Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

Walkthrough Survey of the Proposed Castle Wind Energy Facility near De Aar, Northern Cape, South Africa

Prepared by:
Low de Vries
Volant Environmental (Pty) Ltd
low@volantenvironmental.com

Prepared for:
Jo-Anne Thomas
Savannah Environmental
joanne@savannahsa.com

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

EXPERTISE OF BAT SPECIALISTS

Low de Vries is a registered bat assessment specialist with SABAA and has consulted for numerous field projects, which included bird surveys and the removal of dangerous snakes in Mozambique, as well as several biodiversity surveys in South Africa. He obtained a PhD in Zoology while investigating the general ecology of aardwolves with special focus on home range, diet and prey abundance. After his PhD he spent 14 months on Marion Island assisting with field work on elephant seals, fur seals and killer whales. During his subsequent (and current) postdoctoral position at the University of Pretoria he spent six years conducting research on the ecology of bats and has obtained extensive knowledge on bat behaviour and movements, as well as experience in bat handling.

Disclaimer by specialist

I declare that the work presented in this report is my own and has not been influenced in any way by the developer. At no point has the developer asked me as specialist to manipulate the results in order to make it more favourable for the proposed development. I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP) and the EIA Regulations (2014, as amended). I have the necessary qualifications and expertise (*Pr. Sci. Nat. Zoological Science)* in conducting this specialist report.

Low de Vries, PhD: Zoology, *Pr. Sci. Nat. Zoological Science*

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

Table of Contents

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

List of Figures

List of Tables

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E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

1. Introduction

1.1 Project details

Volant Environmental (Pty) Ltd was contracted by Savannah Environmental (Pty) Ltd to conduct a walkthrough and provide a report of the proposed Castel Wind Energy Facility (WEF) near De Aar in the Northern Cape Province of South Africa and the associated infrastructure of the facility. It is proposed that up to 24 wind turbines will be constructed with associated infrastructure, including Underground Cables, a Substation and Access Roads. The rotor diameter for each turbine will be up to 200 m with a hub height of up to 150 m and each will have a capacity of up to 7.9 MW. The Walkdown Report deals specifically with the placement of turbines and powerlines and provides inputs for the Environmental Management Programme.

1.2 Project location

The proposed Castle WEF is located 30 km east of De Aar in the Emthanjeni Municipality in the Northern Cape Province of South Africa (Figure 1). The area can be accessed from the Hydra Road from the N10. The project Area of Influence (AOI) is situated in the Eastern Upper Karoo unit and the Northern Upper Karoo vegetation types and is mainly used as farmland.

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E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

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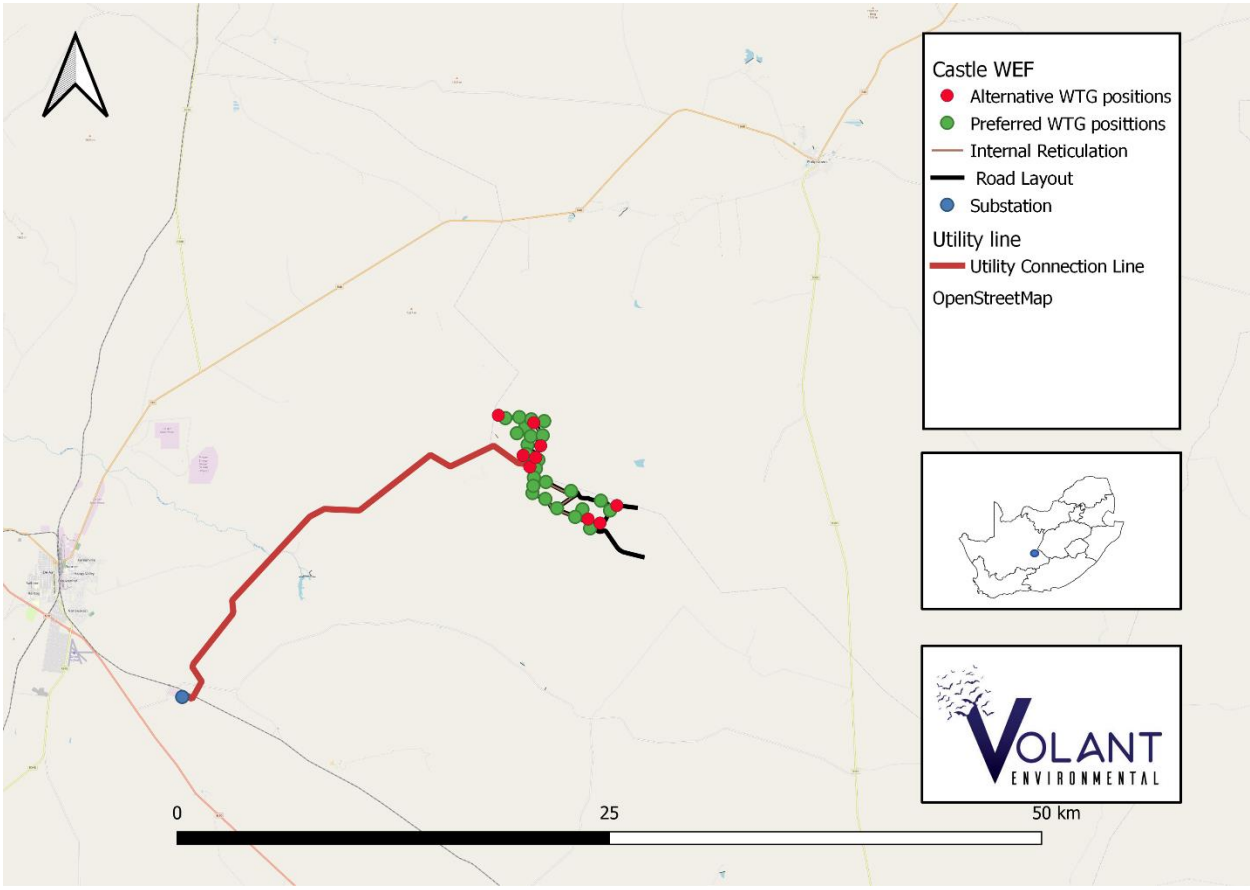

Figure 1. Location of the proposed Castle Wind Energy Facility

1.3 Bat validity period

The initial Pre-construction Survey was conducted between 2013 and 2014 by Animalia (Pty) Ltd[1]. In 2019, an amendment process was undertaken to revise the turbine dimensions. Arcus (Pty) Ltd, the appointed bat specialist to provide comment on turbine layout based on the new turbine specifications, concluded that the initial impact assessment conducted by Animalia (Pty) Ltd is still valid and that the new turbine dimensions should not have a greater impact on bats than

[1] Even though this falls outside the five-year validity period as suggested by SABAA no new EIA application was submitted and the conditions of the original EA remains valid.

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

suggested in the EIA (Aronson 2019). It is stipulated that this only holds true if the mitigation measures proposed during the survey conducted by Animalia are adhered to (Pierce 2014) and that no turbines are placed within the updated buffers zones suggested by Arcus in the Amendment Report (Aronson 2019).

1.4 Assumptions and Limitations

Since bats are known to migrate their populations varies seasonally. As such, this walkdown survey only gives a brief snapshot into bat populations in the area and no conclusions can be drawn from the presence or absence of species.

Distribution records of bats in southern Africa are still poorly reported and limited for many species. In addition, migratory patterns of bats are largely unknown in South Africa. Studies have reported that bats do migrate, but the exact routes followed are not known (Pretorius *et al.*, 2020). The same is true for breeding behaviour and the formation of maternity colonies for many species. WEF pre-construction monitoring reports on bats are reliant on reporting echolocation calls and identifying species from these calls, but without echolocation call libraries accurate identification is not always possible. Published libraries created from release and handheld calls of captured bats are available for southern Africa but are geographically limited. Since the echolocation calls of a particular species from different regions in South Africa are known to vary to some degree (Monadjem *et al.*, 2020), call libraries created in different regions are not always comparable.

Bat detectors are not always effective in recording echolocation calls for all bat species, and some species may be missed e.g., some fruit bat species that do not echolocate. Other species, such as the Egyptian slit-faced bat (*Nycteris thebaica*), emits low intensity calls that may not be recorded. Bat detectors are also limited in the range over which a call can be recorded, and this can be further influenced by environmental conditions such as humidity. In addition, the microphones that are coupled to the detectors are not omnidirectional and recording quality and number of recordings is influenced by the orientation of the call relative to the microphone.

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

2. Methods

All methodologies used for the bat and walkthrough process have been planned using the South Africa Best Practice guidelines for Pre-Construction monitoring of Bats at Wind Energy Facilities (MacEwan et al. 2020) as a guide and comply with all good practice guidelines. Field surveys were conducted between the 25th and 29th of January 2022. The surveys were conducted during this period as it falls during bat breeding season and should provide a reasonable indication of bat activity, including breeding behaviour, in the area.

The Pre-construction survey conducted in 2014 was used as a guide to assess the species present on the AOI and deduce where potential roosting locations might be situated (Pierce e*t al* 2014). This survey was also used as a guide to locate sensitive areas. In addition, a desktop study was undertaken to determine the species of bats that could potentially occur on the AOI (ARC 2020, Monadjem *et al*. 2020). A search for caves was conducted to determine if any large bat colonies are found within 20 km of the area.

An area with a radius of 200m around each proposed turbine location, both preferred and alternative, were investigated to determine if these areas would qualify as "Bat Sensitive Areas". The same applied for the proposed road layout for which an area of 150m on either side of the road was investigated, and substations for which a radius of 300m was investigated.

2.1 Active surveys

Active surveys are recommended for bats in order to assess if any species of conservation concern occur in the area. Surveys should provide robust representation of species assemblage, as well as seasonal activity patterns, and as such transects will be employed to monitor bats across the area using a bat detector. The route and number of transects employed represented adequate coverage of the PAOI. The number of surveys depended on the likelihood of species at risk being present. Surveys began at twilight when conducted in the evening and last for at least 2.5 hours. For the PAOI two nights of transects was conducted on the proposed Wind Energy Facilities.

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E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

2.2 Roost surveys

Bats use a variety of roosts including caves, trees, crevices and buildings, and the choice of roosts is species dependent. The location of caves is fairly well known, and historical records in conjunction with active searching can be used to uncover them. Detection of non-cave roosts sites are more difficult and can only be achieved through active searching. Transects were walked on the property during the day, and potential roosting sites investigated with a bat detector. In addition, the search team was on the lookout for signs of bat activity such as traces of faecal material.

2.3 Foraging areas

Given that the majority of species that has been detected in the area and could potentially occur there are clutter-edge foraging bats (feeding along vegetated areas), the search team investigated areas with more complex vegetation structures. This included, but was not limited to, areas with trees of larger shrubs. During nightly driven transects the search team also drove past these areas to determine if foraging bats are present. It must be noted, however, that the absence of bats in these areas should not exclude these areas as potential foraging habitats. All proposed locations for turbines were inspected to ensure that they are not located in foraging areas.

3. Results

3.1 Species present

During the Pre-construction Survey four bat species were detected through passive and active monitoring including *Eptesicus hottentotus* (Long-tailed serotine), *Laephotis capensis* (Cape serotine), *Miniopterus capensis* (Natal long-fingered bat) and *Tadarida aegyptiaca* (Egyptian free-tailed bat). Our desktop study further revealed that four additional species could potentially be found in the area namely Temminck's myotis (*Myotis tricolor*), Egyptian slit-faced bat (*Nycertris thebaica*), Geoffroy's horseshoe bat (*Rhinolophus clivosus*) and Darling's Horseshoe bat

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

(*Rhinolophus darling*). The only museum record that was collected close the AOI was one individual *T. aegyptiaca* collected *ca.* 25 km from the site (ARC 2020).

None of these species are endemic to South Africa and all are listed as least concern based on the IUCN red data lists. *Miniopterus natalensis* is a cave roosting bat and the presence of these bats indicate that there could be a cave located close to the site, or that they move through the area periodically. *Laephotis capensis* roosts under the bark of trees and in the roofs of houses and as such there could potentially be roosts available for this species. Both *E. hottentotus* and *T. aegyptiaca* will roost in rock crevices, and as such this area provides amble potential roosting locations for these species. *Tadarida aegyptiaca* is an open-air forager that forages at height and is a species that is at high risk for mortalities at WEF.

3.2 Active monitoring

Only three bats from two species were detected during driven transects, two *T. aegyptiacus* and one *L. capensis* (Figure 2). As such no inferences can be drawn from these data, except for confirming the presence of these two species on the PAOI.

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E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

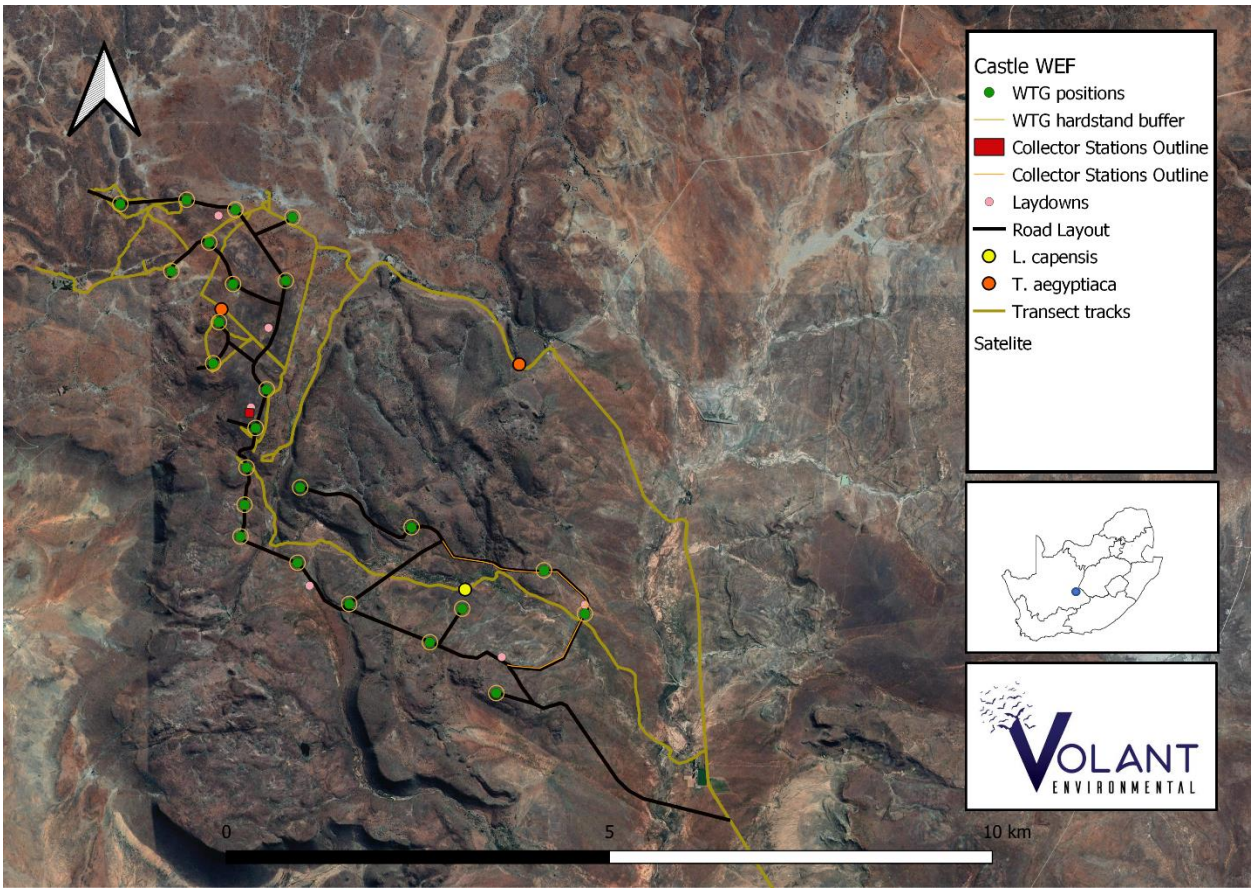

Figure 2. Bats detected during active monitoring

3.3 Bat sensitive zones

Several potential bat sensitive areas, including water sources and courses and potential roosting locations were found as outlined below. A 200 m buffer were implemented around all these sites as recommended by MacEwan (2020) to determine if any turbines or roads overlap with these bat sensitive zones.

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E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

3.3.1 Water sources

Bats are heavily reliant on sources of open water and will visit at least one such source during the course of a night. This is especially relevant in arid regions, such as the Karoo, where water is often limited and the presence thereof unreliable. Several water bodies were identified on the property, and, for the larger part, there are no turbines, or any other infrastructure planned close to these sources (Figure 4, Figure 4). However, on the preferred layout WTG 30 overlaps with the buffer placed around one of these water sources. This is an artificial water source power by a windmill, and it is unlikely that it will contribute significantly as a water source for bats. It is also located in a Medium Risk buffer and as such it is not rated as a No-Go area.

Figure 3. Examples of sources of open water

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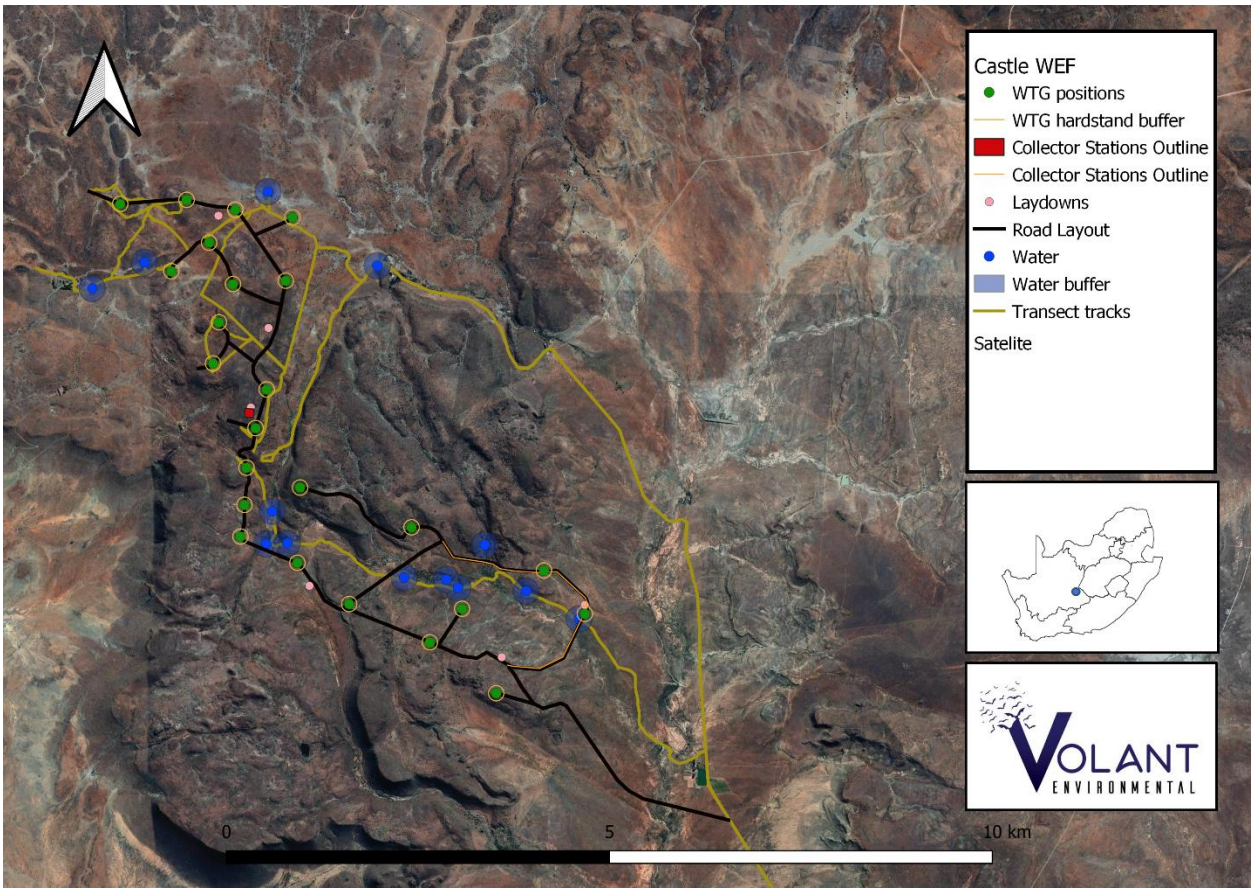

Figure 4. Sources of water on the Area of Influence

3.3.2 Potential roosting sites

Several potential roosting locations were found and inspected, but no bats or signs of bats were detected at any of these locations (Figure 5, Figure 6). These roosting sites consists mostly of rocky areas where there is a potential for bats to roosts in crevices, particularly *T. aegyptiaca* and *E. hottentotus*. In the northern section of the property there are abandoned buildings, but due to the lack of ceilings it is unlikely that these buildings will be used as roosts. Larger trees were also inspected for signs of bats, but again not definite conclusions could be made.

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E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

None of the current turbine locations overlaps with any potential roosting locations, but the road between WTG 21 and 29 does cross through the buffer zone implemented. Considering that the road does not run directly across these rocky areas no potential roosts will be demolished. A cave was found 83 km from the AOI close to Vanderkloof Dam.

This cave is a known winter roost for *M. natalensis* and offers an explanation for the records of this species on the property. Comparatively few records of *M. natalensis* were detected, and it is unlikely that this colony migrates through or across the PAOI, or use it extensively as a foraging area.

Figure 5. Examples of potential roosting locations available on the Area of Influence

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Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

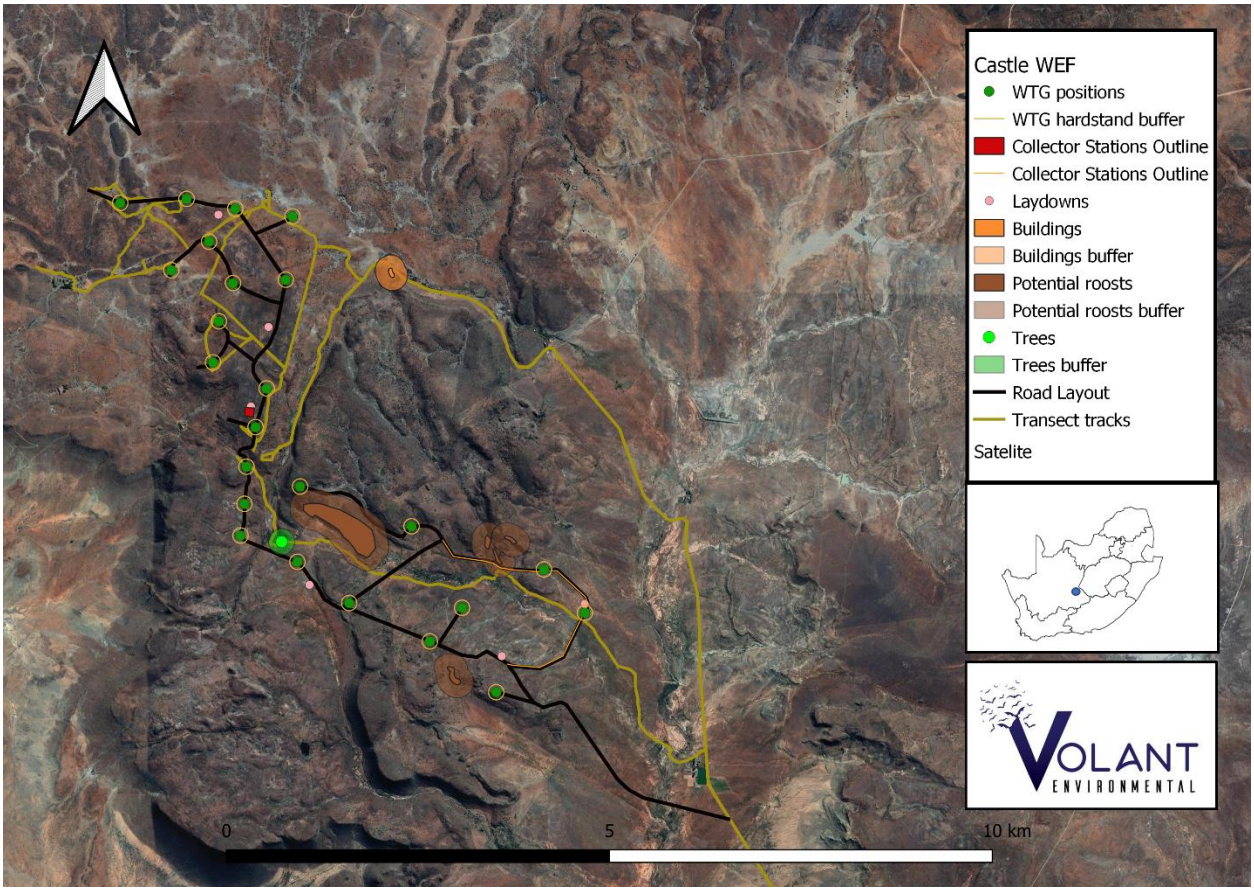

Figure 6. Potential roosting sites detected on the Area of Influence

3.3.3 Watercourse

A large watercourse runs through the property (Figure 7, Figure 8). While much of this watercourse is dry for most of the year, it does provide a sporadic source of water for bats. In addition, the area has a more complex vegetation structure than the surrounding landscape and as such offers better foraging opportunities for bats. Due to the more complex vegetation structure, it also offers roosting sites for bats. As such, the watercourse should be considered as a High Sensitivity zone for bats.

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E-mail: low@volantenvironmental.com
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Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

There are no turbines located within the 200 m buffer that has been implemented around the watercourse. The road does, however, cross the watercourse, and considering that there are already roads on the property that crosses the watercourse it is recommended that these are followed as far as possible. Where additional watercourse crossings cannot be avoided, the recommendations of the aquatic specialist should be adhered to.

Figure 7. Photos of the watercourse that runs through the Area of Influence

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Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

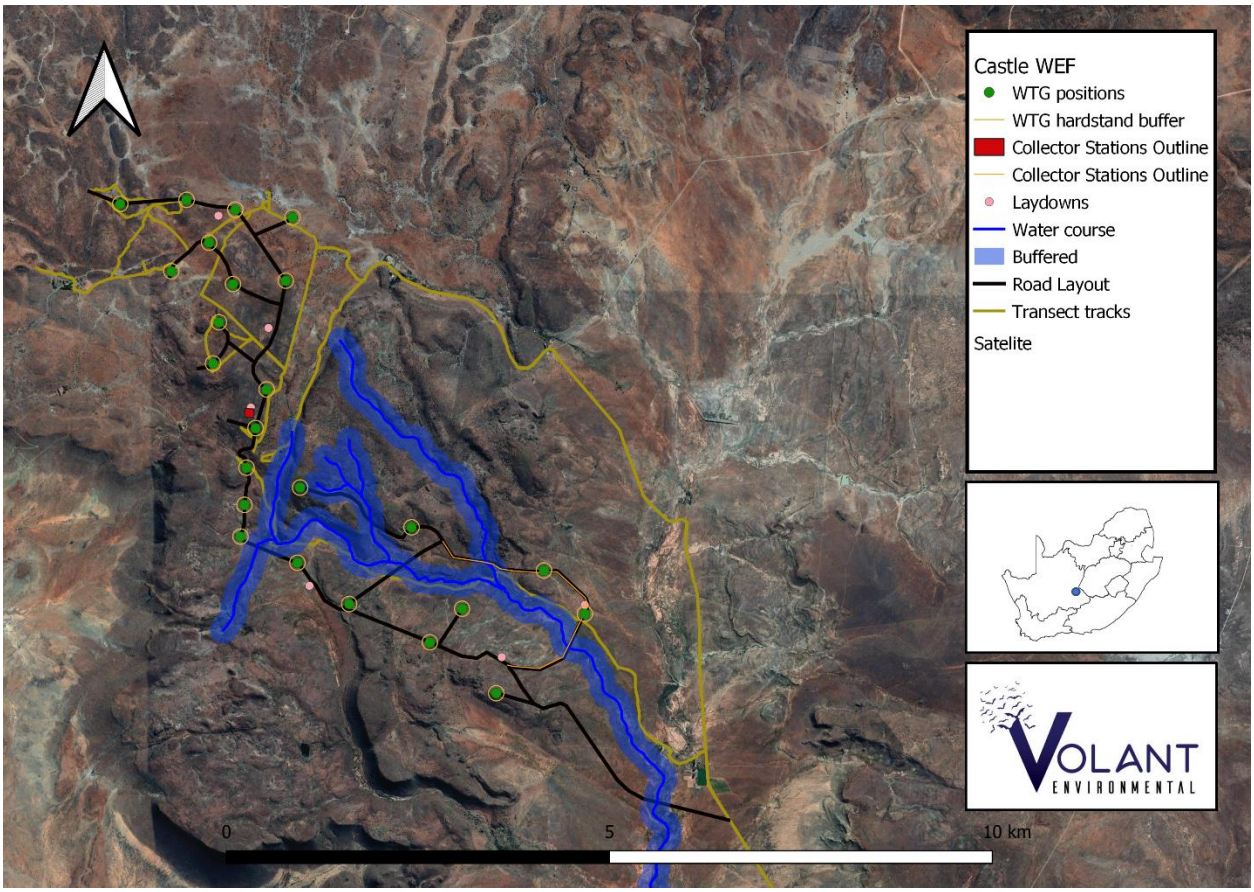

Figure 8. Watercourses located on the proposed area of influence

4. Impact assessment

Based on the EIA and the subsequent Amendment the largest, and possibly only, impact on bats due to the construction of the Castle WEF will be due to bat fatalities as a result of collisions or barotrauma. Mitigation measures that were suggested during the EIA are to avoid sensitive bat areas, and these mitigation measures were implemented after the submission of the Amendment. Currently only WTG 30 falls in a Medium Sensitivity zone. Considering that it is one of the smaller water sources on the AOI it is unlikely to be used by bats and movement of WTG30 is not considered necessary. (Figure 9),. As was stated in the Amendment, the new turbine dimensions

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

are not expected to alter the impact on bats, but it is recommended that turbines with a higher hub height is used since bat activity was found to be higher at lower altitudes during the EIA.
Since all necessarily mitigation measures have already been taken the impact of the current layout on bats is expected to be Low (Table 1), but mitigation measures will need to be employed based on Operational Monitoring as advised during the EIA. These mitigation measures must be informed in real time based on carcass collection and acoustic monitoring by a bat specialist, and cannot be listed currently, but will include possible curtailment.

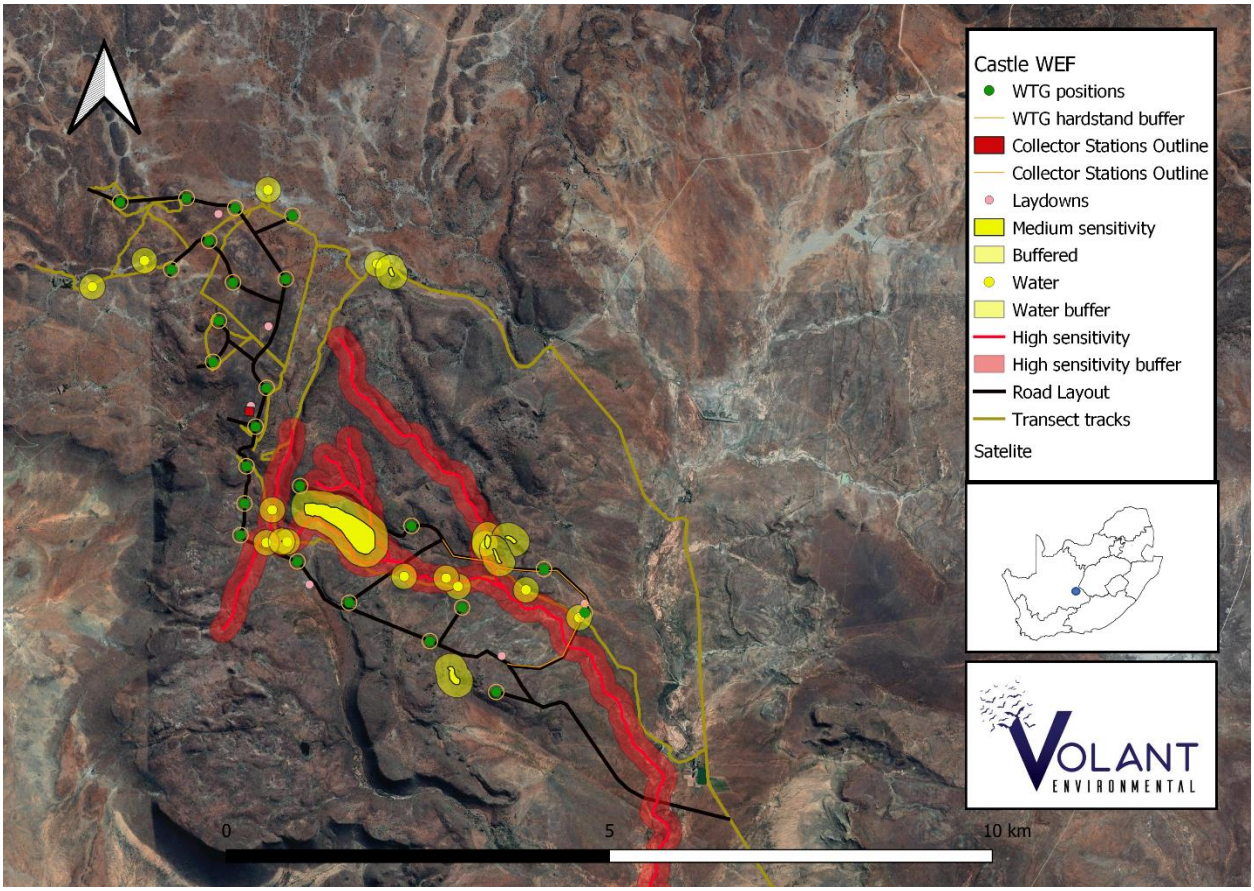

Figure 9. Bat sensitivity areas on the Castle WEF

Table 1. Impact of the proposed Castle Wind Energy Facility of bats in the area given that mitigation measures have already been employed.

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E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

Post Mitigation	Rating	Motivation	Significance
Duration	4 (Permanent)	Impacts on bats due to fatalities will occur for the lifespan of the Castle WEF	28 (Low)
Extent	1 (Local)	The area does not fall on a migratory path and only bats residing in the area will be impacted	
Magnitude	2 (Minor)	It is not expected that there will be a large impact on bats	
Probability	4 (Most Likely)	Bat mortalities at WEF are essentially unavoidable, but the extend can be managed during Operational monitoring	
Mitigation/Enhancement Measures			
Even though the Significance of the expected impact is currently rated as Low additional mitigation measures may need to be considered based on Operational monitoring, in accordance with the prevailing guidelines in effect at the time			

5. Conclusion

The walkdown survey agrees with the findings of the EIA and Amendment and it is unlikely that the construction of the proposed Castle WEF will have a large impact on bat populations in the area. This is assuming that the current layout is employed and that High Bat Sensitivity buffers are avoided. Further mitigation measures will have to be informed during the Operation Monitoring, in accordance with the prevailing guidelines in effect at the time. and curtailment must be employed if deemed necessary by the bat specialist. As such, there are no recommended changes to the layout or EMPr and authorization can be given for the construction of the Castle WEF.

6. References

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

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Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

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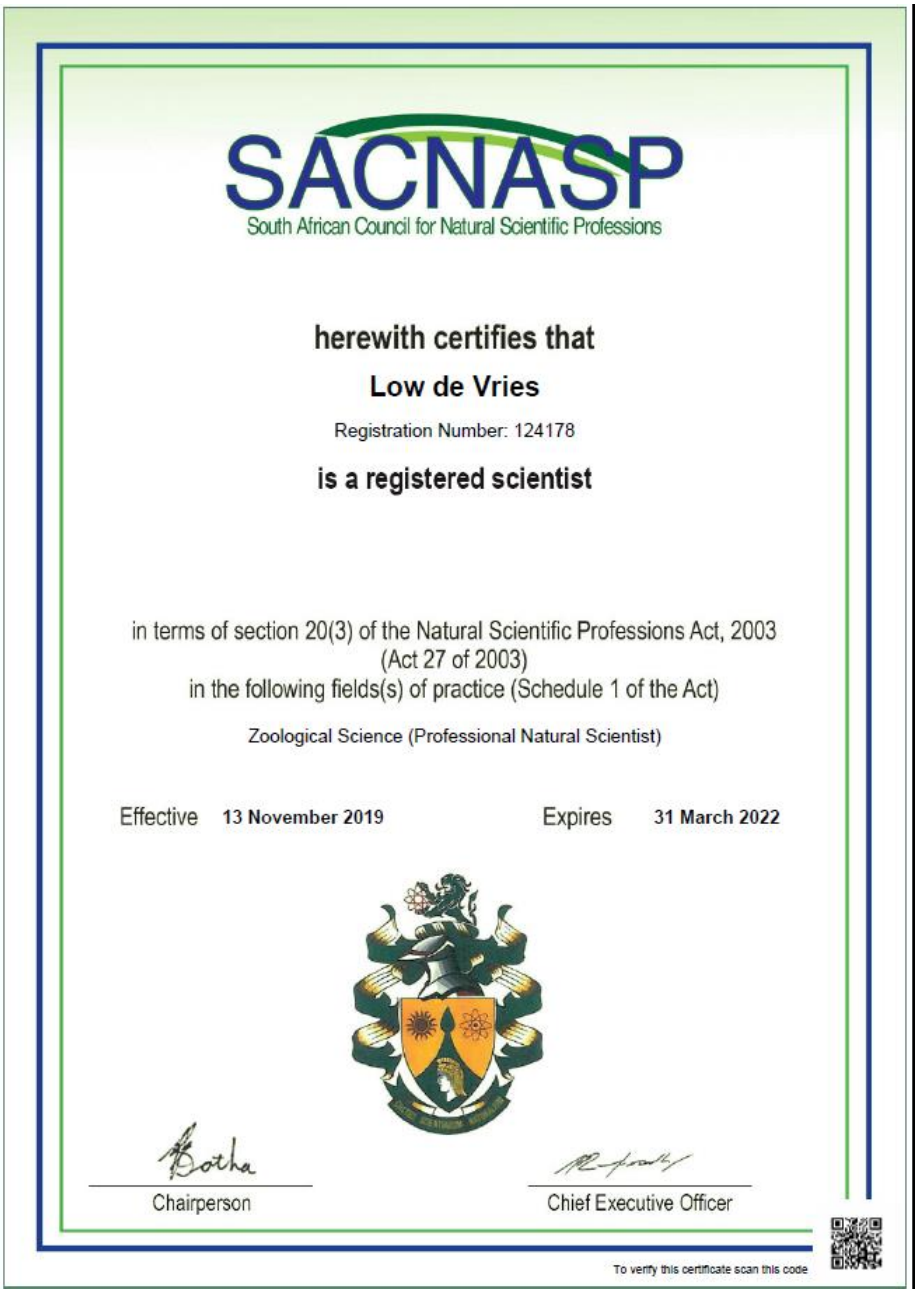
Appendix 1: Specialist qualifications



SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Low de Vries

Registration Number: 124178

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Zoological Science (Professional Natural Scientist)

Effective **13 November 2019** Expires **31 March 2022**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

04290887

University of Pretoria

The Council and Senate hereby declare that
at a congregation of the University the degree

Doctor of Philosophy

in

Zoology

with all the associated rights and privileges
was conferred on

John Low de Vries

in terms of the Higher Education Act, 1997 and the Statute of the University

On behalf of the Council and Senate

Vice-Chancellor and Principal

On behalf of the Faculty of
Natural and Agricultural Sciences

Dean (Acting)

Ek sertifiseer dat hierdie is 'n ware en juiste afskrif van die oorspronklike dokument.
I certify that this is a true and correct copy of the original document.

Kommissaris van Ede / Commissioner of Oaths
Klientediensesentrum / Client Service Centre
Universiteit van Pretoria / University of Pretoria

Datum 18/06/2015 Date

Registrar

2014-09-04

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
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Pr. Sci. Nat. Zoological Science

Appendix 2: Curriculum Vitae of bat specialist

Personal details

Full Name	John Low de Vries
DOB	7 November 1984
Nationality	South African
Marital Status	Married
Email	low@volantenvironmental.com
Phone	+27 82 323 5475
ID number	841107 5188087

Education

Completed	Degree and Institution
2002	Matric, Hoërskool Jeugland, Kempton Park, South Africa
2006	B. Sc Zoology, University of Pretoria, Pretoria, South Africa
2007	B. Sc (Hons) Zoology, University of Pretoria, Pretoria, South Africa
2014	PhD Zoology, University of Pretoria, Pretoria, South Africa

Key areas of expertise

- Bat Specialist — Conducting surveys on bat diversity and abundance and researh on bat ecology.
- Environmental Assessment Practitioner — Writing and collating Basic Assessment (BA) for proposed Wind Energy Facilities

Memberships & Certificates

- SACNASP Registered Professional Natural Scientist in the field of Zoological Science - Registration Number: 124178
- Bat Assessment Specialist with South African Bat Assessment Association (SABAA)

Other Training

- Multivariate statistical modelling (Cape Town, South Africa)
- Bat handling and identification course (AfricanBats)
- Snake handling (Chameleon Village (South Africa)
- ArcGis online course

- First Aid level 2 (Johannesburg, South Africa)

Focal Experience relevant to current project

2021 -current – Bat specialist for three wind energy facilities and associated grid connection near Dorderecht, Eastern Cape Province, South Africa
2021-current – Bat specialist for two wind energy facilities and associated grid connection near Postmasburg, Northern Cape Province, South Africa
2021-current – Bat specialist for wind energy facility and associated grid connection near Belfast, Northern Cape Province, South Africa
2021-current – Bat specialist for wind energy facility and associated grid connection near Aggeneys, Northern Cape Province, South Africa
2021-current – Bat specialist for wind energy facility and associated grid connection near Pofadder, Northern Cape Province, South Africa
2020-2021– Bat specialist for wind energy facility and associated grid connection near Loeriesfontein, Northern Cape Province, South Africa
2020-2021 – Bat specialist for wind energy facility and associated grid connection near Gouda, Northern Cape Province, South Africa
2017 - Biodiversity survey of Bats in Gorongosa National Park, Mozambique
2016-current – Bat Ecologist for the Centre for Viral Zoonoses at the University of Pretoria

Publications

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Cell: +27 82 323 5475
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Web: volantenvironmental.com

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Conference Contributions

Infectious Diseases of Bats Symposium. Fort Collins, Colorado 2017. Body mass index of the Egyptian fruit bat, *Rousettus aegyptiacus*: An indicator of infection status. **de Vries, J.L.**, Dietrich, M., Paweska, J., Markotter, W.

SASAS 2016. **de Vries, J.L.,** Jonker, M.L., Kriel, D., Kotze, A.K. The Tankwa goat: Phenotypically that different?

De Beers Diamond Route Conference, 2010. **de Vries, J.L.,** Pirk, C.W.W., Bennett, N.C. Is the aardwolf a seasonally influenced optimal forager?

Kimberley biodiversity research symposium, 2009. **de Vries, J.L.,** Bennett, N.C., Pirk, C.W.W., Dalerum, F., Cameron, E.Z. Den and home range use of the aardwolf, *Proteles cristatus*

Employment & work-related experiences

2020 - present	Director and founder of Volant Environmental
2016 - present	Postdoctoral fellow, University of Pretoria
2015 - 2016	Postdoctoral fellow, NZG
2014 - 2015	Marion Island field assistant, University of Pretoria
2013	Documentary presenter, Oxford Scientific Films
2010 - 2011	Wildlife Education Trainer, Enviro- Insight

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com

Low de Vries
PhD Zoology
Pr. Sci. Nat. Zoological Science

2010 - 2011 Game Raning Lecturer, Damelin Centurion
2009 - 2018 Lecturer and tutor, University of Pretoria

Recent Project Experience

For further details please contact me directly under low@volantenvironmental.com

Time span	Nature of project	Capacity	Industry / Sector	Client / Developer	Country (Province)
2021	Dordrecht Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	ACED (Pty) Ltd	South Africa (Eastern Cape)
2021	Indwe Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	ACED (Pty) Ltd	South Africa (Eastern Cape)
2021	Waschbank Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	ACED (Pty) Ltd	South Africa (Eastern Cape)
2021	Gorachouqua Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Northern Cape)
2021	Khoemana Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Northern Cape)
2021	Poffadder Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Genesis Eco-Energy Developments (Pty) Ltd	South Africa (Northern Cape)
2021	Aggeneys Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Genesis Eco-Energy Developments (Pty) Ltd	South Africa (Northern Cape)
2021	Dalmanutha Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Mpumalanga)
2020-2021	Bergrivier Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Genesis Eco-Energy Developments (Pty) Ltd	South Africa (Western Cape)
2020-2021	Botterblom Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Genesis Eco-Energy Developments (Pty) Ltd	South Africa (Northern Cape)
2012	Dangerous snake removal	Herpetologist	Mining (Coal)	Anadarko	Mocimboa da Paia, Mozambique

Cell: +27 82 323 5475
E-mail: low@volantenvironmental.com
Web: volantenvironmental.com