Bat Impact Assessment
for the proposed
Sol Invictus Overhead Power Line

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IWS Ref No: 3119

Date: July 2021

Declaration of Independence

Inkululeko Wildlife Services (Pty) Ltd (IWS) is an independent consultancy. IWS has no legal or financial connection with the developer or the environmental assessment practitioner (EAP), except for fulfilling the tasks required for this assessment. Remuneration to IWS for conducting this assessment is not linked to the authorisation of the project by the competent authority. In addition, IWS has no interest or connection to any secondary or future development associated with the approval of this project. This report was compiled by Dr Caroline Lötter, and reviewed by Kate MacEwan, who are both registered with the South African Council for Natural Scientific Professions (SACNASP).

Signed for Inkululeko Wildlife Services (Pty) Ltd by:

Dr Caroline Lötter, Pr. Nat. Sci.

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Executive Summary

Presented in this report is a desktop-based Bat Impact Assessment for the proposed 23 km 132 kV Sol Invictus Overhead Power Line (SIOHPL), situated ~10 km south-west of the town Aggeneys in the Northern Cape. Although the Assessment was focussed on a corridor of 100 m on either side of the SIOHPL, features in the surrounding region of possible relevance from a bat impact perspective were also considered. The Assessment was informed by a review of pertinent information, and a determination of potentially occurring bat species, and bat important habitats along the SIOHPL route. Thirteen bat species have been listed for the study area, of which seven species (54%) are regarded by IWS as priority conservation species. Known significant roosts in the region appear to be limited to mines around the town of Springbok, situated ~70 km south-west of the SIOHPL. High, Medium-High, and Medium sensitive bat habitats and buffers along the proposed SIOHPL route correspond, respectively, with important drainage lines, buffers around these and rocky terrain, and buffers around buildings (where certain bats may roost). To mitigate the Medium significant disturbance of these habitats during construction, and to reduce the Low significant risk of bat electrocution during operation, IWS advises that powerline poles must not be installed where the SIOHPL route coincides with High sensitive drainage lines. Where Medium-High sensitive areas are intersected, the installation of powerline poles should be avoided where possible. In Medium sensitive areas, the installation of powerline poles should be minimized. In remaining Low sensitive areas, rehabilitation alone is considered sufficient to mitigate disturbance of natural habitat. As no major bat concern or impact was identified during this Assessment, a field survey for further investigation and validation is NOT considered necessary, and the proposed SIOHPL with avoidance of High sensitive areas is considered acceptable from a bat impact perspective.

Table of Contents

List of Figures

List of Tables

1. Introduction

Presented herein is a Bat Impact Assessment for the proposed Sol Invictus Overhead Power Line (SIOHPL), situated approximately 10 km south-west of the town Aggeneys in the Northern Cape. The SIOHPL route is approximately 23 km long, and will run roughly parallel to and north of the N14 road, from an Eskom collector substation on the Sol Invictus Photo Voltaic Solar Energy Facility (PVSEF) property in the west, to the Eskom Aggeneys Substation in the east (**Figure 1**).

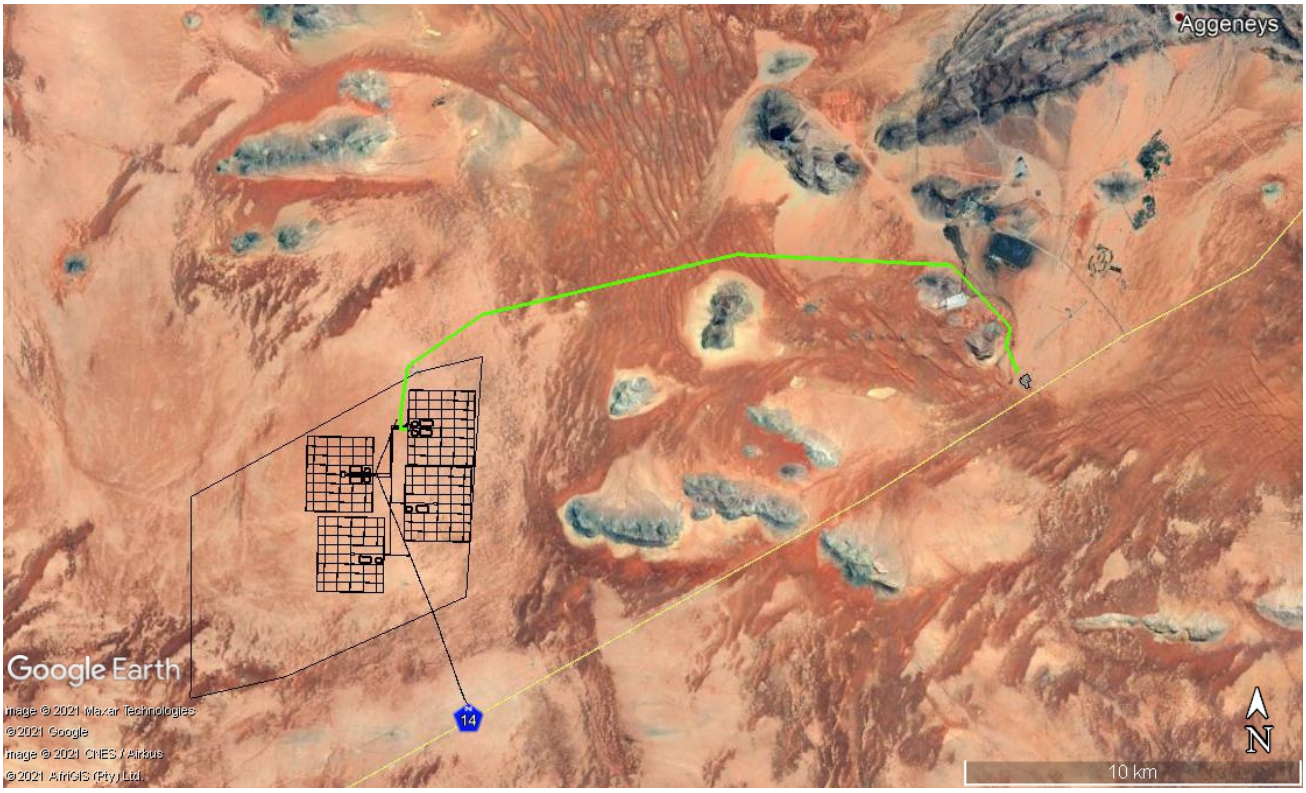

Figure 1 Proposed Sol Invictus Overhead Power Line route (in green)

It is understood by Inkululeko Wildlife Services (IWS) that the SIOHPL will represent a 132 kV steel single or double structure with kingbird conductor. A standard OHPL construction methodology (entailing drill holes, plant poles, and string conductor) will be employed. Large excavations and stabilized backfilling are not anticipated, but can only be verified on site, once a geotechnical appraisal has been undertaken at each OHPL pole position. Pole positions will only be determined once the project has been awarded, and the OHPL design has commenced.

2. Terms of Reference

The developer (Red Rocket independent renewable power producer) requires their projects to fully comply with applicable legislation and national and international guidelines. Currently in South Africa, detailed bat impact assessments are not required for proposed power line projects. It is only if requested for a specific reason, that such assessments are conducted. IWS, therefore, proposed a phased approach to the Bat Impact Assessment for the proposed SIOHPL. Presented in this report is a desktop assessment of important bat habitats and features along and near the OHPL route, and potential impacts of the development on bats with recommended measures to mitigate these.

Although the present Bat Impact Assessment was focussed on a corridor of 100 m on either side of the proposed SIOHPL (as stipulated by the Environmental Assessment Practitioner, WSP), features in the

surrounding region of possible relevance from a bat impact perspective were also considered. Based on the Bat Impact Assessment presented herein, we have indicated in our report Conclusion whether a field survey is necessary for further investigation of bat important considerations.

3. Assessment Team

The Inkululeko Wildlife Services (IWS) is an ecological (wildlife) consultancy with, inter alia, considerable bat specialist expertise. Team members were involved with the bat sensitivity analysis of the Strategic Environmental Assessment for South Africa's Renewable Energy Development Zones (REDZs), and have performed numerous specialist bat assessments in southern Africa for various developments (mines, power lines, the Square Kilometre Array, etc.) as well as for caves, and protected areas. Team members have also conducted close to 40 pre-construction and 10 operational long-term bat monitoring studies for WEFs in southern Africa. Senior IWS personnel include:

Dr Caroline Lötter

Caroline, the Managing Director at IWS, has worked on multiple long-term bat monitoring studies for proposed WEFs. She currently sits on the South African Bat Assessment Association (SABAA) Panel, and is a co-author of the current South African best practice guidelines for pre-construction bat monitoring studies at WEF developments (MacEwan *et al*. 2020a), and a recently-published paper on bat activity and its implications for wind farm development in South Africa (MacEwan *et al*. 2020b). Caroline is SACNASP-accredited as a Professional Natural Scientist in the field of Zoology and obtained a PhD in Zoology on the conservation biology of the rare Giant Bullfrog (*Pyxicephalus adspersus*). Caroline has also performed numerous impact assessments on vertebrate and invertebrate fauna throughout South Africa, and in Sierra Leone. Caroline has produced more than 10 peer-reviewed zoological articles and is a member of the Gauteng and Northern Regions Bat Interest Group (GNorBIG) and the Zoological Society of Southern Africa.

Kate MacEwan

Kate, the Founding Director of IWS, is a SACNASP registered zoologist and environmental scientist with a BSc Honours in Zoology from Wits University. She has over 22 years of zoological and practical bat conservation experience, and a wide diversity of contacts with bat academics and biologists in Africa. She was Chairperson of SABAA for seven years, and is the lead author / co-author of the current South African best practice guidelines regarding bat monitoring studies at WEF developments during pre-construction (MacEwan *et al*. 2020a) and operation (Aronson *et al*. 2020), and regarding bat fatality thresholds (MacEwan *et al*. 2018). Kate is also employed by Western EcoSystems Technology, Inc. in the United States to broaden their international footprint and to partner with IWS to offer a comprehensive and world-class service to Africa and other emerging markets. She has published several peer-reviewed articles on bats at WEFs, including a recent paper on bat activity and its implications for wind farm development in South Africa (MacEwan *et al*. 2020b).

Trevor Morgan

Trevor has worked with Kate and Caroline for 10 years as the Senior Technical Specialist on all the various bat monitoring projects. He has served as an active member on the Executive Committee of the GNorBIG for several years. He is very knowledgeable on South African bats and has extensive experience with bat detectors, their related software, mist-netting, and harp-trapping. By trade, Trevor is an electrician and an inventor, and has constructed his own harp trap and heterodyne bat detector. Trevor's considerable field-based involvement in all long-term bat monitoring studies has been invaluable. Trevor is also a co-author on the MacEwan *et al*. (2020b) article on bat activity and its implications for wind farm development in South Africa.

4. Methodology

4.1 Information Review

The present assessment was informed by our consideration/consultation/review of:

- The layout and other salient details of the proposed project (provided by WSP).
- Available aerial imagery for the site and surrounds. This included satellite imagery taken in December every year it seems between 2003 and 2020 (Google Earth 2021).
- Relevant legislation and guidelines, particularly, the South African Species Environmental Assessment Guideline (SANBI 2020) and Guidance Note 6 (IFC 2019) for the International Finance Corporation Performance Standard 6.
- Previous bat studies in the region and from similar habitats by IWS team members. These included a brief bat survey at the Simon Van Der Stel Copper Mine (ca. 75 km south-west of the SIOHPL), a desktop- and field-based bat impact assessment for the Square Kilometer Array project (IWS 2020), and a 12-month pre-construction bat monitoring study and impact assessment for a proposed wind farm near Kleinsee (NSS 2014).
- Peer-reviewed scientific publications and other reliable literature (mentioned where relevant in the report).

4.2 Potentially Occurring Bat Species

A list of bat species which likely to reside in or frequent the SIOHPL study area was determined based on the: i) bat species records and predicted distribution maps published in Monadjem *et al*. (2020) and Jacobs *et al*. (2013); ii) regional bat species records provided online by the African Chiroptera Report (2020), FIAO (2021) and iNaturalist (2021); and iii) IWS's accumulated bat data and professional knowledge, expertise and judgement. The current national and global Red List status of the listed bat species is as reported by Child *et al*. (2016) and the IUCN (2021-1), respectively.

4.3 Important Bat Habitats

A bat habitat sensitivity map was compiled, which took into consideration the following features of known importance for bats:

- Regional known significant bat roosts (African Chiroptera Report 2020; IWS unpubl. data).
- Local rocky ridges, cliff faces, steep slopes, and outcrops (delineated using contours; CDNGI 2020).
- Local buildings (CDNGI 2020).
- Freshwater Ecosystem Priority Areas (Nel 2011) and other local rivers, wetlands, and other natural and artificial surface water resources (CDNGI 2020).

As there are currently no South African bat-specific buffer and sensitivity mapping guidelines for developments other than wind farms, IWS used the South African guidelines on bat monitoring for proposed wind farms (MacEwan *et al.* 2020a) as an approximate reference.

4.4 Impact Assessment and Mitigation

Potential direct, indirect, and cumulative impacts on bats (including species, habitats, and ecosystem services) were assessed for the different project phases using the methodology stipulated by WSP. Impact magnitude, extent, reversibility, duration, probability, and significance were rated as indicated in **Table 1**. Impact significance was calculated as the product of impact probability and the sum of impact magnitude, extent, reversibility, and duration. Impact avoidance/prevention, minimisation, rehabilitation/restoration, and offsetting were considered, in descending order, for the prescription of impact mitigation measures.

Table 1 Impact assessment criteria and their ratings (supplied by WSP)

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	0 – 30	31 to 60		61 – 100	
Environmental Significance Rating (Negative (-))	**Low (-)**	**Moderate (-)**		**High (-)**	
Environmental Significance Rating (Positive (+))	**Low (+)**	**Moderate (+)**		**High (+)**	

4.5 Assumptions and Limitations

- The present Bat Impact Assessment was only based on a desktop evaluation of pertinent information. No field survey was performed.
- Information on bats in South Africa is limited relative to more popular taxa such as birds and large mammals. E.g. not all bat roosts in caves and mine tunnels in the country are known.
- No alternative route for the proposed SIOHPL was provided for this assessment.

5. Results

5.1 Potentially Occurring Bat Species

Thirteen bat species are listed for the SIOHPL study area in **Table 2**. The Cape Serotine Bat (*Neoromicia capensis*), which often roosts in the roofs of buildings, is likely to be common in the area. The widespread Egyptian Free-tailed Bat (*Tadarida aegyptiaca*) no doubt also occurs. There are many horseshoe (*Rhinolophus*) bat records in the region which represent Geoffroy's Horseshoe Bat (*R. clivosus*) and the Damara Horseshoe Bat (*R. damarensis*; Jacobs *et al*. 2013). There is a low probability that the Cape Horseshoe Bat (*R. capensis*) and Dent's Horseshoe Bat (*R. denti*) occur.

The Egyptian Slit-faced Bat (*Nycteris thebaica*) is likely to occur where e.g. abandoned buildings provide suitable night feeding roosts for this species. There is a good chance that the crevice-roosting Flat-headed Free-tail Bat (*Sauromys petrophilus*) occurs in association with local rocky ridges and outcrops. The widely but sparsely distributed Long-tailed Serotine (*Eptesicus hottentotus*) may also occur in the area given its recorded occurrence in the region (African Chiroptera Report 2020) and its reported association with rocky outcrops (Monadjem *et al.* 2020). The widespread, migratory Natal Long-fingered Bat (*Miniopterus natalensis*) may also be present.

Table 2 Potentially occurring bat species in the SIOHPL study area

FAMILY	SPECIES	COMMON NAME	LoO[1,2,3,4,5]	RED LIST STATUS		LEGAL STATUS	Endemism[6]
				Global[6]	National[7]	Provincial[8]	
VESPERTILIONIDAE	*Neoromicia capensis*	Cape Serotine Bat	High	LC (S)	LC	PS	
MOLOSSIDAE	*Tadarida aegyptiaca*	Egyptian Free-tailed Bat	High	LC (U)	LC	PS	
RHINOLOPHIDAE	*Rhinolophus clivosus*	Geoffroy's Horseshoe Bat	High	LC (U)	LC	PS	
RHINOLOPHIDAE	*Rhinolophus damarensis*	Damara Horseshoe Bat	High	LC (U)	LC	*	
NYCTERIDAE	*Nycteris thebaica*	Egyptian Slit-faced Bat	High	LC (U)	LC	PS	
MOLOSSIDAE	*Sauromys petrophilus*	Flat-headed Free-tail Bat	High	LC (S)	LC	PS	
VESPERTILIONIDAE	*Cistugo seabrae*	Angolan Hairy Bat	High	LC (U)	NT	PS	Southern Africa endemic
MINIOPTERIDAE	*Miniopterus natalensis*	Natal Long-fingered Bat	Moderate	LC (U)	LC	PS	
VESPERTILIONIDAE	*Eptesicus hottentotus*	Long-tailed Serotine Bat	Moderate	LC (U)	LC	PS	
VESPERTILIONIDAE	*Laephotis namibensis*	Namib Long-eared Bat	Moderate	LC (S)	VU	**	Southern Africa endemic
RHINOLOPHIDAE	*Rhinolophus capensis*	Cape Horseshoe Bat	Low	LC (S)	LC	PS	SA endemic
RHINOLOPHIDAE	*Rhinolophus denti*	Dent's Horseshoe Bat	Low	LC (U)	NT	PS	Southern Africa endemic
VESPERTILIONIDAE	*Cistugo lesueuri*	Lesueur's Hairy Bat	Low	LC (D)	LC	PS	SA endemic

Status: D: Decreasing; LC: Least Concern; NT: Near Threatened; PS: Protected Species; S: Stable; U: Unknown; VU: Vulnerable.

Source: [1]Jacobs *et al*. (2013); [2]African Chiroptera Report (2020); [3]Monadjem *et al.* (2020); [4]FIAO (2021); [5]iNaturalist (2021); [6]IUCN (2021); [7]Child *et al.* (2016); [8]NC:NCA (2009)

* *R. damarensis* is not listed in the NC:NCA (2009) as it was described by Jacobs *et al*. only in 2013.

** *L. namibensis* is not listed in the NC:NCA (2009) probably because there is only one record of this species from South Africa (Monadjem *et al*. 2020).

Eleven of the listed species represent provincial Protected Species under the Northern Cape Nature Conservation Act (NC:NCA 2009). The following are regarded by IWS as priority conservation bat species:

- Namib Long-eared Bat (*Laephotis namibensis*): Red Listed as Vulnerable in South Africa (Child *et al*. 2016) where there is only one published record of this species (Monadjem *et al*. 2020).
- Angolan Hairy Bat (*Cistugo seabrae*): Red Listed as Near Threatened in South Africa (Child *et al.* 2016), and endemic in southern Africa (Monadjem *et al.* 2020).
- Dent's Horseshoe Bat (*R. denti*): Red Listed as Near Threatened in South Africa (Child *et al.* 2016), and endemic in southern Africa (Monadjem *et al.* 2020).
- Lesueur's Hairy Bat (*Cistugo lesueuri*): Endemic essentially to the Cape Fold and Drakensberg mountains (Monadjem *et al.* 2020; IUCN 2021-1).
- Cape Horseshoe Bat (*R. capensis*): Endemic to the south-western edge of South Africa and possibly Namibia (Monadjem *et al.* 2020).
- Natal Long-fingered Bat (*M. natalensis*): known to roost in large numbers (sometimes hundreds or thousands of individuals) and to migrate hundreds of kilometres (Miller-Butterworth *et al*. 2003; MacEwan *et al*. 2016).
- Damara Horseshoe Bat (*R. damarensis*): Should be regarded as a provincial Protected Species given its former recognition as Darling's Horseshoe Bat (Jacobs *et al*. 2013), which is listed as a Protected Species under the NC:NCA (2009).

5.2 Important Bat Habitats

Known significant roosts in the region (African Chiroptera Report 2020; IWS unpubl. data) appear to be limited to mines around the town of Springbok, situated approximately 70 km south-west of the SIOHPL. The nearest known cave roosts (IWS unpubl. data) are situated along the west South African and Namibian coastlines, more than 150 km away from the SIOHPL route. Given the large distances of known roosts from the SIOHPL, these roosts have not been mapped and are not further discussed in this report.

Described in **Table 3** and shown in **Figure 2**, is the relative sensitivity (i.e. the conservation importance for bats) of different natural and artificial habitats, and the recommended buffers around these, within the 100 m-wide corridor on either side of the proposed SIOHPL.

Table 3 Relative sensitivity of different bat habitats and buffers within the Sol Invictus OHPL corridor

FEATURE	Delineation and Sensitivity
Natural	
River and wetland Freshwater Ecosystem Priority Areas	Lines/Polygons
Buffer around FEPAs	0-500 m
Seasonal water resources	Lines/Polygons
Buffer around other seasonal water resources	0-200 m
Ephemeral water resources	Lines/Polygons
Buffer around ephemeral water resources	0-50 m
Dry water courses	Lines/Polygons
Rocky ridges, cliff faces, steep slopes, and outcrops	Polygons
Buffer around rocky ridges, cliff faces, steep slopes, and outcrops	0-200 m
Artificial	
Buildings	Points
Buffer around buildings	0-500 m

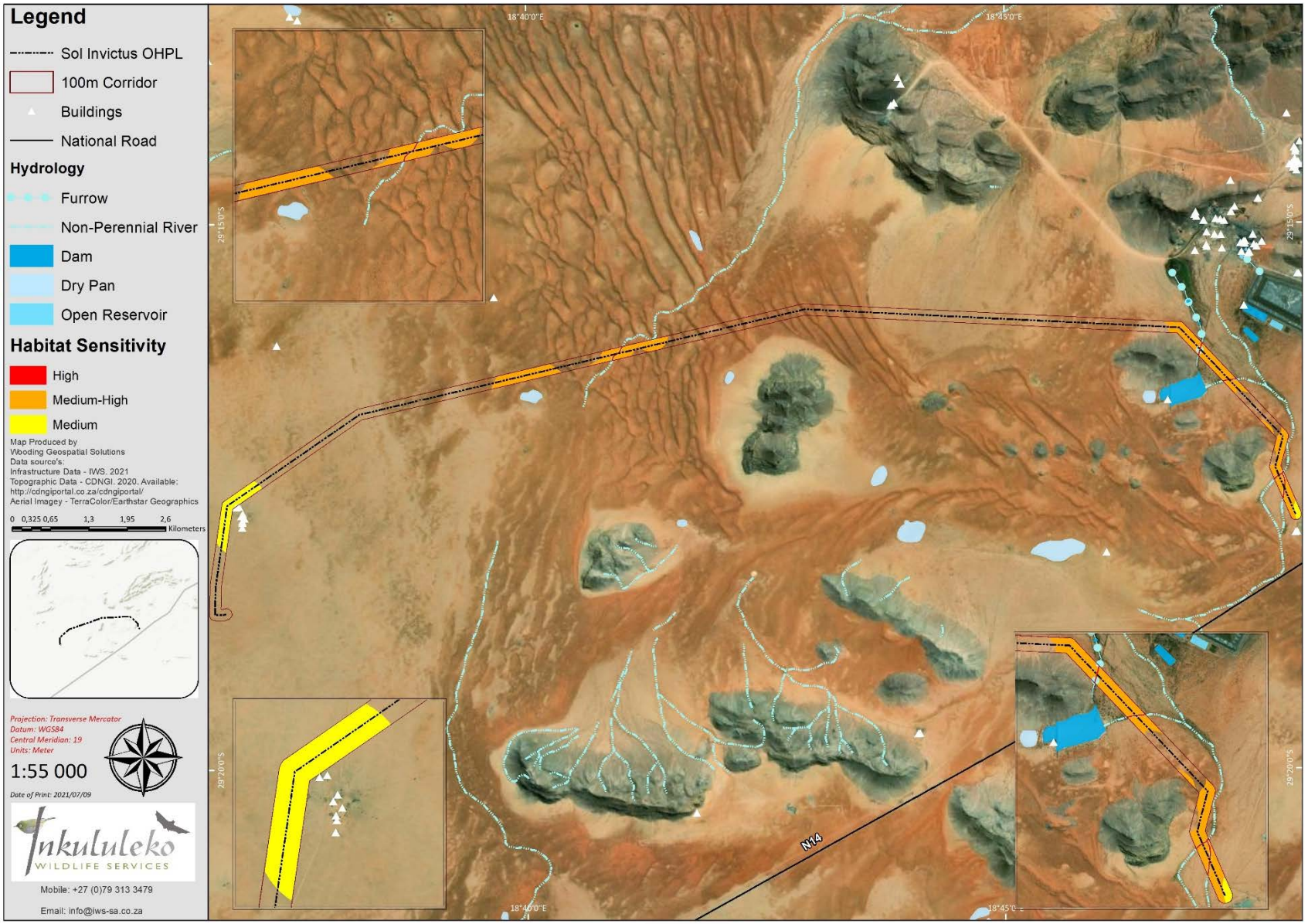

Figure 2 Bat sensitivity map for the proposed Sol Invictus Overhead Power Line

South African Freshwater Ecosystem Priority Areas (Nel *et al.* 2011) and seasonal water resources were rated with High sensitivity and assigned a 0-500 m and a 0-200 m Medium-High sensitive buffer, respectively. In arid environments especially, (natural and artificial) surface water resources provide bats with essential drinking water, concentrated available insect prey and possible roosting and fruiting trees, as well as landmarks and corridors for movement (Serra-Cobo *et al*. 2000; Salata 2012; Sirami *et al.* 2013). Ephemeral water resources were assigned Medium-High sensitivity and buffered with a 0-50 m Medium sensitive buffer. Dry water courses were rated as Medium sensitive areas.

Rocky ridges, cliff faces, steep slopes, and outcrops were assigned High sensitivity and 0-200 m Medium-High sensitive buffer, since rocky terrain is likely to provide suitable natural roosting habitat for many, if not all the listed potentially occurring bat species. Buildings, some of which are likely to provide roosting habitat for certain bat species, were assigned Medium-High sensitivity and buffered with a 0-500m Medium buffer.

The bat sensitivity map (**Figure 2**) should be interpreted as follows. Powerline poles must not be installed where the SIOHPL route coincides with High (red) sensitive drainage lines. Where Medium-High sensitive (orange) areas are intersected by the SIOHPL route, the installation of powerline poles should be avoided where possible. In Medium sensitive (yellow) areas, the installation of powerline poles should be minimized. In remaining Low sensitive areas, rehabilitation alone is considered sufficient to mitigate disturbance of natural habitat.

5.3 Impact Assessment and Mitigation

CURRENT IMPACTS

Habitat Disturbance

Within the SIOHPL corridor, existing impacts on bats are limited to isolated patches where natural habitat has been disturbed by roads, dwellings, furrows, and other anthropogenic activities. Although not assessed, the current disturbance of natural habitat within the corridor is, considered, to be of Low significance.

CONTRUCTION PHASE IMPACTS

Habitat Disturbance

Bat-important habitats (i.e. drainage lines, rocky slopes, and buildings) could potentially be disturbed during construction of the SIOHPL (**Table 4**). To mitigate this potential Medium significant impact, there should be no construction of powerline poles in High sensitive areas. Within Medium-High and Medium sensitive areas, the construction of poles should be, respectively, avoided where possible, and minimized. This impact is unlikely to have a secondary impact on bat ecosystem services.

Table 4 CONSTRUCTION PHASE Impact: Habitat Disturbance

Potential Impact HABITAT DISTURBANCE	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	1	1	3	2	5	35	Moderate	(-)	High
With Mitigation	1	1	3	1	5	30	Low	(-)	High
Mitigation and Management Measures	— Do NOT install powerline poles in High sensitive drainage lines.								
	— Avoid (where possible) installing powerline poles in Medium-High sensitive areas.								
	— Minimize the number of powerline poles to be installed in Medium sensitive areas.								
	— Minimize dust, erosion, and alien plant growth throughout the project footprint.								
	— Do not drain, abstract, contaminate, or otherwise disturb any (natural or artificial) water resource.								
	— Rehabilitate all disturbed natural areas a.s.a.p. based on advice from an appropriate specialist(s).								

OPERATIONAL PHASE IMPACTS

Bat Electrocution

Available evidence indicates that powerlines in general pose a negligible collision risk, and a very Low electrocution risk, for insectivorous bats (EirGrid 2015). Due to their larger size, frugivorous bats are more susceptible to electrocution (Chouhan and Shrivastava 2019). However, no fruit bat species is expected to occur in the SIOHPL study area (**Table 2**). To mitigate the Low significant impact of possible (insectivorous) bat electrocution (**Table 5**), there should be no construction of powerline poles in High sensitive areas. Within Medium-High and Medium sensitive areas, the construction of poles should be, respectively, avoided where possible, and minimized. This impact is unlikely to have a secondary impact on bat ecosystem services.

Table 5 OPERATIONAL PHASE Impact: Bat Electrocution

Potential Impact BAT ELECTROCUTION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	1	4	2	16	Low	(-)	High
With Mitigation	1	1	1	4	2	14	Low	(-)	High
Mitigation and Management Measures	— Do NOT install powerline poles in High sensitive drainage lines. — Avoid (where possible) installing powerline poles in Medium-High sensitive areas. — Minimize the number of powerline poles to be installed in Medium sensitive areas.								

CUMULATIVE IMPACTS

In addition to existing localized habitat disturbance within the SIOHPL corridor, localized habitat disturbance during construction and the Low risk of bat electrocution during operation, will cumulatively have a Medium significant cumulative impact on bats (**Table 6**). To mitigate the Medium significant cumulative impacts of the proposed SIOVLP, there should be no construction of powerline poles in High sensitive areas. Within Medium-High and Medium sensitive areas, the construction of poles should be, respectively, avoided where possible, and minimized. This impact is unlikely to have an appreciable secondary impact on bat ecosystem services.

Table 6 CUMULATIVE Impacts: Habitat Disturbance and Bat Electrocution

Potential Impact HABITAT DISTURBANCE AND BAT ELECTROCUTION	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	4	4	40	Moderate	(-)	High
With Mitigation	1	1	3	4	3	27	Low	(-)	High
Mitigation and Management Measures	— Do NOT install powerline poles in High sensitive drainage lines. — Avoid (where possible) installing powerline poles in Medium-High sensitive areas. — Minimize the number of powerline poles to be installed in Medium sensitive areas. — Minimize dust, erosion, and alien plant growth throughout the project footprint. — Do not drain, abstract, contaminate, or otherwise disturb any (natural or artificial) water resource. — Rehabilitate all disturbed natural areas a.s.a.p. based on advice from an appropriate specialist(s).								

6. Conclusion

As no major bat concern or High significant bat impact was identified during this Assessment, a field survey for further investigation and validation is NOT considered necessary, and the proposed SIOHPL **with avoidance of High sensitive areas** is considered acceptable from a bat impact perspective.

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8. Appendix: IWS Author CV

Name: **DR CAROLINE ANGELA LöTTER (NEÉ YETMAN)**

Name of Firm:	Inkululeko Wildlife Services (Pty) Ltd
Position:	Managing Director
Date of Birth:	6 November 1979
Nationality:	South African
Languages:	English, Afrikaans

QUALIFICATIONS & PROFESSIONAL REGISTRATION

- PhD – Zoology (University of Pretoria: 2003-2011)
- MSc – African Mammalogy (University of Pretoria: 2002)
- BSc Hons – Zoology (University of Pretoria: 2001)
- BSc – Ecology (University of Pretoria: 1998-2000)
- Registered with SACNASP (no. 400182/09) as a Professional Natural Scientist in the field of Zoology

KEY EXPERIENCE

- **Specialist Assessments:**
  - Long-term bat monitoring at more than 16 wind farm sites in South Africa, including field work, desktop research, report writing, and project management.
  - Surveys and impact assessments for the Square Kilometre Array project and several bat caves.
  - Baseline and impact assessments for fauna in general (including mammals, birds, reptiles, amphibians, butterflies, odonata, scorpions and mygalomorph spiders) at over 100 sites in South Africa, Lesotho, and Sierra Leone.
  - Biodiversity Management Plans for large South African mining complexes.
  - Specialist Giant Bullfrog assessments for more than 50 proposed development sites.

EMPLOYMENT EXPERIENCE

- **Inkululeko Wildlife Services, Johannesburg (June 2019 – present)**

  Position Title: Managing Director
  - Bat project management
  - Proposals
  - Desktop research
  - Field work
  - Reporting and report reviews
  - Analysis and reporting of data for peer-review publication
  - Co-author of South African pre-construction bat monitoring guidelines (MacEwan *et al*. 2020a)
  - Co-author of article on bat activity in South Africa and its implications for wind farm development (MacEwan *et al.* 2020b)

- **Natural Scientific Services, Johannesburg (November 2011 – April 2019)**

  Position Title: Senior Zoologist
  - Bat, faunal, and general biodiversity (i.e. faunal, flora, wetland and aquatic) project management
  - Proposals
  - Desktop research
  - Field work
  - Reporting and report reviews
  - Analysis and reporting of data for peer-review publication