraaltjies WEF development site and bat presence confirmed on the site itself, or other wind farms in the area, are marked as such. The proposed WEF is located within the distribution range of six families and approximately 12 species. *Table 2* is informed by the most recent distribution maps of Monadjem, et al. (2010 and 2020). The information in *Table 2* will be updated as required, based on the outcomes of the monitoring programme.

Of the 12 species with distribution ranges that include the proposed development area, four have a conservation status of Near Threatened in South Africa and one Vulnerable, while three have a global conservation status of Near Threatened. *Eptesicus hottentotus* (the Long-tailed serotine) and *Cistugo seabrae* (the Angolan wing-gland bat) are endemic to Southern Africa and have limited suitable habitat left, mainly due to agricultural activities (Monadjem, et al., 2010).

According to the likelihood of fatality risk, as indicated by the latest pre-construction guidelines (MacEwan, 2020) four species, namely *Miniopterus natalensis* (Natal long-fingered bat), *T. aegyptiaca* (Egyptian free-tailed), *S. petrophilus* (Roberts's flat-headed bat) and *N. capensis* (Cape serotine), have a high risk of fatality. The high risk of fatality for *T. aegyptiaca* and *S. petrophilus* is due to their foraging habitat at high altitudes. *Myotis tricolor* (Temminck's myotis bat) has a medium to high risk of fatality while *E. hottentotus* has a medium risk of fatality.

The two Pteropodidae species, with a medium to high risk of fatality, are not expected to roost on the project site itself, as this environment is not expected to be their preferred habitat, however, they could traverse over the project site during migration and are therefore included.

Table 2: Potential bat species occurrence at the proposed Kraaltjies WEF site. Highlighted yellow cells indicate confirmed presence at the development site. Information about the species is from Monadjem, et al. (2010 and 2020).

Family	Species	Common Name	SA conserva-tion status	Global conserva-tion status (IUCN)	Roosting habitat	Functional group (type of forager)	Migratory behaviour	Likelihood of fatality risk*	Bats confirmed in vicinity
PTEROPODIDAE	*Eidolon helvum*	African straw-coloured fruit	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	
	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	High	✓
NYCTERIDAE	*Nycteris thebaica*	Egyptian slit-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	
MOLOSSIDAE	*Tadarida aegyptiaca*	Egyptian free-tailed bat	Least Concern	Least Concern	Roofs of houses, caves, rock crevices, under exfoliating	Open-air, insectivorous	Not known	High	✓

Family	Species	Common Name	SA conserva-tion status	Global conserva-tion status (IUCN)	Roosting habitat	Functional group (type of forager)	Migratory behaviour	Likelihood of fatality risk*	Bats confirmed in vicinity
					rocks, hollow trees				
	Sauromys petrophilus	Robert's Flat-headed bat	Least Concern	Least Concern	Narrow cracks, under exfoliating of rocks, crevices.	Open-air, insectivorous		High	✓
RHINOLOPHIDAE	*Rhinolophus capensis*	Cape horseshoe bat (endemic)	Near Threatened	Near Threatened	Caves, old mines. Night roosts used	Clutter, insectivorous	Not known	Low	
	Rhinolophus clivosus	Geoffroy's horseshoe bat	Near Threatened	Least Concern	Caves, old mines. Night roosts used	Clutter, insectivorous		Low	
VESPERTILIO- NIDAE	*Neoromicia capensis* (now *Laephotis capensis*)	Cape serotine	Least Concern	Least Concern	Roofs of houses, under bark of trees, at basis of aloes	Clutter-edge, insectivorous	Not known	High	✓
	Myotis tricolor	Temminck's myotis	Near Threatened	Least Concern	Roosts in caves, but also in crevices in rock faces, culverts and manmade hollows	Limited information available	Not known	Medium-High	

Family	Species	Common Name	SA conserva-tion status	Global conserva-tion status (IUCN)	Roosting habitat	Functional group (type of forager)	Migratory behaviour	Likelihood of fatality risk*	Bats confirmed in vicinity
	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	

* *Likelihood of fatality risk as indicated by the pre-construction guidelines (MacEwan, et al., 2020).*

*** Nycteris thebaica has been re-classified in Monadjem, et al. (2020) and it is noted that T. aegyptiaca will be split into more than one species in the nearby future, but for the purpose of this study we conclude with the species as mentioned in the above table.*

2.6. POTENTIAL IMPACT OF WEFS 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 and 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 impacts on bats could be summarised as follow:

2.6.1. 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 rock formations, crevices, derelict aardvark holes and under the bark of trees (Table 2). Any disturbance of these natural roosting opportunities might have a negative impact on bats. Demolition of the few existing buildings will destroy bat roosts in those buildings (Barclay and Harder, 2003).
- *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. Quarries created during construction could serve as a further source of open water, and food if insects collect in these areas, which could attract bats.

2.6.2. Operational phase:

- *Direct collisions with rotating turbine blades:* The most important feature of the project that affects bats adversely are the operation of wind turbines, particularly 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 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 operational activities, such as noise after sunset from engines or generators might also deter bats, resulting in loss of feeding habitat.

2.6.3. Cumulative Effect:

The cumulative effect of the combined wind developments within a 35 km radius for the above-expected impacts will be evaluated in the final bat impact assessment report.

2.6.4. No-go Option:

If the development does not progress, the status quo is expected to prevail, and no negative impact is expected.

The ideal concerning managing the impact of WEFs on bats throughout the project's lifespan is to maintain bat populations as they occur on-site and avoid attracting more bats to the area of potential collision.

3. RESULTS AND DISCUSSION

3.1. STATIC RECORDERS

Passive monitoring data for the period between 15 August 2021 and 27 April 2022 is included in this progress report (**Error! Reference source not found.**). 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.

Table 3 indicates a data gap that appeared between 25 January 2022 to 27 April 2022, when the high microphone of System N had a breakdown. The microphone was replaced and was functional for the rest of the monitoring period. Although the high system is the most important, as it gathers data from within the sweep of the turbine blades, we still had data from the 52 m system (O), which was also placed within the sweep of the turbine blades. There is enough data to provide an informed decision regarding the bat situation on site.

Table 3: Table showing periods of monitoring data with the gap in data.

Available Data	Gaps
15 Aug 2021 - 15 Oct 2021	None
16 Oct 2021 - 27 Apr 2022	98m Met High (N): 25 Jan 2022 - 27 Apr 2022

3.3.1. Bat Species Diversity

Calls like five of the 12 species that have distribution ranges overlaying the proposed development site were recorded by the static recorders (Table 2 and Figure 18). Bats can be divided in groups, based on their preferred foraging altitudes. They are adapted, mostly by the physiology of their wings, to forage at a range of altitudes, namely lower altitudes (clutter) amongst the bushes and trees, medium altitudes, and open air (high-flying bats). 73% of the calls were made by *Tadarida aegyptiaca*, which is the dominant species on site. *T. aegyptiaca* is physiologically adapted to flying high and is thus a species at high risk of collision with turbine blades as well as barotrauma. The second highest percentage of calls were made by *N. capensis* (14%), followed by *S. petrophilus* (12%). 1% of the globally as well as regionally Near Threatened *Miniopterus natalensis* and a statistically insignificant number of the endemic *Eptesicus hottentotus* have also been observed at the development site.

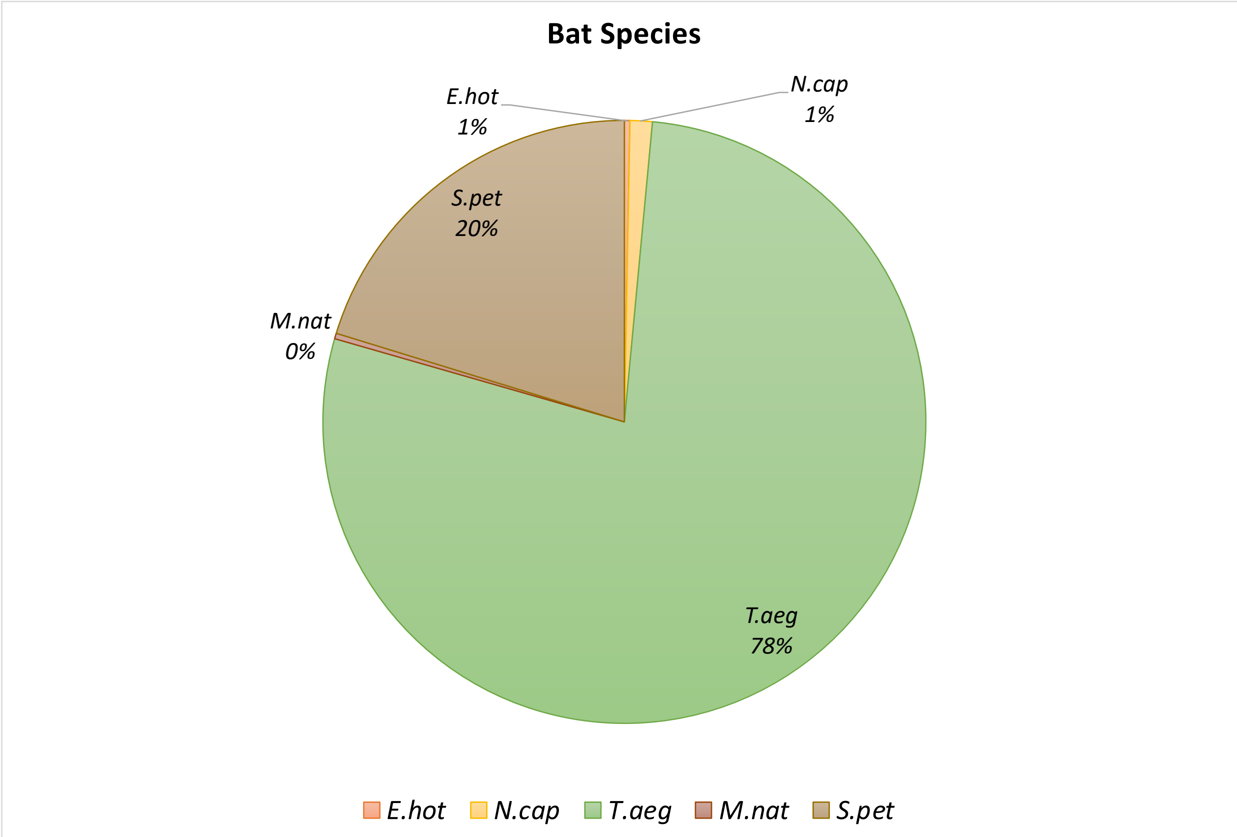

Figure 18: Overall bat species diversity at Kraaltjies WEF

The Molossidae family, namely *T. aegyptiaca* and *S. petrophilus*, are the most dominant bats on site. Both these species are falling within the high-risk fatality category (see Table 2). Therefore, 85% of the recorded bat activity at the Kraaltjies WEF site is expected to be at risk of fatality during the operational lifespan of the turbines.

Species diversity is often higher at lower altitudes, which is demonstrated in Figure 19, depicting the species recorded at all the monitoring points. System N, at 98 m on the Met mast, recorded 88% *T. aegyptiaca,* while the 52 m system (O) on the Met mast, recorded 89% of this species. The second highest percentage of calls were made by *S. petrophilus*, respectively 12% and 11% on these two systems. Generally, at Kraaltjies WEF, one doesn't observe much of a difference in species diversity between the 98 m system and the 52 m systems. In total, nearly 100% of the bats recorded at these two systems belong to the two Molossidae species, *T. aegyptiaca* and *S. petrophilus*.

The expected difference in species diversity between high altitude and 8 m systems is seen when the data from height is compared to the data from the 8 m systems. A higher percentage of *Neoromicia capensis* was recorded at the two 8 m systems. The Met low system (P) recorded 76% *T. aegyptiaca,* 19% *S. petrophilus* and 5% *N. capensis,* while the 10 m mast system (Q) situated in a valley with a relatively higher occurrence of trees and rock formations, recorded a higher percentage of *N. capensis,* namely 28%, 9% *S. petrophilus* and only 61% *T. aegyptiaca.* Noteworthy is that 2% of the activity at system Q belongs to the endangered *Miniopterus natalensis* at this system.

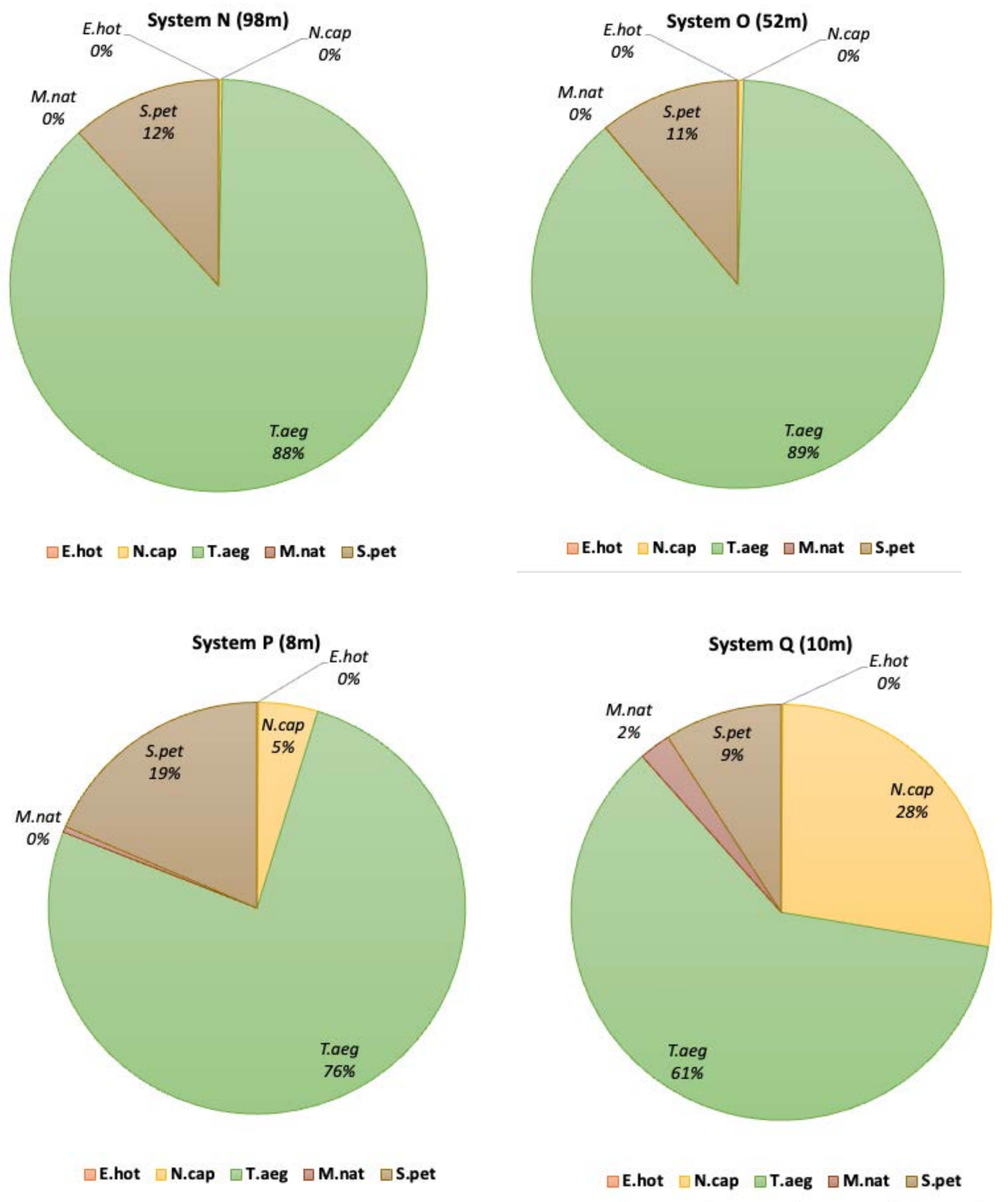

Figure 19: Species diversity at each monitoring site

3.3.2. Temporal distribution of bat passes over the monitoring period

Figure 20 indicates the weekly temporal distribution of bat passes over the monitoring period. The blue bar in the histogram depicts higher activity, indicating the relatively higher occurrence of *T. aegyptiaca* during the monitoring period. One can observe higher activity during the warmer summer months, with activity starting to increase from October, with several peaks from December 2021 to March 2022.

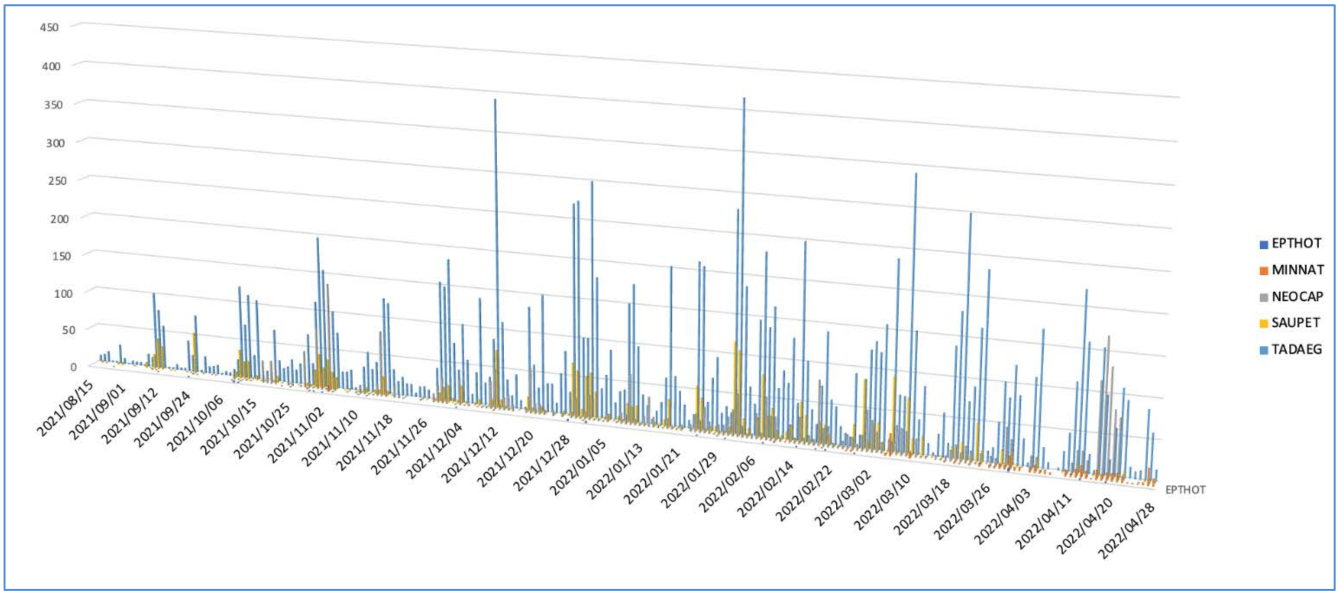

Figure 20: Temporal distribution of bat passes over the monitoring period

3.3.3. Species distribution and activity per monitoring station

The difference in species recorded at the various systems can be observed in **Error! Reference source not found.**. Although this provides a picture of which species were recorded at which systems, one cannot compare the total bat activity of the 98 m system with the other systems, as there was a period of data loss, see **Error! Reference source not found.**.

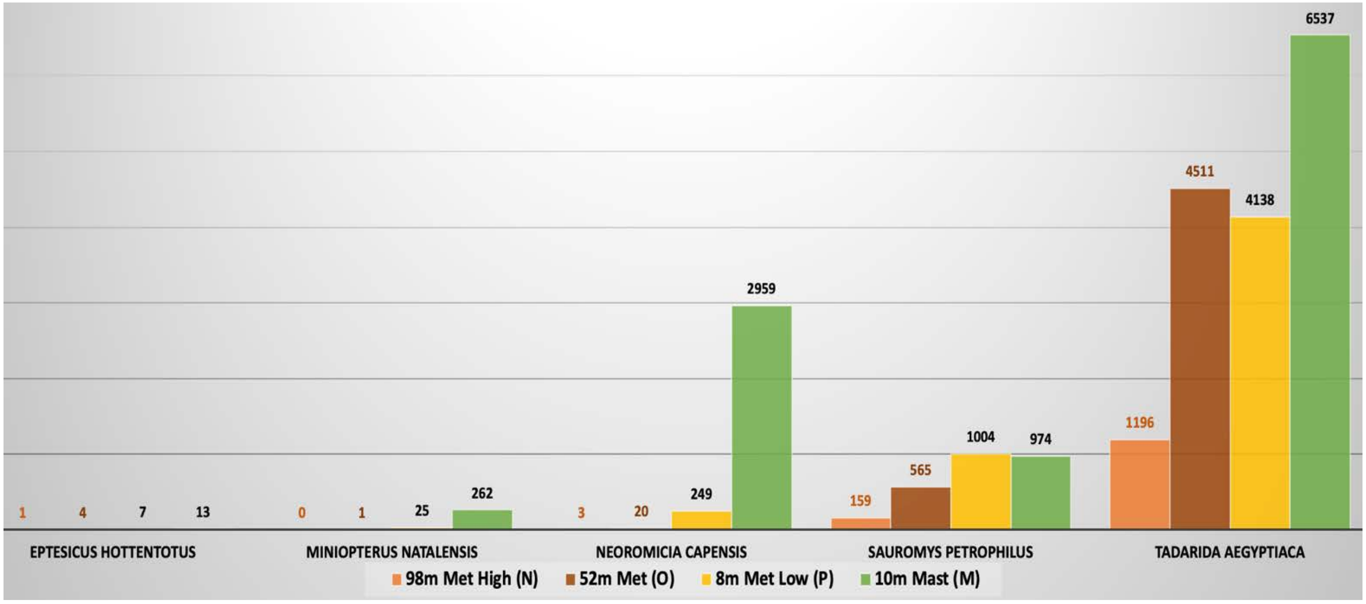

Figure 21: Species and activity per monitoring station

3.3.4. Hourly bat passes per night

The total number of nightly bat passes per hour for the monitoring period is shown in Figure 22. These figures provide insight into the general distribution of bat activity during each night, from sunset to sunrise. The hourly bat activity data is important for the development of mitigation schemes. As expected, higher activity is portrayed three to four hours after sunset, while a gradual decline of activity is shown from approximately five hours before sunrise.

Figure 22 incorporates data for the monitoring period to date. The data shows a general trend, as sunset and sunrise shift with the seasons. These patterns are of importance if mitigation measures are to be developed, as they indicate the most active periods during the night, but more refined monthly data will be taken into consideration if a mitigation programme is developed.

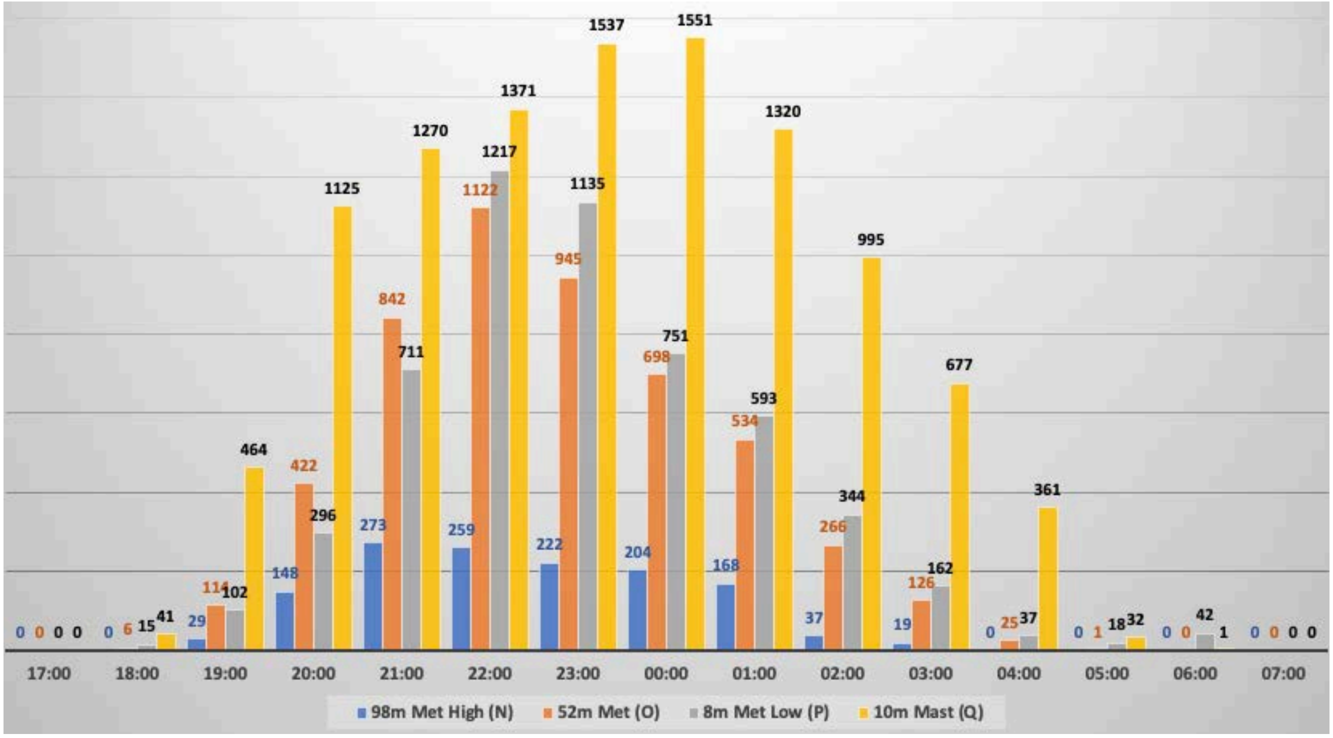

Figure 22: Total hourly nightly bat passes

3.3.5. Average monthly bat activity

The total monthly bat activity is portrayed in Figure 23. In this histogram, it can be observed that activity increases gradually from September, with a peak in February and a slight decline in activity during March. Thereafter a decline is observed in April. It is expected that, as the colder weather sets in, a further decline will be experienced towards the winter months, but one will only be able to confirm this when more data is available.

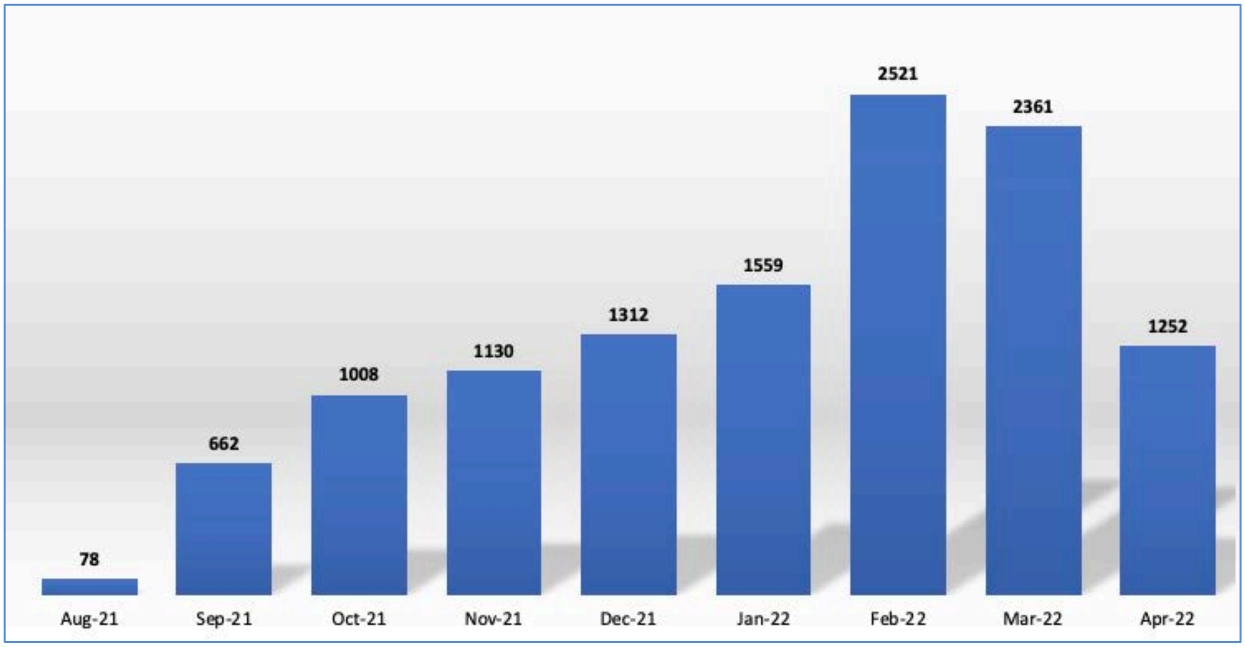

Figure 23: Total monthly bat activity

Figure 24 indicates the average hourly bat activity for each monitoring station. By using averages, the activity of monitoring systems could be compared. Although the species diversity, Section 3.3.1, was quite similar when comparing the 98 m (N) and 52 m (O) systems, the bat activity between 98 m and 52 m differs significantly when compared, with higher activity recorded at 52 m. There seems to be a decline in activity with increased altitude, as System N, situated at 98 m, portrays lower activity when compared to Systems O, at 52 m, and P, at 8 m. The difference between System O and P is minute, while the high system indicates substantially lower activity. Systems N and O should be closely observed, as these systems are situated within the sweep of the turbine blades. The high activity at System Q can be clearly seen in Figure 24. The final report will provide a picture of the whole monitoring period, indicating possible mitigation measures to curb predicted bat activity.

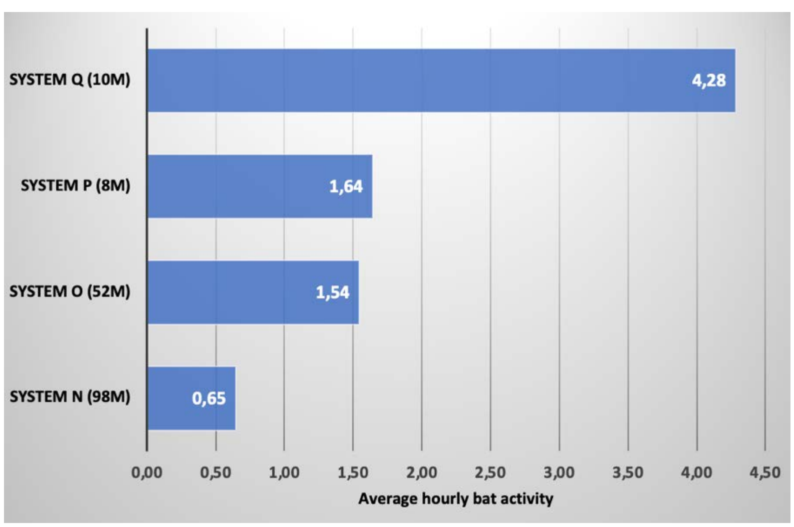

Figure 24: Median of hourly bat activity per system

3.2. TRANSECTS

Transects are a snapshot in time, however, the data from this sampling assists to confirm species present at the site. The transect route, with the stationary monitoring points, is depicted in Figure 25. A SM4 GPS was linked to the detectors so that the route is recorded while driving. The detector was calibrated each time at the start of the transect.

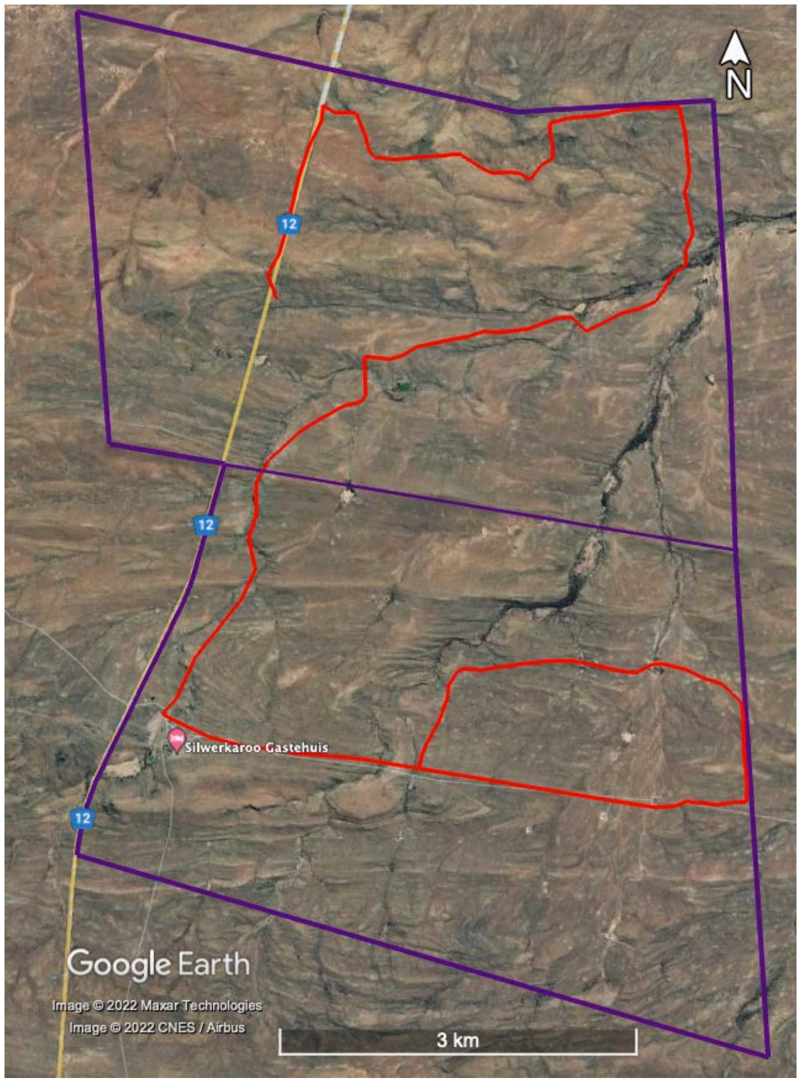

Figure 25: Transect route

A transect was conducted on 23 November 2021. The average temperature during the transect was 16 ^{o}C, while an average Southeastern wind speed of 3 m/s, with a partly cloudy sky, were recorded. No bats were recorded during the transect.

4. CONCLUSION

Of the 12 species with distribution ranges that include the proposed development area, four have a conservation status of Near Threatened in South Africa and one Vulnerable, while three have a global conservation status of Near Threatened. *Eptesicus hottentotus* (the Long-tailed serotine) and *Cistugo seabrae* (the Angolan wing-gland bat) are endemic to Southern Africa and have limited suitable habitat left, mainly due to agricultural activities. *Tadarida aegyptiaca* (Egyptian free-tailed), *Sauromy petrophilus* (Roberts's flat-headed bat), *Miniopterus natalensis* (Natal long-fingered bat) and *Neoromicia capensis* (Cape serotine) have a high risk of fatality and barotrauma from turbine blades due to their foraging preferences. Three more species, *Myotis tricolor* (Temminck's myotis bat), and two fruit bat species, *Eidolon helvum* (African straw-coloured fruit bat) and *Rousettus aegyptiacus* (Egyptian rousette) have a medium to high risk of fatality.

Calls similar to five of the 12 species that have distribution ranges overlaying the proposed development site were recorded by the static recorders. 73% of the calls were made by *T. aegyptiaca*, which is the dominant species on site. *T. aegyptiaca* is physiologically adapted to flying high and is thus a species at high risk of collision with turbine blades, as well as barotrauma. The second highest percentage of calls was made by *N. capensis (14%),* followed by *S. petrophilus (12%).* 1% of the globally as well as regionally Near Threatened *M. natalensis* and a statistically insignificant number of the endemic *E. hottentotus* have also been observed at the development site.

While a similarity was observed in species diversity between the systems situated at 98 m (N) and 52 m (O), the activity was significantly higher at 52 m. A higher occurrence of *N. capensis* was observed at the 8 m systems. 2% of the calls recorded at System Q, situated at an open reservoir in a valley bed, were that of the endangered *M. natalensis.* System Q recorded significantly higher activity than the other systems.

The total number of nightly bat passes per hour for the monitoring period provides insight into the general distribution of bat activity during each night, from sunset to sunrise. As expected, higher activity was recorded three to four hours after sunset, while activity gradually declined from approximately five hours before sunrise.

There was a gradual increase in monthly bat activity from September, with a peak in February and a slight decline in activity during March. Thereafter a decline was observed in April. It is expected that a further decline will be experienced in the winter months, as the colder weather sets in. This must be confirmed when more data are available.

A transect was conducted during November 2021, in optimal weather conditions, but no bats were recorded during the transect session.

Potential impacts on bats are summarised as follows:

Construction phase:

- Loss of existing roosts and/or potential roosts
- Bats attracted onto the site by the artificial creation of new potential roosting areas

Operational phase:

- Direct collisions with rotating turbine blades
- Fatalities from barotrauma

- Loss of foraging habitat

Based on available data, the following can be concluded. High bat activity was experienced from the middle of summer to early autumn. In general, no red flags at this stage suggest the development could not progress to the next phase. However, development must not take place in certain sensitive areas of the proposed WEF, such as the riverbeds and valley hills, where high activity was observed. A sensitivity map, indicating these areas to be avoided, will be provided and possible mitigation measures will be recommended in the final bat monitoring report.

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Appendix 1 – Specialist CV

ABBREVIATED CURRICULUM VITAE: STEPHANIE CHRISTIA DIPPENAAR

Stephanie Dippenaar Consulting, trading as Ekovler

PROFESSION: ENVIRONMENTAL MANAGEMENT, SPECIALISING IN BAT IMPACT ASSESSMENTS

Nationality: South African
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CONTACT DETAILS

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EDUCATION

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

MEMBERSHIPS

- Steering committee of The South African Bat Assessment Association
- 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 Earthlife 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 Khoe Wind Energy Facility	Bat specialist
In progress	Preconstruction Bat monitoring at Hugo Wind Energy Facility	Bat specialist
In progress	Operational bat monitoring at Roggeveld Wind Farm	Bat specialist
In progress	Operational bat monitoring at Kangnas Wind Farm	Bat specialist
In progress	Operational bat monitoring at Perdekraal East Wind Farm	Bat specialist
2022	Preconstruction Bat monitoring at Juno 2 and Juno 3 Wind Energy Facilities	Bat specialist
2022	Background study for the impact on bats by Small Scale Wind Turbines in Cape Town Municipality	Bat specialist
In progress	Preconstruction Bat monitoring at Patatskloof Wind Energy Facility	Bat specialist
In progress	Preconstruction Bat monitoring at Karee Wind Energy Facility	Bat specialist
In progress	Operational bat monitoring at Excelsior Wind Farm	Bat specialist
2021	Preconstruction Bat monitoring at Koup 1 and Koup 2 Wind Energy Facilities	Bat specialist
In progress	Preconstruction bat monitoring for two wind energy facilities at Kleinzee	Bat specialist
2021	Preconstruction bat monitoring at Komas and Gromis Wind Energy Facilities	Bat specialist
In progress	Preconstruction Bat monitoring at Kappa 1 and 2 Wind Energy Facilities	Bat specialist
2020	Preconstruction Bat monitoring at Kokerboom 3 and 4 Wind Energy Facilities	Bat specialist
2020	Operational bat monitoring at Khobab Wind Farm	Bat specialist

Completion	Project description	Role
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	Bat specialist
2019	12 Amendment reports	Bat specialist
2019	Preconstruction bat impact assessment for the Bosjesmansberg WEF	Bat specialist
2018	Preconstruction Bat Monitoring at the Tooverberg Wind Energy Facility	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
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(Letf 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

Completion	Project description	Role
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 Steering Committee of the South Africa Bat Assessment Association.
- Active member of the KZN Bat Rescue Group, assisting rescue bats and bat problems in buildings of residential areas.
- 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. Elaenor 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, February 2011.
- Attending a Biodiversity Course for Environmental Impact Assessments presented by the University of the Free State, May 2010.

LANGUAGE CAPABILITY

Fluent in Afrikaans and English, very limited Xhosa

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 AfriImage 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 2 – 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

Kraaltjies 240 MW Wind Energy Facility

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

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:

21 September 2022

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Stephanie C Dippenaar, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Stephanie Dippenaar Consulting trading as EkoVler

Name of Company

21 September 2022

Date

0619149-5 m/o
HPJ STEVENS

Signature of the Commissioner of Oaths

SUID-AFRIKAANSE POLISIEDIENS
STASIE BEVELVOERDER
STELLENBOSCH
2022 -09- 21
STATION COMMANDER
STELLENBOSCH
SOUTH AFRICAN POLICE SERVICE

Date

Details of Specialist, Declaration and Undertaking Under Oath

Page 3 of 3

Appendix 3 – Site Sensitivity Verification Report

Site Sensitivity Verification Report: Kraaltjies 240 MW Wind Energy Facility

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

1 INTRODUCTION

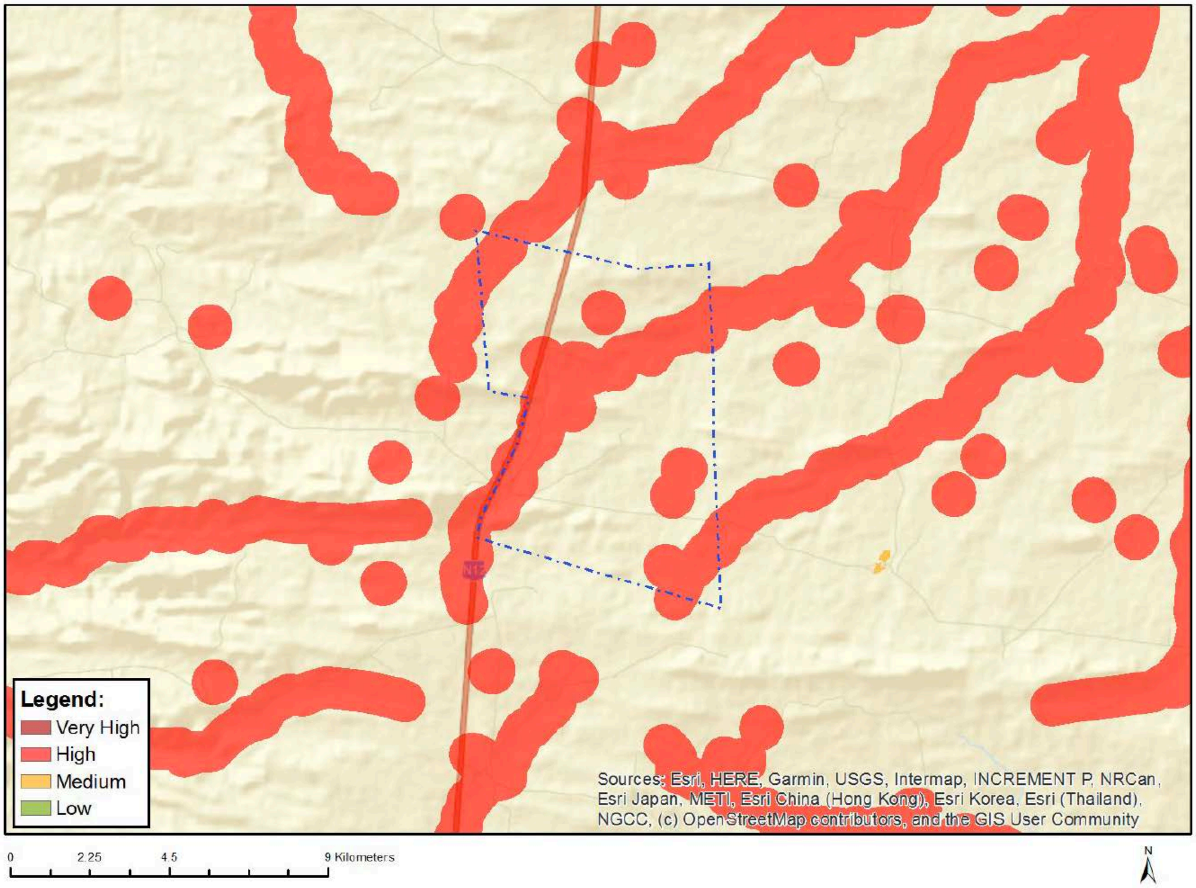
South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing to construct a 240 Megawatt (MW) Wind Energy Facility (WEF), known as the Kraaltjies 240 MW WEF, with associated grid infrastructure, close to Beaufort West in the Central Karoo.

The project site is located on Portion 10 and Portion 25 of the Farm Brits Eigendom No. 374, within the Beaufort West Local Municipality in the Central Karoo District Municipality. The site is located east of the N12 national road, en route to Beaufort West in the Western Cape Province. A 240 MW WEF with an estimated 60 turbines and associated infrastructure is proposed, covering a study area of 3 994.9 ha with a current buildable area of 735 ha.

Stephanie Dippenaar Consulting, trading as EkoVler, was appointed to conduct a minimum of 12-month pre-construction bat monitoring, to inform the Environmental Assessment process for the proposed WEF. This pre-construction bat monitoring commenced in August 2022. Data included between 15 August 2021 and 27 April 2022 is included in this bat scoping report.

2 SITE SENSITIVITY VERIFICATION

The national web-based environmental screening tool, as per the Specialist Assessment Protocols published in GN 320 on 20 March 2020, was applied to the study area. This was undertaken to confirm the current land use and environmental sensitivity of the proposed project area. It was determined that areas of high bat sensitivity are expected to occur within the project site, as shown in Figure A below.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity	***Features(s)***
High	Within 500 m of a river
High	Wetland
High	Within 500 m of a wetland
Medium	Croplands

Figure A: Expected bat-sensitive features at the Kraaltjies 240 MW WEF, as depicted by the Screening Tool

To verify this classification, the following methods were applied as part of the 12-month pre-construction bat monitoring exercise:

- A desktop analysis was undertaken, based on available national and provincial databases, existing reports from the surrounding area, as well as digital satellite imagery (Google Earth Pro and QGIS).
- On-site inspections and roost searches were conducted by a bat specialist during fieldwork sessions.
- Data, consisting of nightly bat activity, was recorded from 15 August to 27 April 2022 from four static monitoring points, which were positioned, amongst others, within the sweep of the proposed turbine

blades at heights of 8 m, 10 m, 52 m, and 98 m respectively. The systems represented the different biotopes within the project site.

- Interviews with landowners and investigations of farm dwellings were conducted.

3 THE OUTCOME OF THE SITE SENSITIVITY VERIFICATION

See Table A below for photos indicating bat conducive features at the Kraaltjies WEF project site.

Table A: Environmental features that may be favourable to bats

	**Vegetation** Although most of the project site is covered in the typical Karoo vegetation of the area, for those bats that might prefer roosting in vegetation or under the bark of trees, the relatively denser trees and bushes situated in the dry riverbeds provide roosting opportunities.
	**Rock formations and rock faces and animal burrows** Rock formations along the low hill tops and along the river valleys provide ample roosting opportunities for bats.
	**Derelict animal burrows** Bats can also make use of abandoned burrows or aardvark holes as roosts.
	**Human dwellings and farm buildings** Human dwellings could provide roosting space for some bat species and evidence of bats were found at Silver Karoo farm dwellings. Culverts and stone walls also provide roosting sites.

Open water and food sources
Water troughs for the livestock, farm dams and water collecting in the riverbeds not only provide water to drink for bats, but also promote insect activity which could result in relatively higher bat activity after rainy spells.

As indicated in the Screening Tool Site Sensitivity Map, Figure B, the project site is classified as high sensitivity mainly due to the availability of natural water resources. Although the 12 months of bat monitoring data analyses have not been completed yet, the investigation has confirmed the high sensitivity, with added sensitivity zones on the site sensitivity map below. Some environmental features, amongst others, may be favourable to bats are indicated in Table A. The bat index for the whole monitoring year for Nama Karoo has not been calculated yet, and one can only truly confirm or reject the screening tool classification when a year's data, including all seasons, is available. Up to now, there is an indication of high bat activity, but the study also shows that there are areas between the high sensitivity zones, which could be utilised for wind turbine development.

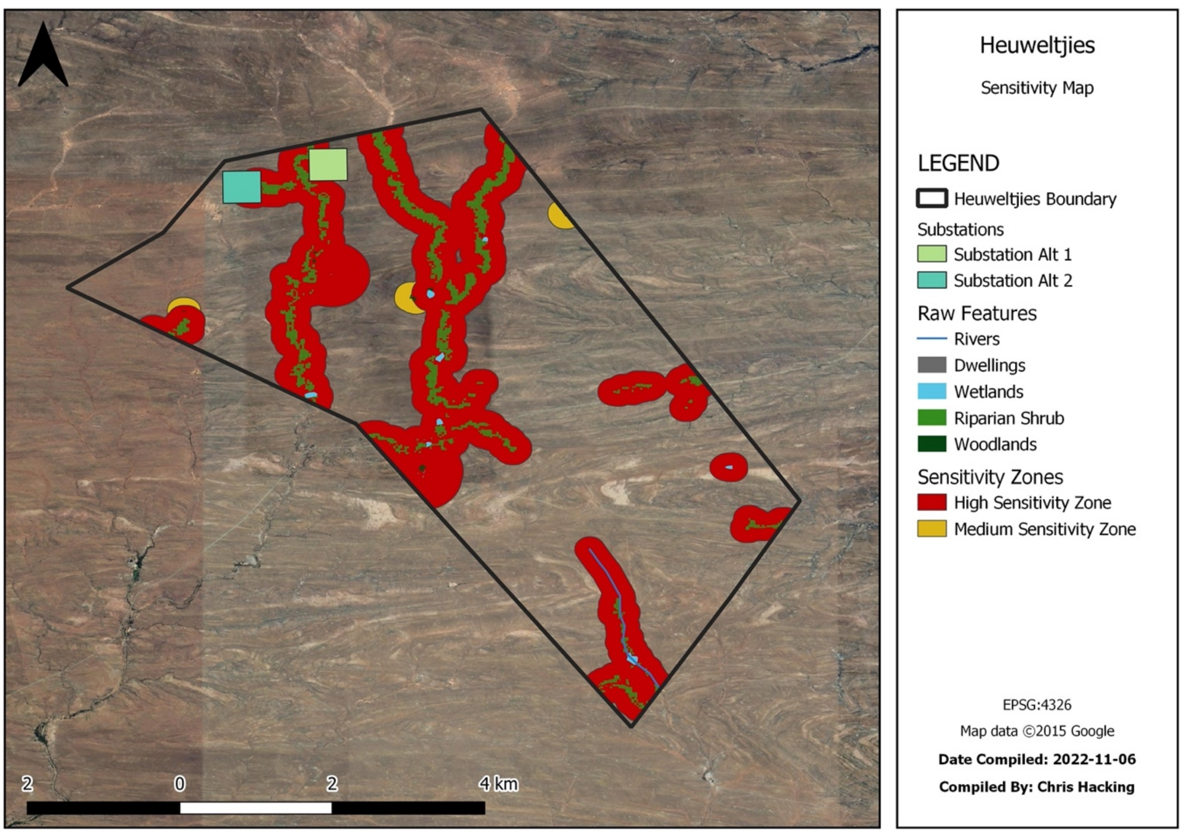


Figure B: Bat sensitivity map at the Kraaltjies 240 MW WEF, as confirmed during the 9-months bat monitoring as described in the main report

4 CONCLUSION

The Site Sensitivity Verification Report indicates that area proposed for the Kraaltjies 240 MW WEF has high bat sensitivity. Some of drainage lines, with relatively larger trees and denser bushes, are particularly conducive to bat activity. At present, the site sensitivities have been verified to be high by the specialist, but this can only be confirmed after the full twelve months of monitoring have been incorporated into the study.