CAMISSA
SUSTAINABILITY CONSULTING

TAAIBOS NORTH WIND ENERGY FACILITY
NORTHERN CAPE, SOUTH AFRICA
BAT (CHIROPTERA) EIA REPORT

October 2022

Produced for
WKN-Windcurrent SA (Pty) Ltd
Cape Town, South Africa

WKN Windcurrent

Produced by
Camissa Sustainability Consulting
Amsterdam, Netherlands

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

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Appendix 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 4
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 5.1, Section 6
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 4
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 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 6
g) an identification of any areas to be avoided, including buffers;	Section 6, Figure 5
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;	Appendix 1 (Figure 5)
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	Section 5

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
k) any mitigation measures for inclusion in the EMPr;	Section 6
l) any conditions for inclusion in the environmental authorisation;	Section 6
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 6
n) a reported 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 7
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	NA
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	NA
q) any other information requested by the competent authority.	NA
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.	NA

1 INTRODUCTION

This report has been prepared for WKN-Windcurrent SA (Pty) Ltd ("WKN") for the proposed Taaibos North wind energy facility (WEF) WKN intends to develop in the Northern Cape, South Africa ("the project"). The project is located approximately 16 km east of Loxton, and forms part of a larger cluster of four other projects also being developed by WKN concurrently.

1.1 Scope and Objectives

This report presents a Bat (Chiroptera) Specialist Assessment for the Taaibos North WEF. Collisions with wind turbine blades are a major cause of bat mortality globally (Cryan, 2011; O'Shea et al., 2016). Given the nature, scale, and uncertainty of these impacts to bats, specialist studies are required to assess the risks of renewable energy infrastructure on bats (MacEwan et al. 2020, SANBI 2020, Bennun et al. 2021). This assessment forms part of the EIA phase for Environmental Authorisation of the project.

The objectives of this assessment are to present the baseline ecological condition of the project for bats, and to use these characterisations to predict and assess the potential impact of the project on bat species and their habitats as well as to provide actions to mitigate impacts if required. The specific terms of reference that guided the compilation of this EIA report were:

- Describe the baseline environment of the project and its sensitivity relative to bats;
- Identify the nature of potential impacts of the proposed project on bats during construction, operation and decommissioning;
- Identify information gaps and limitations; and
- Identify potential mitigation or enhancement measures to minimise impacts to bats.

1.2 Project Technical Description

A preferred AoI has been identified by WKN as a technically suitable area for the development of the Taaibos North WEF, with a contracted capacity of up to 270 MW of wind energy. The project is located on farm portions RE/148, 1/200, 3/200, 2/200, 1/145, 4/145, RE/201, 1/250. The technical specifications of the facility are provided in Table 1 and Table 2.

Table 1: Taaibos North WEF Design Specifications

Number of turbines	Up to 40
Power output per turbine	Unspecified
Facility output	Up to 270 MW
Turbine hub height	Up to 200 m
Turbine rotor diameter	Up to 240 m
Turbine blade length	Up to 120 m
Turbine tip height	Up to 320 m
Turbine road width	14m to be rehabilitated to 8m
BESS Technology	Solid State (Li-Ion) or REDOX-Flow (High level risk assessment for both) – 10 ha / 2700 MWh

Table 2: Taaibos North WEF Construction Specifications

FACILITY COMPONENT	CONSTRUCTION FOOTPRINT	FINAL FOOTPRINT AFTER REHABILITATION
Permanent Laydown Area	TOTAL 3000 m^2 x 40 turbines = 120 000 m^2 which equates to 12.0 ha	TOTAL 3000 m^2 x 40 turbines = 120 000 m^2 which equates to 12.0 ha
Temporary Laydown Area	TOTAL 3000 m^2 x 40 turbines = 120 000 m^2 which equates to 12.0 ha	TOTAL 0 m^2 x 40 turbines = 0m^2 which equates to 0 ha
Turbine Foundation	TOTAL Up to 900m^2 x 40 turbines = 36 000 m^2 which equates to 3.6 ha	TOTAL Up to 900m^2 x 40 turbines = 36 000 m^2 which equates to 3.6 ha
WEF Substation	33/132kV Substation - 1.5ha Offices and parking - 0.5ha Permanent Laydown - 1ha	33/132kV Substation - 1.5ha Offices and parking - 0.5ha Permanent Laydown - 1ha
BESS	TOTAL 10ha / 2700MWh	TOTAL 10ha / 2700MWh
Temporary Laydown Area, Concrete Tower Manufacturing Facility and Construction Compound	10 ha clearance includes Temporary laydown Construction compound Concrete batching plant Crusher plant All to become area cleared for BESS (above) afterwards.	10 ha clearance includes Temporary laydown Construction compound Concrete batching plant Crusher plant All to become area cleared for BESS (above) afterwards.
Collector Substation	10ha	10ha
New Internal Access Roads (14 m construction, rehabilitated to 8 m during operation)	TOTAL 40 000 m x 14m = 560 000 m^2 which equates to 56.0 ha	TOTAL 40 000 m x 8m = 320 000 m^2 which equates to 32.0 ha
Upgraded Existing Internal Access Roads	TOTAL (better estimate coming with civil layout) 40 000 m x 14m = 560 000 m^2 which equates to 56.0 ha	TOTAL (better estimate coming with civil layout) 40 000 m x 8m = 320 000 m^2 which equates to 32.0 ha
TOTAL FOOTPRINT:	159.6 ha *of clearing needed for the construction phase of the development of the proposed WEF*	99.6 ha *of clearing remaining during the post-construction operational phase (after rehabilitation) of the proposed WEF*

2 ASSUMPTIONS AND LIMITATIONS

The core techniques used to assess bat activity in this study are acoustic monitoring and roost surveys both of which have several limitations which will influence the findings and recommendations of this study.

Acoustic monitoring allows for rapid, passive collection of a large volume of bat activity data which can help identify the bat species present within a particular location and their associated spatio-temporal relative activity patterns. In the context of wind farms, acoustic monitoring is therefore a useful technique however, there are several constraints that must be acknowledged. These are discussed in detail by Voigt et al. (2021), Adams et al. (2012), and Kunz et al. (2007a) and fundamentally, include that acoustic monitoring cannot provide an indication of bat abundance or population size at a site. In addition, population demographics such as age and sex of bats cannot generally be determined from echolocation calls. Due to the large volume of data collected by bat detectors it is impractical and prohibitively time-consuming to inspect each file for echolocation calls and to identify the associated bat species. Specialised statistical software uses bat call reference libraries to automate the identification process but developing such libraries is challenging given the variation individual species display in their echolocation call structure and overlap between species. This study used the Wildlife Acoustics library "Bats of South Africa Version 5.4.0", but this excludes reference calls for most South African species thus these may have been overlooked. However, given the duration of the monitoring and spatial coverage of the detectors, the acoustic data provides a reasonable inventory of the species present, and a good indication of the relative magnitude of bat activity. Lastly, bat activity is notably variable in response to a number of factors such as land use change, climactic variability, variations in prey abundance and meteorological conditions which can vary over different time scales. Since this study is limited to 12 months, the baseline conditions presented here may not be representative of activity over longer time frames meaning risk may be misinterpreted.

The major limitation with roost surveys is finding roosting bats. Bats use a diversity of roosting sites including trees, buildings, crevices, and underground sites (caves and mines). The presence of these features at a site can help to target roost searches but evidence of bats may not always be apparent even if bats are present. Importantly, the absence of bat evidence in these situations does not equate to evidence of bat absence (Collins 2006). Thus, this study uses a precautionary approach and will apply buffers to roosts (largely buildings and rocky crevices) even if bats were not located given their potential role in supporting roosting bats.

Finally, it is difficult to assess the risk to bats during operation of the proposed facility based on acoustic data collected during pre-construction surveys. For example, Hein et al. (2013) showed that pre-construction bat activity was not a significant indicator of collision risk. Lintott et al. (2016) argued that environmental impact assessments do not predict the risks to bats accurately. This may partly be because it is hypothesized that bats may be attracted to wind turbines (Cryan and Barclay 2009, Guest et al. 2022) which some evidence suggests may be the case (Horn et al. 2008, Richardson et al. 2021). While this report makes predications about the potential risk to bats posed by the project, these carry a degree of uncertainty and must be verified by using post-construction surveys to ensure that the predictions are accurate and bat behaviour has not altered from pre-construction levels (Lintott et al. 2016).

3 LEGAL REQUIREMENTS AND GUIDELINES

There are various international, regional and local legislation, policies, regulations, guidelines, conventions, and treaties in place for the protection of biodiversity, under which bats would also be protected or considered. These create a policy environment aiming to prevent excessive impacts to biodiversity. Specific policies include the following:

- Convention on Biological Diversity Post-2020 Global Biodiversity Framework
- United Nations Sustainable Development Goals
- Convention on the Conservation of Migratory Species of Wild Animals (1979)
- Convention on Biological Diversity (1993)
- Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (NEMA, Act No. 107 of 1998)
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
- Northern Cape Nature Conservation Act (Act 9 of 2009)
- The Equator Principles (2013)

- The Red List of Mammals of South Africa, Swaziland and Lesotho (2016)
- South Africa National Biodiversity Strategy and Action Plan (2005)
- South African Good Practise Guidelines for Surveying Bats in Wind Energy Facility Developments – Pre-Construction (2020)
- South African Good Practise Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (2020)
- South African Bat Fatality Threshold Guidelines (2018)
- Mitigation Guidance for Bats at Operational Wind Energy Facilities in South Africa (2018)

4 ASSESSMENT METHODOLOGY

The Project Area of Influence (PAOI) was defined as the AoI plus a 10 km buffer given that bats are volant mammals (Scottish Natural Heritage 2019). This area was studied at a desktop level to determine which bat species (i.e., impact receptors) are likely to occur at the project, to provide information on their natural history and conservation status, and to contextualise the project site within the larger social-ecological environment with respect to bats. Bats were also studied through field surveys in the AoIs of all five proposed WEFs in the development cluster (Figure 1). The field data from this larger area, as well as the desktop information from the PAOI, was used to assess impacts for each WEF individually.

During the field surveys, bat activity was sampled at 12 locations with Wildlife Acoustics, Inc. SM4 bat detectors (Figure 1, Table 3). At eight locations, SMM-U2 microphones were positioned at the top of a 10 m aluminium mast. At two locations each (T2 and S2), microphones were positioned on a meteorological towers at 60 m and 140 m respectively to record bats at two heights. At two locations (T6 and S6) a shorter meteorological tower at which microphones were positioned at 60 m was used as well. Sampling took place nightly from sunset to sunrise.

The sampling period included winter, spring, summer, and autumn. The monitoring period therefore spans the full annual cycle and as such provides a representative sample of annual bat activity patterns and how this changes seasonally.

Roost surveys entailed discussions with landowners to locate any known roosts or potential roosts with evidence of bats. In addition, buildings at farmsteads within the AoIs, as well as a ridgeline with rocky outcrops/crevices (Figure 1), were systematically surveyed during field visits in July 2021 (winter), October 2021 (spring) and January 2022 (summer). The surveys aimed to directly observe roosting bats, locate evidence of roosting bats (e.g., culled insect remains, fur-oil-stained exit and entry points, guano/droppings), and assess the likelihood for each potential roost to support bats.

Acoustic data retrieved from each bat detector were processed using Kaleidoscope® Pro (Version 5.4.2, Wildlife Acoustics, Inc.). Bats were automatically identified using the embedded “Bats of South Africa Version 5.4.0” reference library and verified by inspecting echolocation files. The number of acoustic files recorded was used as a measure to quantify bat activity.

Table 3: Summary of the Bat Acoustic Monitoring Sampling Locations and Effort

Bat Detector	Coordinates	# Sample Nights	Altitude (m)	Nearest Habitat Features
T1	31.624698°S 22.519940°E	303	1,467	At farmstead, with farm dams and trees
T2	31.587314°S 22.537918°E	140 m – 325 60 m - 365	1,469	120 m from dry water course, 730 m from rocky outcrop, microphones sampling open air habitat at 60 m and 140 m
T3	31.653809°S 22.499427°E	365	1,488	35 m from rocky outcrop, at base of small ridgeline, 250 m from farm dam and drainage area

Bat Detector	Coordinates	# Sample Nights	Altitude (m)	Nearest Habitat Features
T4	31.508794°S 22.591075°E	365	1,535	290 m from NFEPA river, 113 m from non-perennial stream, 300 m from boulder piles
T5	31.582265°S 22.471836°E	365	1,467	260 m from rocky outcrop, at base of koppie
T6	31.643892°S 22.493630°E	317	1,466	350 m from farm dam, microphone sampling open air habitat at 60 m
S1	31.488557°S 22.635047°E	365	1,372	378 m, 908 m and, 1.2 km from farm dam
S2	31.619094°S 22.794839°E	365	1,342	880 m from wetland, microphone sampling open air habitat at 60 m and 140 m
S3	31.575674°S 22.802260°E	365	1,371	At base of ridgeline with rocky habitat
S4	31.658429°S 22.777069°E	365	1,314	Midway up 12 % slope, 160 m from rocky outcrop
S5	31.532380°S 22.702309°E	365	1,349	120 m from wetland, 160 m from farm dam
S6	31.556770°S 22.736294°E	311	1,353	Microphone sampling open air habitat at 60 m

5 SPECIALIST FINDINGS

5.1 Ecological Baseline

The AoIs are all situated in the arid Nama Karoo Biome and the landscape is characterised by relatively flat or gently sloping plains interspersed with mountainous terrain (inselbergs and koppies). The vegetation is dominated by Eastern Upper Karoo comprising low growing shrubs and bunch grasses thus the vegetation structure has limited heterogeneity. The vegetation is more structurally complex in association with aquatic resources (rivers, drainage areas) and in isolated areas (e.g., at farmsteads and livestock watering points) where trees are present. Small areas of Upper Karoo Hardeveld intrude into some AoI's which is associated with steep slopes of koppies, butts, mesas as well as with large boulders and stones (Mucina and Rutherford 2006). The climate of the AoIs is arid, with low, unreliable rain which falls mostly in late summer and early autumn, peaking in March (Mucina and Rutherford 2006). Most rivers are non-perennial with six flowing through the AoIs including the Brak, Klein-Brak and Sout rivers. Critical biodiversity areas and Ecological support areas have been identified for large portions of the PAOI (Figure 1).

Bat roosting sites in the AoIs are relatively limited and unlikely to support large congregations of bats. The closest known major bat roost is approximately 75 km north. Rocky outcrops are present and these geological features may provide roosting spaces for species such as Roberts's flat-headed bat, Egyptian free-tailed bat, Lesueur's hairy Bat, and Long-tailed serotine that roost in rocky crevices (Monadjem et al. 2018). The Long-tailed serotine roosts in small groups of a few individuals while Roberts's Flat-headed bat tends to roost communally in small groups of tens of individuals (Jacobs and Fenton 2002). Egyptian free-tailed bats can roost in groups of tens to a few hundred individuals (Herselman and Norton 1985).

Bats are also likely to roost in buildings associated with farmsteads within and bordering the project especially Cape serotine and Egyptian Free-tailed Bat (Monadjem et al. 2018). Trees growing at these farmsteads, and in limited places elsewhere on site usually at livestock water points, could also provide roosting spaces for bats although the extent of this is limited since these trees are typically not large and day-time temperatures may be too hot to use them as roosts (Monadjem et al. 2018). The building inspections on site did not reveal any evidence of roosting bats however based on the magnitude of bat activity recorded at T1, which is located at a farmstead, it is likely that bats are roosting in buildings and/or trees at this farmstead.

Sensitive features in the PAOI at which bat foraging activity may be concentrated include farmsteads, wetlands, farm dams, the livestock water points, rocky outcrops, and along drainage networks/riparian areas. The presence of water, vegetation and lighting at these features could promote insect activity and hence attract foraging bats. For example, Long-tailed serotine have been captured foraging for flies at a livestock kraal (Shortridge 1942). Activity could also be concentrated along the non-perennial rivers and smaller streams.

Based on current taxonomic information and bat occurrence data, 10 bat species could occur within the PAOI (Table 4). The majority have a low likelihood of occurrence apart from three species (Natal long-fingered bat, Cape serotine and Egyptian free-tailed bat) which have a high likelihood of being present since they are among the most widely distributed bats in South Africa (Monadjem et al. 2010).

Table 4: Bat Species Potentially Occurring within the Taaibos and Soutrivier PAOI

Common Name *Species Name*	Key Habitat Requirements*	Prob. of Occurrence	Conservation Status		WEF Risk[δ]
			IUCN[+]	RSA*	
Natal long-fingered bat *Miniopterus natalensis*	Temperate or subtropical species. Primarily in savannas and grasslands. Roosts in caves, mines, and road culverts. Clutter-edge forager.	**Confirmed (1,412 passes)**	LC/Unknown	LC	High
Cape serotine *Neoromicia capensis*	Arid semi-desert, montane grassland, forests, savanna and shrubland. Roosts in vegetation and human-made structures. Clutter-edge forager.	**Confirmed (60,871 passes)**	LC/Stable	LC	High
Egyptian free-tailed bat *Tadarida aegyptiaca*	Desert, semi-arid scrub, savanna, grassland, and agricultural land. Roosts in rocky crevices, caves, vegetation, and human-made structures. Open-air forager.	**Confirmed (64,456 passes)**	LC/Unknown	LC	High
Roberts's flat-headed bat *Sauromys petrophilus*	Wet and dry woodlands, shrublands and Acacia-wooded grasslands always in areas with rocky outcrops and hills. Roosts in narrow rock crevices and fissures. Open-air forager.	**Confirmed (4,255 passes)**	LC/Stable	LC	High
African Straw-coloured fruit bat *Eidolon helvum*	Non-breeding migrant in the PAOI.	Low	NT/D	LC	High
Long-tailed serotine *Eptesicus hottentotus*	Montane grasslands, marshland and well-wooded riverbanks, mountainous terrain near water. Roosts in caves, mines, and rocky crevices. Clutter-edge forager.	**Confirmed (610 passes)**	LC/Unknown	LC	Medium
Lesueur's wing-gland bat *Cistugo lesueuri*	Roosts in rock crevices, usually near water, associated with broken terrain (koppies and cliffs) in high-altitude montane vegetation. Clutter-edge forager.	Moderate	LC/Decreasing	LC	Medium
Egyptian slit-faced bat *Nycteris thebaica*	Savannah, desert, arid rocky areas, and riparian strips. Gregarious and roosts in caves but also in mine adits, Aardvark holes, rock crevices, road culverts, roofs, and hollow trees. Clutter forager.	Moderate	LC/Unknown	LC	Low
Geoffroy's horseshoe bat *Rhinolophus clivosus*	Savannah woodland, shrubland, dry, riparian forest, open grasslands, and semi-desert. Roosts in caves, rock crevices, disused mines, hollow baobabs, and buildings. Clutter forager.	Moderate	LC/Unknown	LC	Low
Damara Horseshoe bat *Rhinolophus damarensis*	Arid savannah and shrubland in the Nama-Karoo biome. Roosts in natural caves but will use mines.	Low	LC/Unknown	LC	Low

Common Name *Species Name*	Key Habitat Requirements*	Prob. of Occurrence	Conservation Status		WEF Risk δ
			IUCN†	RSA*	

*Child et al. (2016), *Monadjem et al. (2020); †IUCN (2021); δ MacEwan et al. (2020)

5.2 Pre-Construction Bat Monitoring Findings

A total of 131,604 bat passes were recorded across 365 sample nights. Approximately 46 % and 49 % of total bat activity was attributed to Cape serotine and Egyptian free-tailed bat respectively. The remaining three species accounted for 5 % of all activity.

Approximately 54 % of total activity was recorded at T1 and 72 % of this activity was attributed to Cape serotine. This species was recorded notably more often at T1, with 84 % of all its activity across the study area recorded here (Figure 2). Elsewhere on the site it was recorded orders of magnitude lower, and Cape serotine was also recorded seldomly at height. Moderate activity of this species was recorded during the following periods (Table 5): in spring and summer at S5, in summer at S4, in spring and summer at T3 and in summer at T5. Median Cape serotine activity was low in winter, apart from at T1 when it was moderate.

In contrast, median activity per night of Egyptian free-tailed bat was high or moderate across all seasons (apart from winter) and at most monitoring locations (Table 5). At S2, high activity was recorded at both 60 m and 140 m in autumn, spring, and summer. Activity at height at T2, S6 and T6 was also high but this varied by season: high in autumn and summer, and moderate in spring.

Median bat activity per night for Natal long-fingered bat, Long-tailed serotine, and Roberts's flat-headed bat was low for all seasons across all locations and sampling heights.

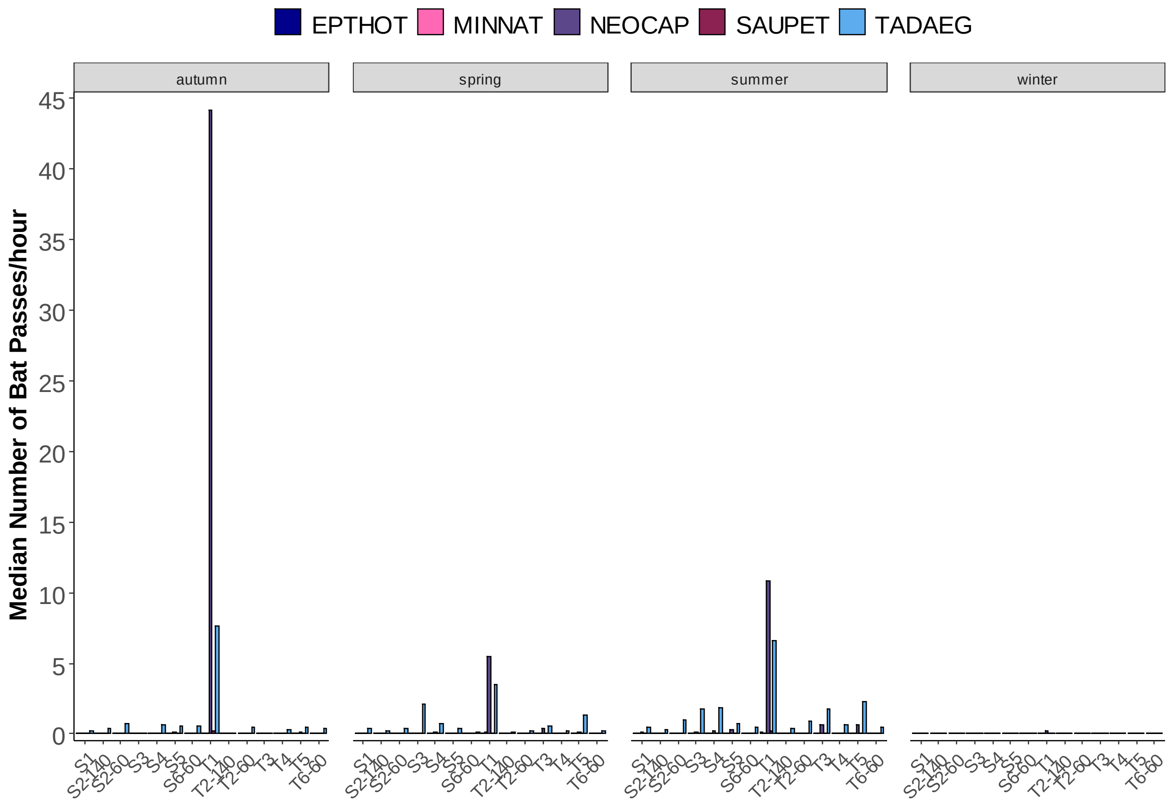

Figure 2: Bar chart showing the medium number of bat passes per night at each monitoring location per species in each season.

Table 5: Spatial risk profile of the AoI based on median bat passes/night (Risk = High, Medium, Low) for the two most common species.

Bat Detector	Cape serotine				Egyptian free-tailed bat			
	autumn	spring	summer	winter	autumn	spring	summer	winter
S1	0.1	0.0	0.1	0.0	0.2	0.4	0.5	0.0
S2-140	0.0	0.0	0.0	0.0	0.4	0.3	0.3	0.0
S2-60	0.0	0.0	0.0	0.0	0.8	0.3	0.9	0.0
S3	0.0	0.0	0.1	0.0	0.0	2.1	1.8	0.0
S4	0.1	0.1	0.2	0.0	0.7	0.7	1.9	0.0
S5	0.2	0.0	0.3	0.0	0.6	0.4	0.7	0.0
S6-60	0.0	0.0	0.0	0.0	0.5	0.1	0.5	0.0
T1	44.1	5.5	10.8	0.2	7.6	3.5	6.6	0.0
T2-140	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.0
T2-60	0.0	0.0	0.0	0.0	0.5	0.3	0.9	0.0
T3	0.0	0.4	0.6	0.0	0.0	0.6	1.7	0.0
T4	0.1	0.0	0.0	0.0	0.3	0.2	0.6	0.0
T5	0.1	0.1	0.6	0.0	0.5	1.3	2.2	0.0
T6-60	0.0	0.0	0.0	0.0	0.4	0.2	0.5	0.0

One of the key findings from the pre-construction monitoring is that Egyptian free-tailed bat is active at 140 m. Free-tailed bats are aerial-hawking bats whose morphology and echolocation strategy allow them to fly in open areas (Norberg and Rayner 1987), including at high altitudes (Fenton and Griffin 1997, Voigt et al. 2019). High median bat activity was recorded for this species at 140 m at S2 in autumn, spring, and summer while at T2, high activity was only recorded during summer, with moderate activity during spring, and low activity in autumn and winter. Egyptian free-tailed bats were also recorded at 60 m, at higher relative magnitudes compared to 140 m, although in some seasons, activity across the two heights was the same (Table 5). Further, Egyptian free-tailed bat activity at height was higher relative to ground level activity although this was variable. This species is flexible in its foraging strategy and it is thought that the habitat below has little influence on this species (Monadjem et al. 2020). It is likely roosting in rocky crevices in the AoIs in small groups and in farmstead buildings. The higher activity of this species near T1 suggests that this species is likely roosting in buildings at this farmstead. Cape serotine is also likely roosting here based on the magnitude of its activity at T1.

Although high activity was recorded for Cape serotine and Egyptian free-tailed bat at some monitoring locations at ground level, when disaggregating total nightly activity into hourly time periods, median activity levels are lower. For both species activity varied seasonally (Figure 3). In spring and autumn, activity was concentrated, at moderate levels, in the first few hours of the night, before reducing to low levels. While Cape serotine activity tended to disipate by 22:00, Egyptian free-tailed bat activity continued at moderate levels until 02:00 in spring and 00:00 in autumn.

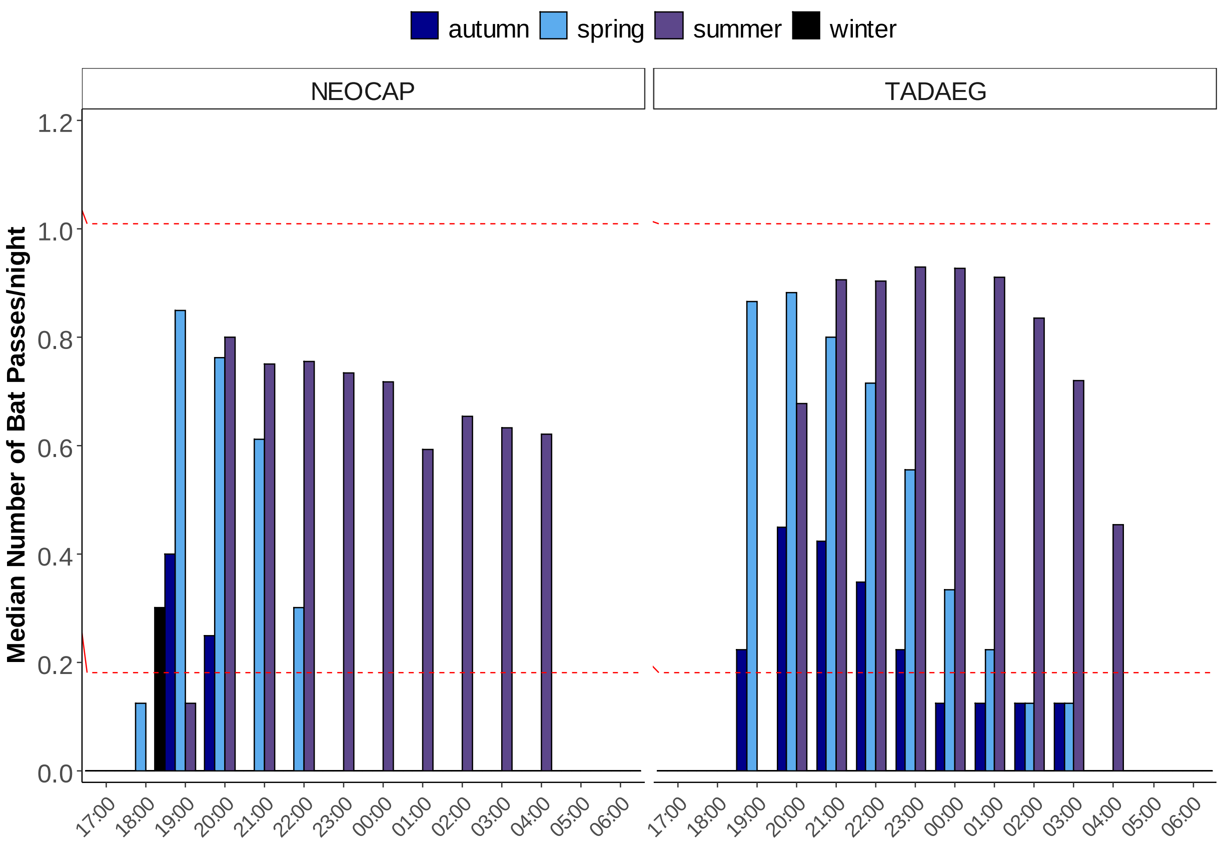

Figure 3: Median number of bat passes per night across nightly time periods for Cape serotine (NEOCAP) and Egyptian free-tailed bat (TADAEG) at ground level. 17:00 represents bat activity between 17:00 and 18:00 etc. Median bat activity between the two red lines represents medium risk.

At height, all species had low risk across all time periods except for Egyptian free-tailed bat. At 60 m and 140 m, this species had high median activity between 20:00 and 21:00 in autumn, and between 21:00 and 03:00 in summer (Figure 4). Outside of these periods, activity was either moderate or low.

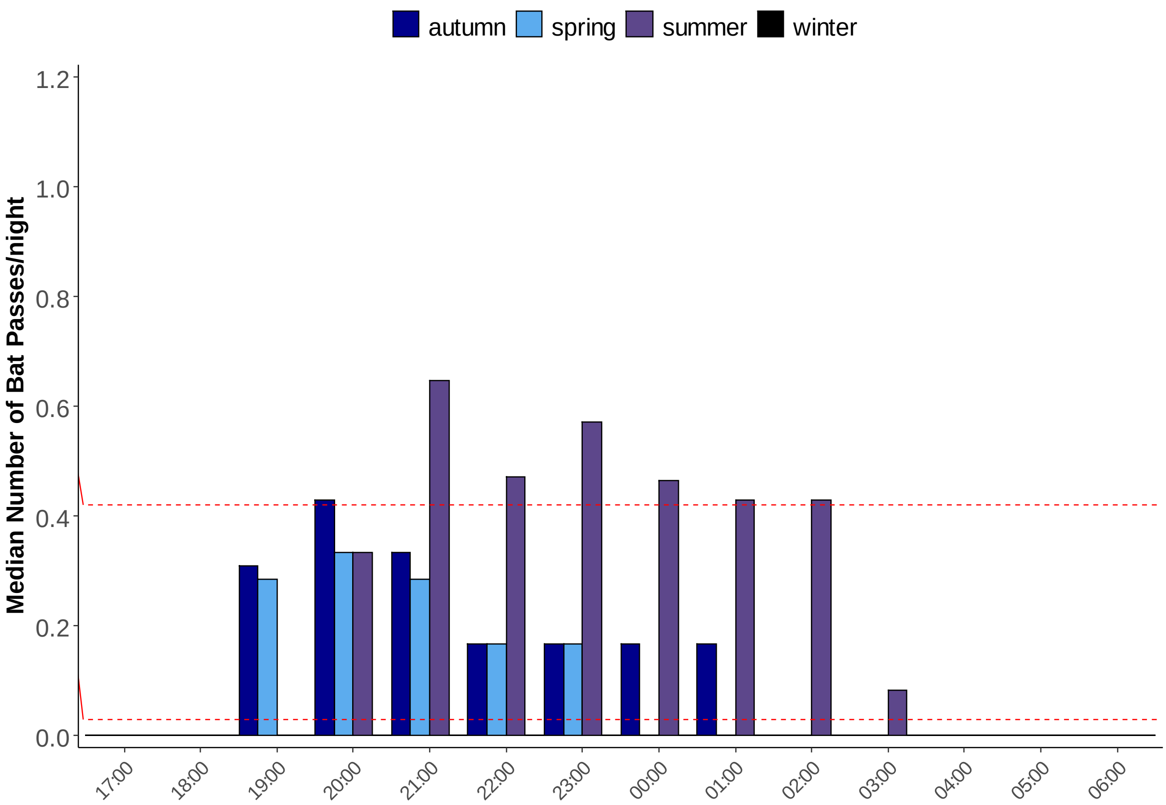

Figure 4: Median number of bat passes per night across nightly time periods for Egyptian free-tailed bat at height. 17:00 represents bat activity between 17:00 and 18:00 etc. Median bat activity between the two red lines represents medium risk.

6 IDENTIFICATION AND ASSESSMENT OF IMPACTS

Impacts to bats that are likely to occur because of the construction, operation and decommissioning of the wind energy facility are identified and assessed in the following section. In preparing this impact assessment, the unit of analysis is the local bat community and their associated habitats within the PAOI. As such, impacts are not assessed relative to individual bats. For each impact identified in Section 6, the respective mitigation measures were categorised into those aimed at first avoiding impacts, then minimising impacts, and finally restoring areas impacted. Measures to reduce residual impacts are also provided.

The primary mechanism to mitigate risks of the project to bats is to avoid impacts. A clear finding of the monitoring is the magnitude of bat activity at T1. This location is at a farmstead and has several habitat features which attract bats. These include the buildings which may serve as roosts for bats, lighting around the farmstead will attract insects and therefore foraging bats, trees which will serve as foraging and roosting spaces, and aquatic habitat at which bats can drink and forage. This demonstrates the importance of these features in the landscape for bats. Based on the magnitude of bat activity recorded at T1, and since it was notably higher compared to areas away from the farmstead, it is likely that bats are roosting in buildings and/or trees in this area and/or using the area for foraging. Bat activity was also relatively higher at T3, T5, S3 and S4. Each of these bat detectors was installed near a rocky outcrop suggesting that bats may be favouring these areas for roosting (under/between slabs of rock, in small boulder caves, in narrow cracks), commuting along (given their linear nature in the landscape) and/or for foraging.

Systematic roost surveys near T1, at the other farmsteads and at rocky outcrops did not provide any evidence of roosting bats but finding roosting bats is challenging. In these situations a lack of evidence of roosting bats is not evidence that bats are not roosting at the farmsteads (Collins

2006). Buffering roosts is one mechanism to reduce impacts to bats and the size of the buffer is based on the number of bats roosting in a particular space. Since no active roost was found, determining its size is not possible. Based on the roost surveys it is more likely that small numbers of bats are roosting together in some buildings as opposed to many bats. Bats may also switch which buildings they roost in seasonally depending on how the thermal dynamics vary of each building. South African best practise recommends a 500 m buffer for small roosts (1 – 49 bats) of Least Concern bat species. As such, the farmstead roosting spaces at T1 as well as elsewhere in the AoI's, have been buffered by 500 m. Rocky crevices have been buffered by 200 m since these are likely to contain fewer roosting bats compared to buildings.

Given the predicted high risk to bats during certain periods, buffers have been placed around other key habitat features as per best practice to assist in avoiding impacts to bats. Apart from the roost buildings and rocky crevices, buffers of 200 m (100 m for drainage lines) were applied to habitat features such as clumps of trees, cultivated areas, wetlands, riparian vegetation, and rivers/streams. As per best practise, no part of the wind turbines, including the blade tips, shall intrude into the no-go buffers. Since the specific turbine size is unknown, a buffer of 120 m was applied to determine additional no-go areas since this is the maximum blade length being applied for. This was done to ensure the turbine blades do not extend into sensitive areas for bats. All turbines in the proposed layout adhere to these No-Go buffers and as such the layout is acceptable in terms of avoiding and minimizing impacts to bats (Figure 5).

For some high-flying species such as Egyptian free-tailed bat, the habitat or land use below does not generally influence their activity (Monadjem et al. 2020) which makes habitat based mitigations (e.g., buffers) less effective. This species was recorded at 50 m and 100 m, where median activity levels suggest high risk during some seasons (Table 5). Mitigation to minimize impacts to higher-flying species should include the choice of turbine design since this has the potential to influence bat fatality [e.g., Barclay et al.(2007)] but the impact of turbine size on bat fatality is poorly understood. Generally, impacts to high-flying species should be minimized by limiting the size of the rotor swept area as much as practicable since they are active across much of the rotor swept zone.

However, residual impacts to bats could occur since there is still likely to be a high degree of risky airspace even with a minimized rotor swept area. In addition, some bats may be attracted to turbines (Horn et al. 2008, Cryan and Barclay 2009, Richardson et al. 2021, Guest et al. 2022, Leroux et al. 2022) once installed and operational and therefore additional mitigation measures would be needed to minimize residual impacts.

Firstly, this will require the use of blade feathering, or similar mechanism, to prevent free-wheeling of blades below the turbine cut-in speed. This has been shown to reduce bat fatality with the benefit of not impacting on energy production (Young et al. 2011, Good et al. 2012).

Secondly, risk of collision impact is related to bat morphology with fast flying, open-air species more likely to be impacted than low-flying species who forage closer to the ground or in edge spaces near vegetation (Thaxter et al. 2017, Aronson 2022, Figure 7). Impacts to lower-flying species can be minimized by ensuring blades do not sweep close to ground level. Even though this meausure is directed at lower-flying species, higher flying species will also benefit.

Bat activity decreases exponentially with height (Wellig et al. 2018) meaning risk is higher closer to ground level. The size of the rotor swept area should account for this because the lower the blades sweep the ground, the higher risk they will present to bats. It is therefore recommended to maintain a minimum blade sweep of 30 m to mimize residual impacts as much as possible (Figure 7). There is limited published emperical evidence for this specific height but based on typical activity of Cape serotine, a lower-flying species, this is likely to be a reasonable height were risk would reduce to moderate or low levels.

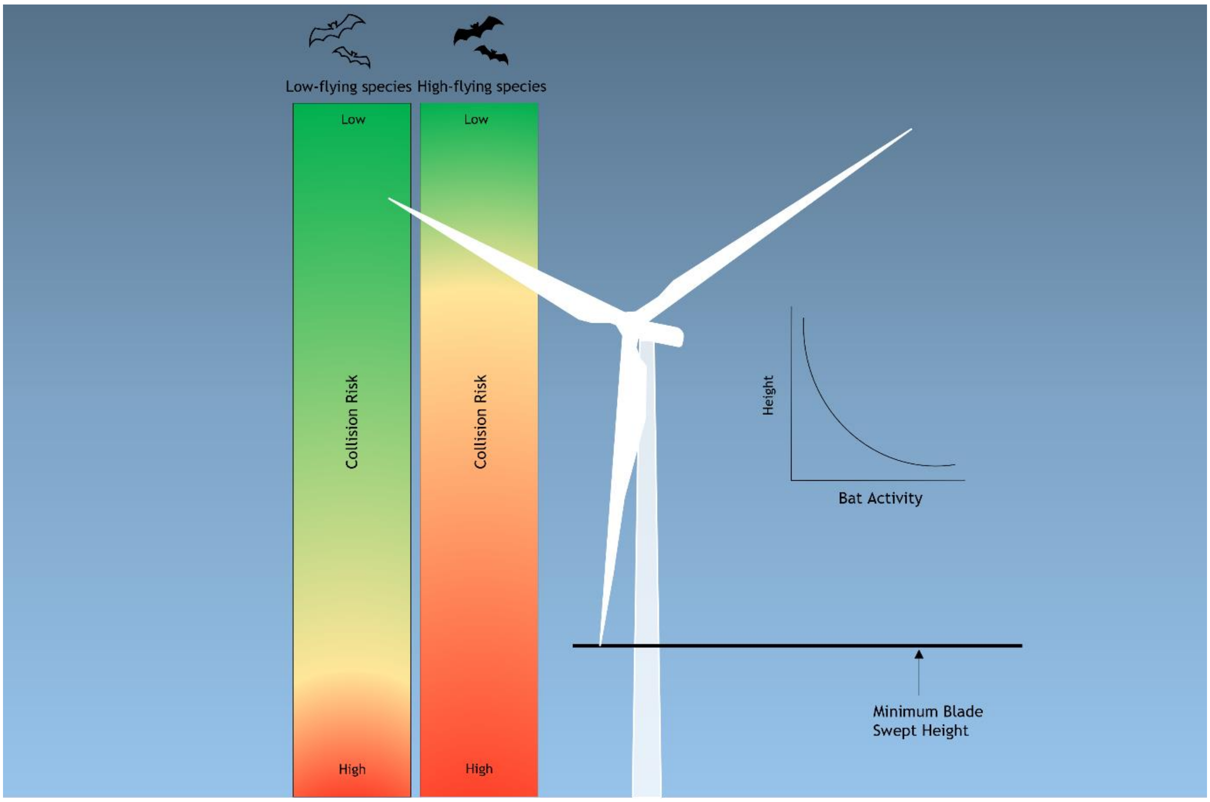

Figure 7: Conceptual Framework used to differentiate risk between low and high-flying bat species and the relationship with turbine size.

During operation, bat fatality monitoring must be undertaken to search for bat carcasses beneath wind turbines to measure the residual impact of the WEF on bats for a minimum of two years, and then every five years (Aronson et al. 2020). Mitigation measures that are known to minimise bat fatality if needed based on the fatality monitoring results include curtailment and/or acoustic deterrents (Arnett et al. 2013, Romano et al. 2019, Weaver et al. 2020). These techniques must be used if post-construction fatality monitoring indicates that species fatality thresholds have been exceeded (MacEwan et al. 2018) to minimise impacts, maintain the impacts to bats within acceptable limits of change and prevent declines in the impacted bat population. The bat fatality thresholds for the project were determined as follows:

(a) Annual fatality threshold per 10 ha = 0.2[1]

(b) Turbine area of influence (ha) = 3,901

(c) Annual fatality threshold per LC species = (a) x [(b)/10]

= 78 individuals[2]

Thus, according to the threshold guidance (MacEwan et al. 2018), the bias-adjusted threshold fatality value is 78 individuals per least concern (LC) bat species per annum. Should this be exceeded during an annual period, curtailment and/or acoustic deterrents must be used to reduce fatality levels to below the threshold. For frugivorous bats, conservation important or rare/range restricted bats, i.e., Species of Special Concern (SSC), the annual fatality threshold is 1 individual. This threshold is relevant to Lesueur's wing-gland bat (*Cistugo lesueuri*) which has a moderate likelihood occurrence:

(d) Annual fatality threshold per SSC = 1 individual

[1] Based on reference value for Nama Karoo in MacEwan et al. (2018).

[2] This threshold must be compared to the unbiased annual bat fatality estimate generated as part of the post-construction fatality monitoring program.

To avoid impacts due to light pollution from the substation and operation and maintenance buildings, and to minimize conversion of important bat habitats, this infrastructure must not be constructed within the no-go buffers. This will increase the distance between this infrastructure and bat habitats, avoiding the impact as much as possible. However, effects from lighting might still impact bats and insects depending on the intensity. This can be minimised by using motion-sensor lighting, minimising sky-glow by using hoods, and by using low pressure sodium lights at the substation and operation and maintenance buildings.

6.1 Impact Assessment

Wind farms impact bats directly because bats collide with spinning wind turbine blades (Horn et al. 2008), and indirectly through the modification of habitats, including disturbance or destruction of roosting, foraging and commuting spaces and light pollution (Kunz et al. 2007b; Millon et al. 2018).

6.1.1 Construction Phase

<table>
<tr><th colspan="4">Impact:
MODIFICATION OF BAT HABITAT (ROOSTING, FORAGING, COMMUTING)</th></tr>
<tr><td colspan="4">Nature:
Vegetation clearing for access roads, turbines and their service areas and other infrastructure, as well as noise and dust generated during the construction phase, will negatively and indirectly impact bats by removing habitat used for foraging and commuting, through disturbance, and displacement (Kunz et al. 2007b, Millon et al. 2018, Bennun et al. 2021). This impact is likely to have species specific effects; clutter edge species (e.g., Cape serotine) are more likely to be impacted by habitat modification given their greater association with physical habitat features compared to high-flying species (e.g., Egyptian free-tailed bat).

Construction of WEF infrastructure could result in destruction (direct impact) of bat roosts (rocky crevices, buildings) and disturbance (indirect impact) of bat roosts potentially resulting in roost abandonment. Bat mortality can occur if roosts which contain bats are destroyed. Installation of new infrastructure in the landscape (e.g., buildings, turbines, road culverts) can inadvertently provide new roosting spaces for some bat species, attracting them to areas with wind turbines and potentially increasing the likelihood of collisions.</td></tr>
<tr><th></th><th>Rating</th><th>Motivation</th><th>Significance</th></tr>
<tr><td colspan="4">Prior to Mitigation</td></tr>
<tr><td>Duration</td><td>Short-term</td><td>The impact will persist for the duration of the construction period, but displacement and habitat loss may persist for the duration of operation.</td><td rowspan="4">Moderate Negative</td></tr>
<tr><td>Extent</td><td>Study Area</td><td>The impact will be limited to the site of development.</td></tr>
<tr><td>Probability</td><td>Probable</td><td>The responses of bats to habitat modification due to wind turbines is largely understudied but it is reasonable to assume that there may be some level of species-specific displacement effect [e.g., Millon et al. (2018)].

Since no confirmed roosts have been located, it is unlikely that this impact will occur.</td></tr>
<tr><td>Severity</td><td>Moderately severe</td><td>Given the limited habitat modification relative to remaining habitat this impact is likely to only cause a slight impact on processes as bats will find alternative habitat.

Roosts are critical for bat life history thus impacts to roosts could impact on ecological processes. However, no major confirmed roosts have been found within the AoI and hence it is unlikely this impact will have a high severity.</td></tr>
<tr><td colspan="4">Mitigation</td></tr>
<tr><td colspan="4">Mitigation:
<u>Avoid:</u></td></tr>
</table>

Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts) by ensuring they are properly sealed such that bats cannot gain access. No construction activities at night. No placement of infrastructure (except roads) in no-go areas (Figure 5). Minimise: Minimise clearing of vegetation, minimise disturbance and destruction of farm buildings on site, minimise removal of trees, minimise disturbance and destruction of rocky outcrops, and where this is required, these features should be examined for roosting bats. This study assumes that all buildings and rocky outcrops are potentially roosts and must be buffered since numerous species use these features for roosting. Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during construction. Restore: Rehabilitate all areas disturbed during construction (including aquatic habitat).			
Post Mitigation			
Reversibility	Reversible	The impact that can be reversed provided appropriate rehabilitation is implemented. By removing wind turbines, the impact of displacement will be removed, however, this impact will persist for a long duration during operation of the WEF.	**Moderate Negative**
Irreplaceable loss	Resource will be lost	100 ha of land will be cleared for the development (Table 2), but this could be rehabilitated after the operation of the facility. However, it is likely that not all areas may be successfully rehabilitated, and it is inevitable that some habitat will be permanently lost.	
Mitigation Potential	Achievable	Rehabilitation of Nama Karoo vegetation is achievable hence the impact of habitat loss can be mitigated. Removing wind turbines will mitigate the impact of displacement.	

6.1.2 Operational Phase

Impact: BAT FATALITY			
Nature: Bat mortality (direct impact) through collisions with wind turbine blades is the principal impact of wind energy facilities on bats (Cryan and Barclay 2009, Arnett et al. 2016).			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Long term	The impact will persist for the duration of the operation of the wind farm.	**High Negative**
Extent	Study Area	The impact will mainly be limited to the site of development, but bats can be attracted to (Richardson et al. 2021, Guest et al. 2022), or move through, the wind farm from beyond the site.	
Probability	Probable	Bat fatality has been reported at all wind farms where this has been investigated in South Africa thus it is highly probably that bat fatality will occur at the WEF.	
Severity	Severe	Median bat passes per hour ranged from low to high risk, varying spatially and temporally and per species. Given the limitations of acoustic monitoring (Lintott et al. 2016, Voigt et al. 2021) it is reasonable to assume at least a severe impact overall because impacts may have population level impacts over time (Frick et al. 2017, Davy et al. 2020, Friedenberg and Frick 2021).	
Mitigation			
Mitigation:			

<u>Avoid:</u> No placement of turbines within no-go areas (Figure 5). <u>Minimise:</u> Maintain a minimum blade sweep of 30 m to avoid impacts to lower flying bats such as clutter-edge species (e.g., Cape serotine, Natal long-fingered bat) Minimise the rotor diameter Turbine blades must be feathered, or a similar technique should be used, to prevent free-wheeling below the turbine cut-in speed. Implement post-construction fatality monitoring and apply additional curtailment or deterrents if fatality thresholds are exceeded.			
Post Mitigation			
Reversibility	Reversible	Removing the WEF will remove the impact to the bat community and hence the impact is reversible at the community or population level.	**Moderate Negative**
Irreplaceable loss	Resource will be lost	Bat fatality is highly likely and hence impacts to individual bats will result in a loss of resources. Curtailment and deterrents do not fully remove the impact to bats.	
Mitigation Potential	Achievable	Curtailment and deterrents can successfully reduce bat fatality (Arnett 2011, Arnett et al. 2016, Weaver et al. 2020), but not completely.	

Impact: **LIGHT POLLUTION**			
Nature: Construction of infrastructure will increase ecological light pollution from artificial lighting associated with the substation and other operational and maintenance buildings associated with the project. Light pollution can alter ecological dynamics (Horváth et al. 2009). Lighting attracts and can cause direct mortality of insects, reducing the prey base for bats, especially bat species that are light-phobic. These species may also be displaced from previous foraging areas due to lighting. Other bat species forage around lights, attracted by higher numbers of insects. This may bring these species into the vicinity of the project and indirectly increase the risk of collision with wind turbines.			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Long term	The impact will persist for the duration of the operation of the wind farm.	**Low Negative**
Extent	Study Area	The impact will be limited to the site of development, but sky glow can occur beyond the site depending on the scale and intensity of lighting used.	
Probability	Probable	Negative effects of light pollution have been demonstrated for bats (Rydell 1992, Svensson and Rydell 1998, Stone et al. 2009), thus it is probable that the impact will occur.	
Severity	Slight	Light pollution is an understudied impact, but it is likely that ecological processes may be disturbed. However, given the small scale of lighting that will be used at the project, the severity is predicted to be slight.	
Mitigation			
Mitigation: <u>Avoid:</u> No placement of substations and operational and maintenance buildings within no-go areas (Figure 5). <u>Minimise:</u>			

Use as little lighting as possible, maximise use of motion-sensor lighting, avoid sky-glow by using hoods, increase spacing between lighting units, and using low intensity lighting (Rydell 1992, Stone 2012).			
Post Mitigation			
Reversibility	Reversible	The impact is reversible but only after a long time, when the WEF is decommissioned.	**Low Negative**
Irreplaceable loss	Resource will be lost	The impact may result in a loss of insects.	
Mitigation Potential	Achievable	The mitigation measures are easily applied and demonstrably feasible (Stone et al. 2015).	

6.1.3 Decommissioning Phase

Impact: **MODIFICATION OF BAT HABITAT**			
Nature: Impacts during the decommissioning phase will be indirect and involve disturbance to bats through excessive noise and dust, and damage to vegetation.			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Short-term	The impact will persist for the duration of the decommissioning phase.	**Low Negative**
Extent	Study Area	The impact will be limited to the site of development.	
Probability	May Occur	Decommissioning activities will probably not impact bats.	
Severity	Slight	Given the limited habitat modification relative to remaining habitat this impact is likely to only cause a slight impact on processes as bats will find alternative habitat. Most decommissioning activities will take place during daylight hours when bats are not active, lessening the impact severity.	
Mitigation			
Mitigation: Avoid: No decommissioning activities at night. Minimise: Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during decommissioning. Restore: Rehabilitate all areas disturbed during construction (including aquatic habitat).			
Post Mitigation			
Reversibility	Reversible	-	**Low Negative**
Irreplaceable loss	Resource will not be lost	-	
Mitigation Potential	Achievable	-	

6.2 Cumulative Impacts

For the purposes of the cumulative impact assessment (CIA), cumulative impacts are defined as the total impacts resulting from the successive, incremental, and/or combined effects of a project when added to other existing, planned and/or reasonably anticipated future projects, as well as background pressures (IFC 2013). The project considered here is the Taaibos North Wind Energy Facility. The goal of this assessment is to evaluate the potential resulting impact to the vulnerability and/or risk to the sustainability of the bat species affected (IFC 2013).

6.2.1 Step 1: VECs and spatial-temporal boundary

Following guidance in IFC (2013), the first step in the CIA was to determine the Valued Environmental Components (VECs), the bat species most likely to be affected by cumulative impacts, and the temporal and geographic scope of the analysis. Of the species recorded in the AoI during the acoustic monitoring, and based on bat distribution records (ACR 2020), Cape serotine (*Laephotis capensis*), Egyptian free-tailed bat (*Tadarida aegyptiaca*) and Natal long-fingered bat (*Miniopterus natalensis*) are most likely to be impacted cumulatively. This is because they are the most widespread bat species in South Africa (Monadjem et al. 2020), classified as high risk species to wind energy impacts (MacEwan et al. 2020), and the most impacted by operating wind energy facilities in the country (Aronson 2022).

The temporal time frame over which cumulative impacts are considered was 25 years, the typical lifespan of a renewable energy facility. However, cumulative effects could extend beyond this timeframe if development of the cluster of five projects is phased over time.

The Ecologically Appropriate Area of Analysis (EAAA) for the assessment was determined by considering the ecology of the identified species likely to be affected since cumulative impacts should be evaluated across scales potentially affected species are likely to occur (Voigt et al. 2012, Lehnert et al. 2014). The acoustic monitoring confirmed the presence of Natal long-fingered bat in the PAOI, a migratory species which moves seasonally between winter hibernacula and summer maternity cave roosts in South Africa (van der Merwe 1975, Miller-Butterworth et al. 2003). This migration increases the potential that these bats will encounter wind turbines, or be displaced by them (Millon et al. 2018), especially if these are placed along migratory routes. Based on research by Pretorius et al. (2020) the location of the development cluster is not within a migratory corridor for this species. Therefore, the EAAA was determined based on foraging distances of Natal long-fingered bat which tracking data show can be up to 30 km from a roost (Rainho and Palmeirim 2011, Vincent et al. 2011).

Data on the spatial ecology of the Egyptian free-tailed bat and Cape serotine, specifically the sizes of their foraging or community ranges, are not available. Data from European free-tailed bat, *Tadarida teniotis*, in Portugal (Marques et al. 2004) and Serotine bat, *Eptesicus serotinus*, in England (Robinson and Stebbings 1997) were used as surrogates. Feeding areas for some *T. teniotis* individuals were over 30 km from their roost while the maximum distance between *E. serotinus* feeding areas was over 41 km.

Cumulative impact assessment in South African typically consider developments within a radius of 35 km which therefore is potentially in line with the movement ecology of the three VECs. Hence the EAAA was a 35 km radius around the PAOI (Figure 6).

6.2.2 Step 2: Other Activities and External Drivers

The second step in the CIA was to identify other past, existing, or planned activities within the EAAA and to assess the external influences and stressors on the three VECs. With reference to the Renewable Energy Application database (Q2, 2022), currently four approved wind energy projects are located within the EAAA (Figure 6). Also considered are the four other projects being develop as part of the Soutrivier and Taaibos cluster. Given that the EAAA includes a Renewable Energy Development Zone (Beaufort West), it is reasonable to expect further development over the 25-year period considered in this assessment. The REDZ provides policy support for renewables growth, and its existence creates an enabling environment for wind energy development. As such, at least a moderate level of wind energy development can be expected over the following 25 years in the EAAA.

There are no documented major past threats to Egyptian free-tailed bat and Cape serotine or current threats to them other than renewable energy (Child et al. 2016). Hence this CIA considers renewable energy the primary impact to these VECs. Natal long-fingered bat is locally threatened in parts of its range by habitat loss resulting from conversion of land to agricultural use, incidental poisoning with insecticides, loss of prey base, and the disturbance of roosting and maternity caves (Child et al. 2016).

6.2.3 Step 3: Baseline Status of VECs

Egyptian free-tailed bat is very widely distributed, locally common and recorded from many protected areas in South Africa however, although the population is stable, the population size is unknown (Child et al. 2016). It is classified as Least Concern nationally and globally. This species is present in the AoI and based on its activity levels, it is at medium to high risk of collision during autumn, spring, and summer (Table 5). It is flexible in its habitat requirements and one reason for its wide distribution is its affinity to roost in buildings or other man-made structures (Monadjem et al. 2020).

Cape serotine is also widely distributed in South Africa with a large population and hence is classified as Least Concern nationally and globally. However, it is possible that this species comprises a complex of closely related species (Monadjem et al. 2020). The population trend is stable, but the population size is unknown. Although this species is present in the AoI, its activity levels suggest low risk of collision (Table 5). Cape serotine is also flexible in its habitat requirements and its use of buildings and other anthropogenic structures as roosts has possibly led to its numbers increasing.

Natal long-fingered bat is a common and widespread species, classified as Least Concern nationally and globally with a stable national population, but it may be experiencing local declines (Child et al. 2016). The size of the national population is unknown but this species roosts in large colonies; De Hoop Guano cave in the Western Cape hosts approximately 200,000 individuals, and in the Highveld, some caves may contain up to 4000 individuals (Child et al. 2016). Activity levels of this species in the AoI were relatively low suggest low overall risk of collision.

6.2.4 Step 4: Assess Cumulative Impacts on VECs

The key potential impacts that could affect the long-term sustainability and/or viability of the Egyptian free-tailed bat and Cape serotine in the EAAA are collisions with wind turbines. This may lead to local extinctions and fragmentation of the national population since bats have low reproductive rates (Barclay and Harder 2003). For Natal long-fingered bat, key impacts include collisions with wind turbines blades, but also displacement along migratory routes due to wind turbines (Millon et al. 2018), which may also lead to local or regional extinctions and population fragmentation. This species shows strong philopatry which means that should a colony be lost or destroyed, it may not be repopulated from other areas, potentially leading to local extinction (Miller-Butterworth et al. 2003).

6.2.5 Step 5: Assess Significance of Predicted Cumulative Impacts

Rodhouse et al. (2019), Davy et al.(2020) and Frick et al. (2017) have all shown that in North America, Least Concern bats may be experiencing impacts due to wind farms that could result in changes to their conservation status. This may be a future scenario for widespread, common Least Concern bats species in South Africa. As such, the significance of cumulative impacts is assessed as High without mitigation. The application of mitigation measures is anticipated to reduce the overall impact of the project to a moderate level.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Duration	Long-term	Long-term
Extent	Study Area	Regional
Probability	Probable	Probable
Severity	Severe	Severe
Nature	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss	Resource will be lost	Resource will be lost
Mitigation Potential	Achievable	Achievable
Significance	**High Negative**	**High Negative**
Confidence in findings: Medium		

6.2.6 Step 6: Management of Cumulative Impacts

Management interventions for bats at operating wind farms in South Africa are benchmarked against fatality thresholds. These thresholds attempt to manage impacts to bats by considering potential population level effects, with the threshold values set below the rate at which populations may decline due to anthropogenic pressures (MacEwan et al. 2018). Thresholds have been set for this project and these should be determined for all other future wind energy developments. In theory, should each individual development apply thresholds and appropriate mitigation measures if these are exceeded, the EAAA VEC populations should not decline.

The mitigation measures proposed in this report (buffering key habitats used by bats, use of appropriate lighting technology, blade feathering (or similar mechanism to reduce blade movement at low wind speeds below the cut-in speed), and using curtailment and/or acoustic deterrents) should be applied to all future projects so that there is a collective management responsibility (IFC 2013).

7 ENVIRONMENTAL MANAGEMENT PROGRAMME

<table>
<tr><th>Objective</th><th colspan="2">Avoid and minimise modification of bat habitats</th></tr>
<tr><td>Project component/s</td><td colspan="2">All project infrastructure</td></tr>
<tr><td>Potential Impact</td><td colspan="2">Vegetation clearing for project infrastructure, as well as noise, dust and pollution generated during construction activities, will impact bats by removing habitat used for foraging and commuting, through disturbance, and displacement. Construction of WEF infrastructure could result in destruction and/or disturbance to bat roosts, and inadvertently provide new roosting spaces for some bat species in risky locations.</td></tr>
<tr><td>Activity/risk source</td><td colspan="2">All construction activities and associated activities (e.g., driving)</td></tr>
<tr><td>Mitigation: Target/Objective</td><td colspan="2">1. Avoid potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts)
2. Minimise disturbance to bats
3. Minimise habitat loss</td></tr>
<tr><td>Mitigation: Action/control</td><td>Responsibility</td><td>Timeframe</td></tr>
<tr><td>1. Ensure all project infrastructure (e.g., buildings, turbines, road culverts) is properly sealed such that bats cannot gain access.
2. No construction activities at night, apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste).
3. No placement of infrastructure (except roads) in No-Go areas.
4. Minimise clearing of vegetation, minimise disturbance and destruction of farm buildings and rocky crevices, minimise removal of trees.
5. Rehabilitate all areas disturbed during construction, (including aquatic habitat).</td><td>EPC Contractor/Operator</td><td>During design and planning phase and throughout construction phase</td></tr>
<tr><td>Performance Indicator</td><td colspan="2">- No bat roosts are destroyed
- No bats colonise new project infrastructure for roosting
- No infrastructure in No-Go areas (except roads)
- All areas disturbed during construction are rehabilitated</td></tr>
<tr><td>Monitoring</td><td colspan="2">- An appointed ECO must inspect all new project infrastructure, in conjunction with or via training from a bat ecologist, to ensure bats cannot gain access.
- ECO to ensure compliance with good construction abatement control practices.
- ECO must ensure no infrastructure is placed in No-Go areas (see Figure 5).
- If a bat roost is encountered during construction, the ECO must consult a bat ecologist to determine appropriate actions.
- ECO to ensure all disturbed areas are rehabilitated.</td></tr>
</table>

Objective	Avoid and minimise bat fatality	
Project component/s	Wind Turbines	
Potential Impact	Bat mortality through collisions with wind turbine blades.	
Activity/risk source	Operating Wind Turbines	
Mitigation: Target/Objective	1. Avoid bat fatalities through turbine layout design 2. Minimise bat fatalities through turbine design, and by using blade feathering, curtailment, and deterrents	
Mitigation: Action/control	**Responsibility**	**Timeframe**
1. No placement of turbines within No-Go areas to reduce spatial overlap between bats and wind turbines. 2. Maintain a minimum blade sweep of 30 m to minimize impacts to lower flying bats such as clutter-edge species (e.g., Cape serotine, Natal long-fingered bat). 3. Minimise the rotor swept areas to reduce impacts to high-flying species (e.g., Egyptian free-tailed bat). 4. Turbine blades must be feathered, or a similar technique should be used, to prevent free-wheeling below the turbine cut-in speed. 5. Implement fatality monitoring throughout the operational phase and apply curtailment or deterrents if fatality thresholds are exceeded. Annual fatality threshold per Least Concern species = 78 individuals. Annual fatality threshold per Species of Special Concern = 1 individual for Lesueur's wing-gland bat (*Cistugo lesueuri*).	EPC Contractor/Operator	BMP developed prior to operation. BMP active throughout operation phase.
Performance Indicator	- ≤ 78 individuals per Least Concern species killed annually - ≤ 1 individual per Species of Special Concern killed annually	
Monitoring	- ECO must ensure no turbines are placed in No-Go areas, including the blade tips (see Figure 5). - ECO must ensure the dimensions of the final selected turbine adhere to requirements (A minimum blade sweep of 30 m). - ECO must ensure blade feathering is implemented. - A Biodiversity Management Plan (BMP) for bats must be developed by a bat ecologist before operation which includes the design of a post-construction fatality monitoring program (PCFM) for bats, and an adaptive management response plan that provides an action plan for mitigation should fatality thresholds be exceeded. - ECO to ensure adherence to BMP and any mitigation measures implemented.	

Objective	Avoid and minimise light pollution	
Project component/s	Project Lighting	
Potential Impact	Light pollution can alter ecological dynamics	
Activity/risk source	Emission of light from project lighting	
Mitigation: Target/Objective	1. Avoid light pollution through spatial planning of the facility 2. Minimise light pollution by using appropriate lighting technology	
Mitigation: Action/control	**Responsibility**	**Timeframe**
1. No placement of substations and operational and maintenance buildings in No-Go areas. 2. Use as little lighting as possible, maximise use of motion-sensor lighting, avoid sky-glow by using hoods, increase spacing between lighting units, and using low intensity lights.	EPC Contractor/Operator	During design and planning phase and throughout operation phase
Performance Indicator	- No buildings in No-Go areas - Use of appropriate lighting technology	
Monitoring	- ECO must ensure no buildings are in No-Go areas (see Figure 5). - ECO must ensure lighting technology meets requirements.	

8 CONCLUSION

This report assessed impacts to bats that could occur because of the construction, operation and decommission of the Taaibos North WEF. The assessment was based on 12 months of baseline data on bat activity recorded at the project. Based on these data, the key issue for the WEF will be managing impacts to high-flying free-tailed bats; specifically Egyptian free-tailed bat, but also possibly Roberts's flat-headed bat. The magnitude of Egyptian free-tailed bat activity was high across the AoI, including at 60 m and 140 m, based on median bat activity with reference to MacEwan et al. (2020). For this reason, the overall impact of the project is assessed at high. While this is restricted to certain nightly time periods and seasons, this high risk needs to be addressed and the mitigation options for high-flying species are relatively limited. This is because these bats are active across most of the rotor swept zone and hence are likely to encounter wind turbine blades while foraging or commuting. Additionally, bats may also be attracted to wind turbines (Guest et al. 2022).

The first mitigation measure proposed to manage risk is to adhere to the no-go buffers which aim to spatially avoid impacts by buffering key habitat features used by bats. This measure is likely to be effective for most bat species recorded at the project (e.g., Cape serotine, Long-tailed serotine, and Natal long-fingered bat) but additional mitigation measures are needed to minimize impacts to free-tailed bats, which forage high in the air, and to reduce residual impacts. Turbine design can be effective, and it is recommended to maintain a minimum blade sweep of at least 30 m and to limit the rotor diameter as much as practicable to minimise the space where collisions might occur. Additionally, blade feathering must be implemented which will limit the rotation of turbine blades below the turbine cut-in speed when electricity is not being generated.

Mitigation measures to minimise residual impacts after the application of the above measures include curtailment and acoustic deterrents. These measures are effective, and given the predicted risk, it is possible they may need to be implemented because the fatality thresholds are relatively low. As such, the project should consider the cost and feasibility of these measures. The residual impacts must be monitored using post-construction fatality monitoring for a minimum of two years (Aronson et al. 2020). Curtailment and/or acoustic deterrents must be used if this monitoring indicates that species fatality thresholds have been exceeded (MacEwan et al. 2018) to maintain the impacts to bats within acceptable limits of change and prevent declines in the impacted bat populations. A Biodiversity Management Plan (BMP) for bats must be developed by a bat ecologist, and implemented at the start of operation, which includes the post-construction fatality monitoring plan design, fatality thresholds calculations and rationale, a curtailment plan, and an adaptive management response plan that provides an action pathway for mitigation should fatality thresholds be exceeded.

The proposed project can be approved considering that the overall impact to bats was assessed as moderate after the application of the mitigation measures proposed to avoid and minimise impacts to bats. Residual impacts to bats will be managed via a Biodiversity Management Plan (BMP) which will use bat fatality thresholds as benchmarks for determining additional response actions such as the use of curtailment to reduce turbine operation during key activity times for bats.

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Appendix 1: Figures

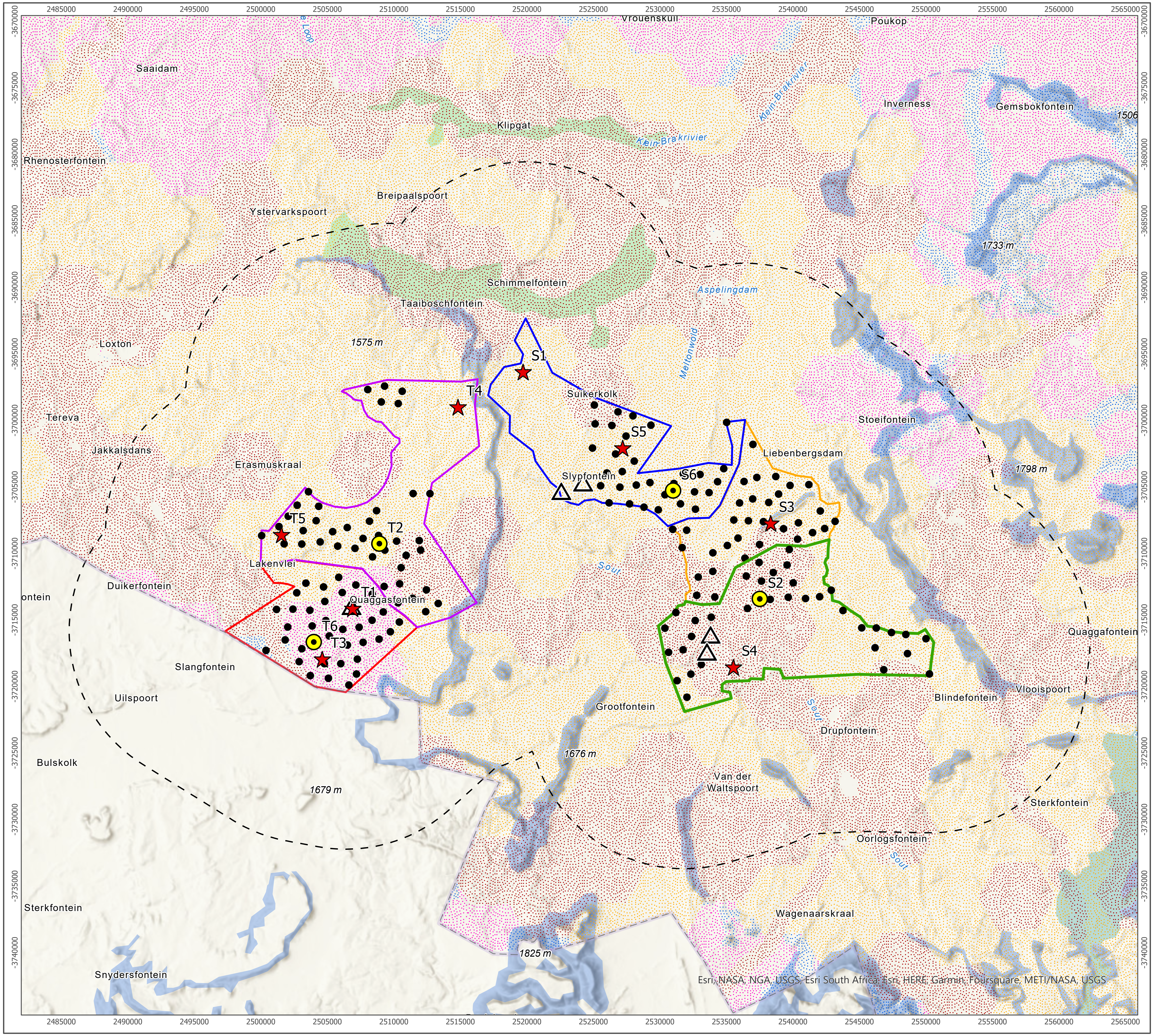
CAMISSA SUSTAINABILITY CONSULTING

- Proposed Turbine Layout
- Roost Surveys
- Met Mast
- Short Mast
- Soutrivier North AOI
- Soutrivier Central AOI
- Soutrivier South AOI
- Taaibos North AOI
- Taaibos South AOI
- PAOI
- Critical Biodiversity Area One
- Critical Biodiversity Area Two
- Ecological Support Area
- Other Natural Areas
- Bushmanland Vloere
- Eastern Upper Karoo
- Southern Karoo Riviere
- Upper Karoo Hardeveld

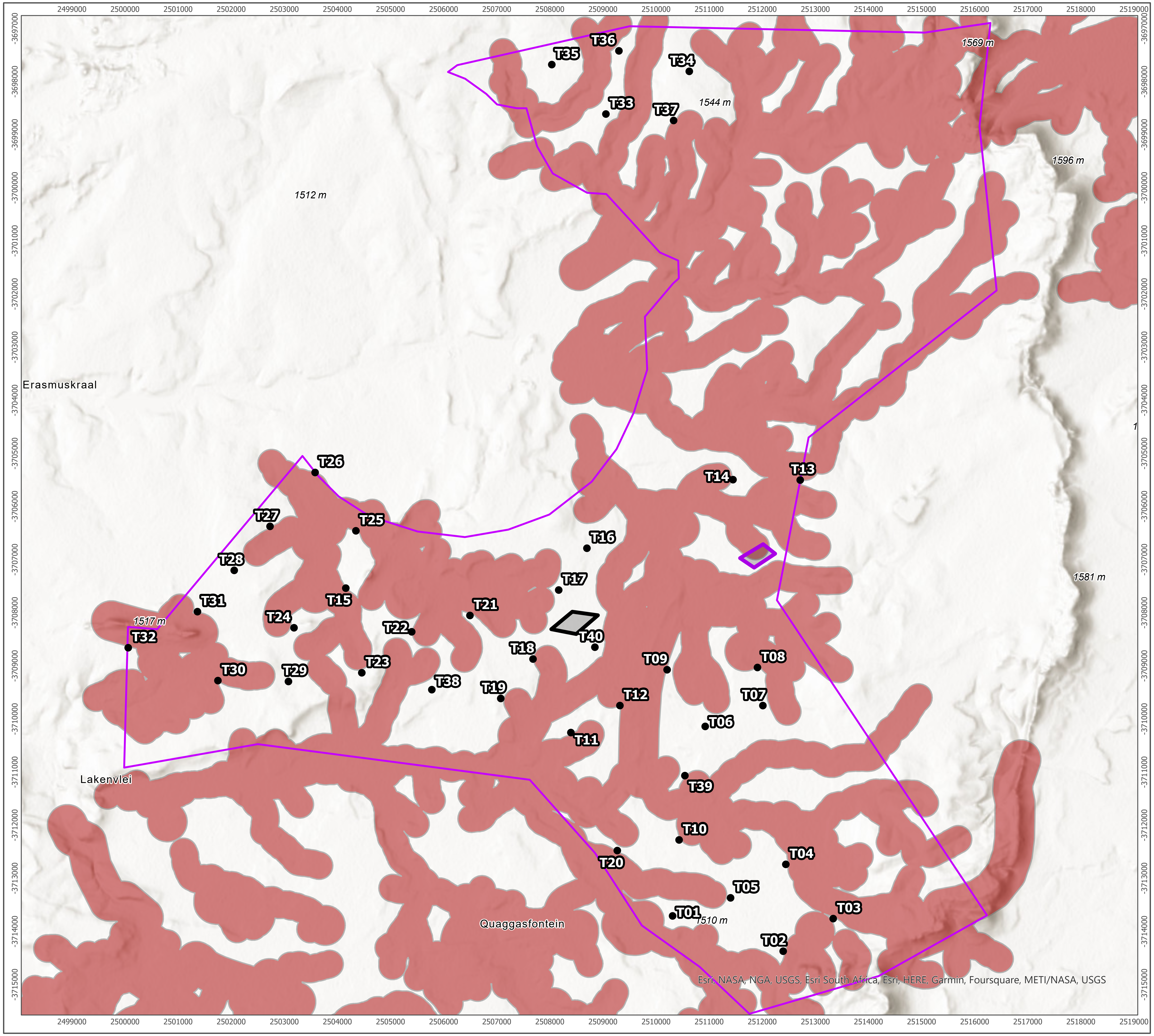
0 5 10 km

Date: 28/10/2022

N



Taaibos North Wind Energy Facility
Figure 1
Bat Survey Locations



CAMISSA
SUSTAINABILITY CONSULTING

- Proposed Turbine Layout
- Taaibos North AOI
- Taaibos Collector Substation 10ha
- Taaibos North Substation Compound - 14ha
- No Go Areas

0 1 2 km

N

Date: 28/10/2022

Taaibos North Wind Energy Facility
Figure 5
Bat Constraints Map

CAMISSA
SUSTAINABILITY CONSULTING

- EAAA
- PAOI
- Soutrivier South
- Soutrivier Central
- Soutrivier North
- Taaibos North
- Taaibos South
- Critical Biodiversity Area One
- Critical Biodiversity Area Two
- Ecological Support Area
- Other Natural Areas
- Nobelsfield Wind Energy Facility
- Mainstream Wind and Solar Energy Facility
- Nuweveld East Wind Energy Facility
- Modderfontein Wind Energy Facility
- NPAES Focus Areas
- Protected Area
- Beaufort West REDZ

1:550 000

0 10 20 km

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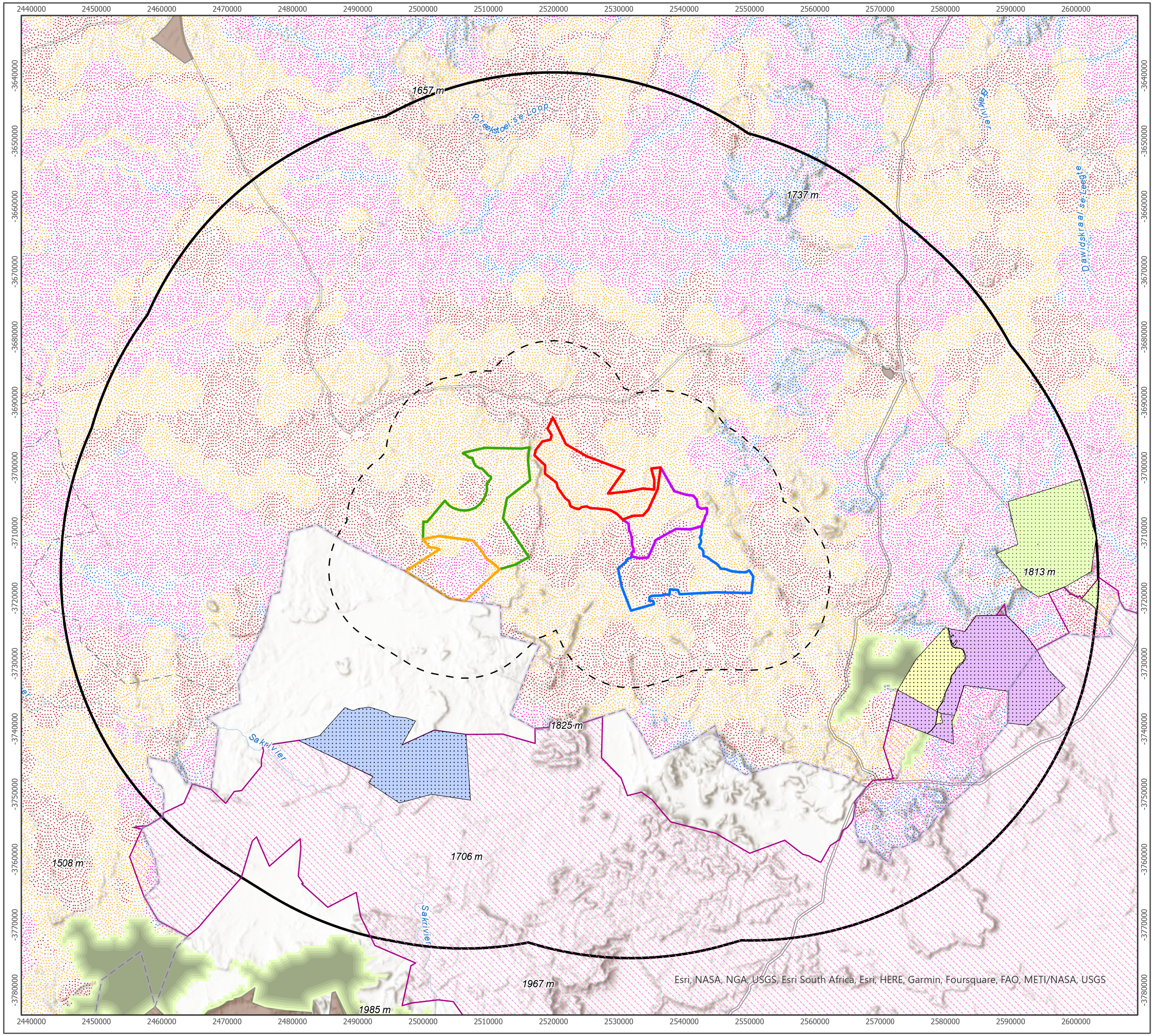
Date: 26/Sep/2022

Taaibos North Wind Energy Facility
Figure 6
Cumulative Impact Assessment



Appendix 2: Specialist CV

CURRICULUM VITAE JONATHAN ARONSON

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1 BACKGROUND

Jonathan is a research ecologist with 13 years of experience working on bat and wind energy interactions. He has been at the forefront of bats and wind energy research in South Africa and has worked on more than 100 WEF projects in South Africa, Kenya, Ethiopia, Mozambique, Zambia, Uzbekistan, Azerbaijan, Pakistan, Vietnam, and the UK. He has presented his research at the International Bat Research Conference, the Conference on Wind Energy and Wildlife Impacts, and at numerous local and international bat workshops and symposia.

He is experienced in undertaking pre-construction and operational monitoring projects for bats, impact assessments, mitigation strategy design (including the design of curtailment programs), due diligence exercises, ecological surveys, GIS screening studies and providing strategic advice. He has delivered training to local search teams at operational wind farms in South Africa, Pakistan and Vietnam on bat and bird carcass search methodologies, including providing on-going support and mentoring.

Jonathan has also helped shaped wind-wildlife best practise and policy, co-authoring the Good Practise Guidelines for Surveying Bats at Wind Energy Facilities in South Africa, and developing monitoring guidelines for bat fatality at operational wind power projects. He is a founding member of the South African Bat Assessment Advisory Panel (SABAAP) and a registered as a Professional Natural Scientist (Ecological Science) with SACNASP.

2 PROFESSIONAL HISTORY

Director/Founder, Camissa Sustainability Consulting (2020 – current)
International Finance Corporation (IFC) ESG Sustainability Advice & Solutions Department (2020 – current)
Senior Ecologist, Arcus Consultancy Services South Africa (Pty) Ltd (2019 - 2020)
Ecology Specialist, Arcus Consultancy Services South Africa (Pty) Ltd (2013 – 2019)
Director/Founder, Gaia Environmental Services Pty (Ltd) (2011 - 2013)

3 QUALIFICATIONS

MSc (Environment and Resource Management; Energy and Climate Specialization)
Vrije Universiteit Amsterdam (2020 – 2021)

MSc (Zoology)
University of Cape Town (2009 – 2011)

BSc - Honours (Freshwater Biology)
University of Cape Town (2007)

BSc (Zoology)
University of Cape Town (2003 – 2006)

4 AFFILIATIONS

South African Bat Assessment Advisory Panel (2013 to 2020)
Professional Natural Scientist (Ecological Science) – SACNASP Registration #400238/14

5 PROJECT EXPERIENCE

Research Projects

- Current State of Knowledge of Wind Energy Impacts on Bats in South Africa
- Darling National Demonstration Wind Farm Project. Designed and implemented a research project investigating bat fatality in the Western Cape

Strategic Advice

- Risk screening for five wind farms in Uzbekistan and Azerbaijan (International Finance Corporation)
- Review of Terms of Reference for Bat Pre-construction Monitoring projects in India (International Finance Corporation)
- Stakeholder Advisory Committee for Good Practices Handbook Post-Construction Monitoring of Bird and Bat Fatalities at Onshore Wind Energy Facilities (International Finance Corporation)
- Review of Bird Fatality data from De Aar 1 and De Aar 2 Wind Farms (Mulilo)
- Management and mitigation recommendations for bats at three proposed wind farms (Rainmaker Energy)
- Peer Review for Three Bat Monitoring Reports for the Bokpoort II Solar Developments (Golder Associates)
- Peer Review of Operational Monitoring at the Jeffreys Bay Wind Farm, including updating the operational mitigation strategy for bats (Globeleq South Africa Management Services)
- Oyster Bay Wind Energy Facility. Reviewing a pre-construction bat monitoring study and providing input into a stand-alone study (RES Southern Africa)
- Review and design mitigation strategies for bats at the Kinangop Wind Park, Kenya (African Infrastructure Investment Managers)

Operational Monitoring Projects for Bats and Birds

- Pakistan Super Six Wind Farms (Consortium of six Companies)
- Loi Hai 2 and Phu Lac 2 Wind Farms (International Finance Corporation)
- Waainek, Chaba and Grassridge Wind Farms (EDF Energy)
- Golden Valley 1 Wind Farm (Biotherm Energy)
- Darling Wind Farm (ENERTRAG)
- Eskom Sere Wind Farm (Endangered Wildlife Trust)
- West Coast One Wind Energy Facility (Aurora Wind Power)
- Fazakerly Waste Water Treatment Works (United Utilities)
- Beck Burn Wind Farm (EDF Energy)
- Gouda Wind Energy Facility (Blue Falcon 140)
- Hopefield Wind Farm (Umoya Energy)

Pre-Construction Monitoring and Environmental Impact Assessments for Bats

- Taaibos and Soutrivier Wind Energy Facilities (WKN Windcurrent SA)
- Pofadder Wind Energy Facility (Atlantic Renewable Energy Partners (Pty) Ltd)
- Ummbila Emoyeni Wind Energy Facility (Windlab Developments South Africa (Pty) Ltd)
- Kleinberg Wind Energy Facility (Mulilo)
- Klipfontein & Zoute Kloof Solar PV Projects (Resource Management Services)
- Swellendam Wind Energy Facility (The Energy Team/Calidris)
- Swellendam Wind Energy Facility (Veld Renewables)
- Ingwe Wind Energy Facility (ABO Wind renewable energies)
- Duiker Wind Energy Facility (ABO Wind renewable energies)
- Pienaarspoort Wind Energy Facility (ABO Wind renewable energies)
- Choje Wind and Solar Energy Facility (Wind Relic)
- Wobben WEC Wind Project (Integrated Wind Power)
- Nuweveld Wind Energy Facility (Red Cap Energy)
- Banna Ba Phifu Wind Energy Facility (WKN Windcurrent SA)
- Kwagga Wind Energy Facility (ABO Wind renewable energies)
- Unika 1 Wind Farm in Zambia (SLR Consulting)
- Namaacha Wind Farm (Consultec)
- Paulputs Wind Energy Facility (WKN Windcurrent SA)
- Putsonderwater Wind Energy Facility (WKN Windcurrent SA)
- Zingesele Wind Energy Facility (juwi Renewable Energies)

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- Highlands Wind Energy Facility (WKN Windcurrent SA)
- Kap Vley Wind Energy Facility (juwi Renewable Energies)
- Universal and Sonop Wind Energy Faculties (JG Afrika)
- Kolkies and Karee Wind Energy Facility (Mainstream Renewable Power South Africa)
- Komsberg East and West Wind Energy Facility (African Clean Energy Developments)
- Spitskop West Wind Energy Facility (RES Southern Africa/Gestamp)
- Spitskop East Wind Energy Facility (RES Southern Africa)
- Patryshoogte Wind Energy Facility (RES Southern Africa)
- Elliot Wind Energy Facility (Rainmaker Energy)
- Pofadder Wind Energy Facility (Mainstream Renewable Power South Africa)
- Swartberg Wind Energy Facility (CSIR)
- Clover Valley and Groene Kloof Wing Energy Facility (Western Wind Energy)

Ecological Surveys

- Mokolo Bat Cave Assessment for water pipeline development (GIBB)
- Killean Wind Farm Bat acoustic surveys for this proposed site in Scotland, UK. (Renewable Energy Systems)
- Maple Road, Tankersely. Bat acoustic surveys including a walked transect for this proposed site near Barnsley, UK (Rula Developments).
- Wild Bird Global Avian Influenza Network for Surveillance (Percy Fitzpatrick Institute of African Ornithology)
- Tree-Grass Dynamics Research Project (University of Cape Town)
- Zululand Tree Project (University of Cape Town)

Environmental Due Diligence Projects

- Klawer Wind Farm (SLR Consulting)
- Excelsior Wind Farm (IBIS Consulting)
- Golden Valley Wind Farm (IBIS Consulting)
- Perdekraal Wind Farm (IBIS Consulting)
- Copperton Wind Energy Facility (SLR Consulting)
- Roggeveld Wind Farm (IBIS Consulting)
- Kangas Wind Farms (ERM)
- Excelsior Wind Farms (ERM)
- Golden Valley Wind Farms (ERM)

Amendment Applications for Wind and Solar Farms

- Bokpoort Solar Amendment (Royal HaskoningDHV)
- Haga Haga (CES - Environmental and social advisory services)
- Paulputs (Arcus Consultancy Services South Africa)
- Suurplaat (Savannah Environmental)
- Kap Vley (juwi)
- San Kraal (Arcus Consultancy Services South Africa)
- Phezukomoya (Arcus Consultancy Services South Africa)
- Gemini (Savannah Environmental)
- Castle Wind Farm (juwi)
- Namas (Savannah Environmental)
- Zonnequa (Savannah Environmental)
- Ukomeleza (CES - Environmental and social advisory services)
- Great Kei (CES - Environmental and social advisory services)
- Motherwell (CES - Environmental and social advisory services)
- Dassiesridge (CES - Environmental and social advisory services)
- Great Karoo (Savannah Environmental)
- Gunstfontein (Savannah Environmental)

- Komserberg East and West (Aurecon South Africa)
- Soetwater (Savannah Environmental)
- Karusa (Savannah Environmental)
- Zen (Savannah Environmental)

Screening Studies

- Feasibility assessment for four potential wind farms in the Northern Cape (ABO Wind renewable energies)
- Feasibility assessment for four potential wind farms in Mozambique (Ibis Consulting)
- Assessment of the Feasibility of a Wind Farm in the Northern Cape (juwi Renewable Energies)
- Assessment of the Feasibility of two Wind Farms in the Eastern Cape (WKN Windcurrent SA)

6 PUBLICATIONS

Aronson, J.B., Shackleton, S., and Sikutshwa, L. (2019). Joining the puzzle pieces: reconceptualising ecosystem-based adaptation in South Africa within the current natural resource management and adaptation context. Policy Brief, African Climate and Development Initiative.

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

Aronson, J.B., Sowler, S. and MacEwan, K. (2018). Mitigation Guidance for Bats at Wind Energy Faculties in South Africa.

Aronson, J.B., Richardson, E.K., MacEwan, K., Jacobs, D., Marais, W., Aiken, S., Taylor, P., Sowler,S. and Hein, C (2014). South African Good Practise Guidelines for Operational Monitoring for Bats atWind Energy Facilities (1st Edition).

Sowler, S. and S. Stoffberg (2014). South African Good Practise Guidelines for Surveying Bats in WindEnergy Facility Developments - Pre-Construction (3rd Edition). Kath Potgieter, K., MacEwan, K., Lötter,C., Marais, M., Aronson, J.B., Jordaan, S., Jacobs, D.S, Richardson, K., Taylor, P., Avni, J., Diamond,M., Cohen, L., Dippenaar, S., Pierce, M., Power, J. and Ramalho, R (eds).

Aronson, J.B., Thomas, A. and Jordaan, S. 2013. Bat fatality at a Wind Energy Facility in the Western Cape, South Africa. African Bat Conservation News 31: 9-12.

7 TRAINING

- National Wind Coordinating Collaborative (NWCC) Wind Wildlife Research Meeting, December 2020.
- Conference on Wildlife and Wind Energy Impacts, Stirling, August 2019.
- GenEst Carcass Fatality Estimator Workshop, Stirling, August 2019.
- GenEst Carcass Fatality Estimator Workshop, Kirstenbosch Research Centre (KRC), October 2018.
- Windaba Conference and Exhibition - Africa's Premier Wind Energy Conference; Cape Town, 2013 – 2019
- Bats & Wind Energy Workshop, The Waterfront Hotel & Spa, Durban, July 2016.
- Endangered Wildlife Trust (EWT) Bats & Wind Energy Training Course, Oct 2013.
- Endangered Wildlife Trust (EWT) Bats & Wind Energy Training Course, Jan 2012.

Appendix 3: Specialist Declaration of Interest environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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

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

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

PROJECT TITLE

Proposed construction of the Taaibos North Wind Energy Facility, Northern Cape Province.

Kindly note the following:

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

Departmental Details

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:	Camissa Sustainability Consulting			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100%
Specialist name:	Jonathan Aronson			
Specialist Qualifications:	MSc (Zoology), MSc (Environment and Resource Management)			
Professional affiliation/registration:	SACNASP			
Physical address:	Wenslauerstraat 4 3, Amsterdam, Netherlands			
Postal address:	Wenslauerstraat 4 3, Amsterdam, Netherlands			
Postal code:	1053 BA	Cell:	+31 62 797 1247	
Telephone:	+31 62 797 1247	Fax:	NA	
E-mail:	jonathan@camissaconsulting.com			

2. DECLARATION BY THE SPECIALIST

I, Jonathan Aronson, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

Camissa Sustainability Consulting

Name of Company:

06/11/2022

Date:

3. UNDERTAKING UNDER OATH/ AFFIRMATION

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

Signature of the Specialist

Camissa Sustainability Consulting

Name of Company

06/11/2022

Date

Signature of the Commissioner of Oaths

Date