FAUNAL SCOPING REPORT FOR THE PROPOSED SOYUZ 4 WEF, NORTHERN CAPE

Prepared for:

Soyuz 4 (Pty) Ltd

Prepared by:

Biodiversity Africa

30 Chudleigh Road
Plumstead, 7800
Cape Town, Western Cape



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Details of Company

Biodiversity Africa	Biodiversity Africa is situated in Cape Town and specialises in terrestrial botanical and faunal impact assessments.
Tel	078 340 6295
Email	Amber@biodiversityafrica.com
Address	30 Chudleigh Road Plumstead, 7800 Cape Town

Author

Amber Jackson (Faunal Specialist)

Amber has over ten years' experience in environmental consulting and has managed projects across various sectors including mining, agriculture, forestry, renewable energy, housing, coastal and wetland recreational infrastructure. Most of these projects required lender finance and therefore met both in-country, lender and sector specific requirements.

Amber completed the IFC lead and Swiss funded programme in Environmental and Social Risk Management course in 2018. The purpose of the course was to upskill Sub-Saharan African environmental consultants to increase the uptake of E&S standards by Financial Institutions.

Amber specialises in terrestrial vertebrate faunal assessments. She has conducted large scale faunal impact assessments that are to international lender's standards in Mozambique, Tanzania, Lesotho and Malawi. In South Africa her faunal impact assessments comply with the protocols for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity and follows the SANBI Species Environmental Assessment Guideline. Her specialist input goes beyond impact assessments and includes faunal opportunities and constraints assessments, Critical Habitat Assessments, Biodiversity related Management Plans and Biodiversity Monitoring Programmes.

Amber holds a BSc (Zoology and Ecology, Environment & Conservation) and BSc (Hons) in Ecology, Environment & Conservation from WITS University and an MPhil in Environmental Management from University of Cape Town. Amber's honours focused on the landscape effects on Herpetofauna in Kruger National Park and her Master's thesis focused on the management of social and natural aspects of environmental systems with a dissertation in food security that investigated the complex food system of informal and formal distribution markets.

Declaration of Independence

Amber Jackson (Faunal Specialist)

- I, Amber Jackson, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017;
- 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 report 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.

…….. ……

SIGNED DATE

The applicant Soyuz 4 (Pty) Ltd is proposing the development of a commercial Wind Energy Facility (WEF) and associated infrastructure on a site located approximately 46 km South of Britstown within the Ubuntu Local Municipality and the Pixley ka Seme District Municipality in the Northern Cape Province. The project site covers approximately 14 200ha comprising of six farm portions and 75 turbines with a contracted capacity of up to 480 MW and will have an actual (permanent) footprint of up to 150 ha have been proposed. The energy generated by the WEF will be connected to the national grid, a separate Basic Assessment will be undertaken to assess two grid connection options.

Objective and methodology

The objectives of this faunal scoping assessment are to establish the site ecological importance to faunal species that may inhabit the project area. This was done by conducting literature to generate a faunal species list for the area and identify which of those species are species of conservation concern (SCC). A field survey was undertaken during early autumn from 10-20 March 2022. The purpose of the survey was to determine faunal habitats present within the site that could support species of conservation concern and to record the species present. The survey included camera trapping, Sherman trapping, drift fence trap array, active searching, night drives and active acoustic survey for the faunal taxon groups: Amphibians, Reptiles and Mammals. The site ecological importance was then established using the sensitivity analysis outlined in the Species Guideline Document (SANBI, 2021).

Habitat

Two broad habitats, namely, the Eastern Upper Karoo and the Upper Karoo Hardeveld are present within the study area. Five fine scale faunal habitats were identified in the study area, namely:

1. Grassland (subset of Eastern Upper Karoo).
2. Wash and Dwarf Succulent Karoo Shrubland (subset of Eastern Upper Karoo).
3. Rocky slopes and plateaus (subset of Upper Karoo Hardeveld).
4. Rivers (annual and perennial), wetlands and incidental pools.
5. Manmade.

Faunal species distribution and occurrence in relation to the study area

Amphibians

Of the 13 amphibian species with a distribution that includes the project area, nine species have been confirmed within the study area (FitzPatrick, 2022; iNat, 2022). The field survey recorded three of these amphibian species, namely, the Tandy's Sand Frog (*Tomopterna tandyi*), Boettger's Caco (*Cacosternum boettgeri*) and the Giant African Bullfrog (*Pyxicephalus adspersus*). Microhabitats important to amphibian species include terrestrial and aquatic habitats.

Reptiles

Of the 48 reptile species with a distribution that includes the project area, 36 species have been confirmed within the study area (FitzPatrick, 2022; iNat, 2022). The field survey recorded three snake species, two tortoise, one terrapin and eight lizard species, including the Marsh Terrapin (*Pelomedusa galeata*), Cape Cobra (*Naja nivea*), Karoo Sand Snake (*Psammophis notostictus*), Spotted Skaapsteker (*Psammophylax rhombeatus*) and Bibron's Gecko (*Chondrodactylus bibronii*). The Leopard Tortoise (*Stigmochelys pardalis*) was most abundant recorded from 14 locations across the study area. Rocky outcrops across the study site hosted lizards associated with the habitat including the Southern Rock Agama (*Agama atra*), Karoo Girdled Lizard (*Karusasaurus polyzonus*) and Western Rock Skink (*Trachylepis sulcate*). Grassland and Dwarf Succulent Karoo Shrubland habitats hosted the Spotted Desert Lizard (*Meroles suborbitalis*), Spotted Sandveld Lizard (*Nucras intertexta*) and Karoo Sand Lizard (*Pedioplanis laticeps*). The Common Ground Agama (*Agama aculeata*) and Variegated Skink (*Trachylepis variegate*) were common across the site with many *A. aculeata* sunning themselves on the roads.

Mammals

Of the 64 mammal species with a distribution that includes the project area, 36 species have been confirmed within the study area (FitzPatrick, 2022; iNat, 2022). The field survey recorded 20 mammal species. The field survey recorded seven carnivore species, namely, Bat-eared Fox (*Otocyon megalotis*), African Wildcat (*Felis silvestris*), the Southern Aardwolf (*Proteles cristatus*), Slender Mongoose (*Herpestes sanguineus*), Cape Grey Mongoose (*Herpestes pulverulentus*), Meerkat (*Suricata suricatta*) and Yellow Mongoose (*Cynictis penicillata*). The Yellow Mongoose and Meerkat were the most prevalent diurnal carnivores recorded in the study area. Farmer in the area report the Black-backed Jackal (*Canis mesomela*) as a pest as they will prey on lambs.

Six rodents were recorded from the study area with the most conspicuous being the Ground Squirrel (*Xerus inauris*), Highveld Gerbil (*Gerbilliscus brantsii*), Pouched Mouse (*Saccostomus campestris*), Four-striped Grass Rat (*Rhabdomys pumilio*) and Pigmy Mouse (*Mus minutoides*). Evidence of the Cape Porcupine (*Hystrix africaeaustralis*) was found across the site e.g., quills, skat, burrows, and foraging sites.

The study area host both naturally occurring antelope and introduced antelope. Introduced species include the Eland, Gemsbok, Sable and Kudu. Naturally occurring species include the Steenbok, Duiker, Grey Rhebok, Mountain Reedbuck, Blesbok and Springbok. Although some farms stock Springbok, vast herds of Springbok used to migrate through the region and small herds still occur naturally (CSIR, 2019). Five Antelope species were confirmed during the field survey including Steenbok, Mountain Reedbuck, Blesbok and Springbok.

Other mammal's species recorded in the study area include the Rock Sengi (*Elephantulus sp*.), Vervet Monkey (*Chlorocebus pygerythrus*), Rock Hyrax (*Procavia capensis*), Rock Hare (*Pronolagus sp.)* and Scrub Hares (*Lepus sp.*).

Faunal Species of Conservation Concern

Species of conservation concern are those species that are either nationally threatened and listed as critically endangered, endangered, vulnerable or near-threatened and/or endemic and/or range restricted. It refers to a species that may require conservation of what individuals remain to ensure the longevity of the species.

Amphibians

None of the amphibian species that have a distribution which includes the project area are of conservation concern.

Reptiles

Two reptile species of conservation concern have a distribution which includes a portion of the study area. Namely, the Karoo Dwarf Tortoise (*Chersobius boulengeri*) listed as Endangered and the Tent Tortoise (*Psammobates tentorius*) listed as Near-Threatened (Hofmeyr, *et. al*., 2018; Hofmeyr, Leuteritz & Baard, 2018).

The Karoo Dwarf Tortoise has a *high likelihood of occurrence* within the study area that contains rocky outcrop habitat. The actual footprint of all six wind energy facilities is estimated at 9km^2 (900ha), which is 0.007% of the species extent of occurrence. This species is considered to be well protected within south African conservation areas (Tolley, *et. al.,* 2019). Given the size of the proposed project in relation to the species area extent of occurrence and that it is considered well protected the project, is unlikely to negatively influence the viability of this species. However, it is still an endangered species and mitigation measures must be implemented to prevent further loss of this species by this project.

The Tent Tortoise was *confirmed* within the study area. This species is therefore highly likely to occur throughout the study area. Given the proposed project is 0.002% of this species EOO and that it is considered well protected, the project is unlikely to negatively influence the viability of this species. However, it is still near-threatened and mitigation measures must be implemented to prevent further loss of this species by this project.

Mammals

The study area intersects the distribution of eight mammal species of conservation concern, five threatened and three near-threatened species. Threatened species includes the Riverine Rabbit (*Bunolagus monticularis*) (CR), Mountain Reedbuck (*Redunca fulvorufula*) (EN), Black-footed Cat (*Felis nigripes*) (VU), African White-tailed Mouse (*Mystromys albicaudatus*) (VU) and Leopard (*Panthera pardus*) (VU). Near-threatened species includes the Grey Rhebok (*Pelea capreolus*), Brown Hyaena (*Parahyaena brunnea*) and Cape Clawless Otter (*Aonyx capensis*).

Two vulnerable species, Black-footed Cat and African White-tailed Mouse, have a high likelihood of occurrence in the study area and the Mountain Reedbuck was confirmed at two locations within the study area.

The Riverine Rabbit, listed as critically endangered, was flagged by the DFFE Screener as Medium sensitivity due to the proximity of the existing population and the potential for suitable habitat within the study area. This species has a likelihood of occurrence in the Wash habitat and along seasonal rivers throughout the study area.

Faunal Species of Conservation Concern

The Species Environmental Assessment guideline (SANBI, 2021) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience, the combination of these resulted in a rating of SEI (Table 6.2).

Table: Sensitivity assessment for each habitat type within the project site

Habitat	Species	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	SEI
Grassland	Black-footed Cat (VU)	High	Very High	Very High	Very High	**Medium**
Washes and Rivers in Dwarf Succulent Karoo	Riverine Rabbit (CR)	High	High	High	Low	**Very High**
Dwarf Succulent Karoo	Tent Tortoise (NT)	Medium	High	Medium	High	**Low**
Rocky Slopes, Slabs and Plateaus	Southern Mountain Reedbuck (EN) & Karoo Dwarf Tortoise (EN)	High	High	High	Medium	**High**
Rivers, wetlands and incidental pools	General Fauna i.e. no SCC	Low	High	Medium	High	**Low**
Manmade & Agricultural	General Fauna i.e. no SCC	Low	Very Low	Very Low	Very High	**Very Low**

Likely Impacts

The clearing of habitat for the construction of the WEF facility, access roads and associated infrastructure could result in the following impacts:

- The direct and permanent loss of faunal habitat.
- Faunal mortality due to roadkill and persecution.
- Disturbance to faunal species due to construction and operation activities that generate noise, dust, vibrations and lighting. This disturbance may cause faunal species to leave the area or disrupt foraging and/or breeding behaviour of those that remain.

The spatial extent, temporal scale and impact significance will vary for each impact, and these will be individually assessed in the faunal impact assessment report. This scoping report does not include an assessment of impacts.

Impacts will be rated in the Environmental Impact Assessment phase.

Conclusions

Several amphibian, reptile and mammal species were recorded within the study area across all habitat types. The Grassland and Dwarf Succulent Karoo habitat types are extensive and for the most part unimpacted by the proposed development. Although road networks can be extensive these have been designed to utilise existing roads and tracks to reduce further loss of habitat. The rocky habitats appear to be where the majority of the turbine infrastructure will be placed. These are sensitive habitats and have a High site ecological importance to both the endangered Southern Mountain Reedbuck and Karoo Dwarf Tortoise. The project is unlikely to negatively influence the viability of these two species. However, they are still an endangered species and mitigation measures must be implemented to prevent further loss of this species by this project.

The Wash habitat and riverine areas within the Dwarf Succulent Karoo habitat would have a very high site ecological importance to the critically endangered Riverine Rabbit (*Bunolagus monticularis*) should it occur in the study area. The study area is located less than 50km northeast of the northern population of the Riverine Rabbit and suitable habitat is present. There is a moderate likelihood of this species occurring within the wash and riverine habitats. The majority of the project infrastructure avoids this habitat and effort should be made to avoid project related infrastructure (roads and cables) transecting this habitat.

Ecological Statement and Opinion of the Specialist

Project infrastructure should be designed to avoid very high sensitive features such as the washes. Further to the above, impacts on the faunal species and associated habitats can be reduced to acceptable levels through the implementation of mitigation measures. *The specialist is therefore of the opinion that the development can proceed provided the recommendations contained in this report are implemented.*

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Acronyms

AOO	Area Of Occupancy
asl	Above Sea Level
BI	Biodiversity Importance
CBA	Critical Biodiversity Area
CI	Conservation Importance
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically Endangered
EN	Endangered
EIA	Environmental Impact Assessment
EOO	Extent of Occupancy
FI	Functional Integrity
GBIF	Global Biodiversity Information Facility
GIS	Geographical Information System
Ha	Hectare
IUCN	International Union for Conservation of Nature
km	Kilometre
LC	Least Concern
m	Metre
NBSAP	National Biodiversity and Strategy Action Plan
NEMBA	National Environmental Management Biodiversity Act
PAOI	Project Area of Influence
PNCO	Provincial Nature Conservation Ordinance
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
QDS	Quarter Degree Square
RR	Receptor Resilience
SA	South Africa
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
TOPS	Threatened and Protected Species
VU	Vulnerable

Specialist Check List

The contents of this specialist report complies with the legislated requirements as described in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 320			SECTION OF REPORT
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:		
	3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page 2 Appendix 2 and 3
	3.1.2	A signed statement of independence by the specialist;	Page 3
	3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2.5
	3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Chapter 2
	3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.3
	3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Chapter 4
	3.1.7	Additional environmental impacts expected from the proposed development;	Chapter 5
	3.1.8	Any direct, indirect and cumulative impacts of the proposed development;	TBD
	3.1.9	The degree to which the impacts and risks can be mitigated;	TBD
	3.1.10	The degree to which the impacts and risks can be reversed;	
	3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources;	
	3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Section 6.2
	3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	N/A
	3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Section 6.3
	3.1.15	Any conditions to which this statement is subjected.	Section 6.2
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.		✓
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.		

1. INTRODUCTION

1.1. Project Description

The applicant Soyuz 4 (Pty) Ltd is proposing the development of a commercial Wind Energy Facility (WEF) and associated infrastructure on a site located approximately 46 km South of Britstown within the Ubuntu Local Municipality and the Pixley ka Seme District Municipality in the Northern Cape Province (Figure 1.1).

Five additional WEF's are concurrently being considered on the surrounding properties and are assessed by way of separate impact assessment processes in accordance with the 2014 Environmental Impact Assessment Regulations (GN No. R982, as amended) for listed activities contained in Listing Notices 1, 2 and 3 (GN R983, R984 and R985, as amended). These projects are known as Soyuz 1 WEF, Soyuz 2 WEF, Soyuz 3 WEF, Soyuz 5 WEF and Soyuz 6 WEF.

A preferred project site with an extent of approximately 125 000 ha has been identified as a technically suitable area for the development of the six WEF projects. It is proposed that each WEF will comprise of up to 75 turbines with a contracted capacity of up to 480 MW and will have an actual (permanent) footprint of up to 150 ha.

The Soyuz 4 WEF project site covers approximately 14 200 ha and comprises the following farm portions:

- The Farm Altringham No. 19
- The Farm No. 18
- Remaining Extent of the Farm Allemans Dam No. 17
- Remaining Extent (Portion 0) of the Farm Allemans Combuis No. 1
- Remaining Extent of Portion 1 of the Farm Combuisfonteion No. 142
- Portion 1 of the Farm Allemans Dam No. 17.

The Soyuz 4 WEF project site is proposed to accommodate the following infrastructure, which will enable the wind farm to supply a contracted capacity of up to 480 MW (Figure 1.2):

- Up to 75 wind turbines with a maximum hub height of up to 160 m and a rotor diameter of up to 200 m;
- A transformer at the base of each turbine;
- Concrete turbine foundations;
- Turbine, crane and blade hardstands;
- Temporary laydown areas (with a combined footprint of up to 14 ha) which will accommodate the boom erection, storage and assembly area;
- Battery Energy Storage System (with a footprint of up to 5 ha);
- Cabling between the turbines, to be laid underground where practical;
- Two on-site substations with a combined footprint of up to 4 ha in extent to facilitate the connection between the wind farm and the electricity grid;

- Access roads to the site and between project components inclusive of stormwater infrastructure. A 12 m wide road corridor may be temporarily required during construction and then rehabilitated to 6m wide permanent road after construction. The WEF will have a total road network of up to 125 km.
- A temporary site camp establishment and concrete batching plants (with a combined footprint of up to 2 ha); and
- Operation and Maintenance buildings (with a combined footprint of up to 2 ha) including a gate house, security building, control centre, offices, warehouses, a workshop and visitor's centre.

In order to evacuate the energy generated by the WEF to the national grid, a separate Basic Assessment will be undertaken to assess two grid connection alternatives:

- Alternative 1: A 132 / 400kV overhead powerline (OHL) within a 500 m wide assessment corridor from the Switching Station on site to a proposed new 132 / 400 kV MTS located north of the WEF and adjacent to the Hydra – Kronos 400 kV line.

- Alternative 2: A 132 / 400 kV overhead powerline (OHL) within a 500 m assessment corridor from the Switching Station on site to a proposed new 132 / 400 kV MTS located south of the WEF and adjacent to the Droerivier - Hydra 400 kV line.

The EA applications for the wind farm project and grid connection infrastructure are being undertaken in parallel as they are co-dependent, i.e. one will not be developed without the other.

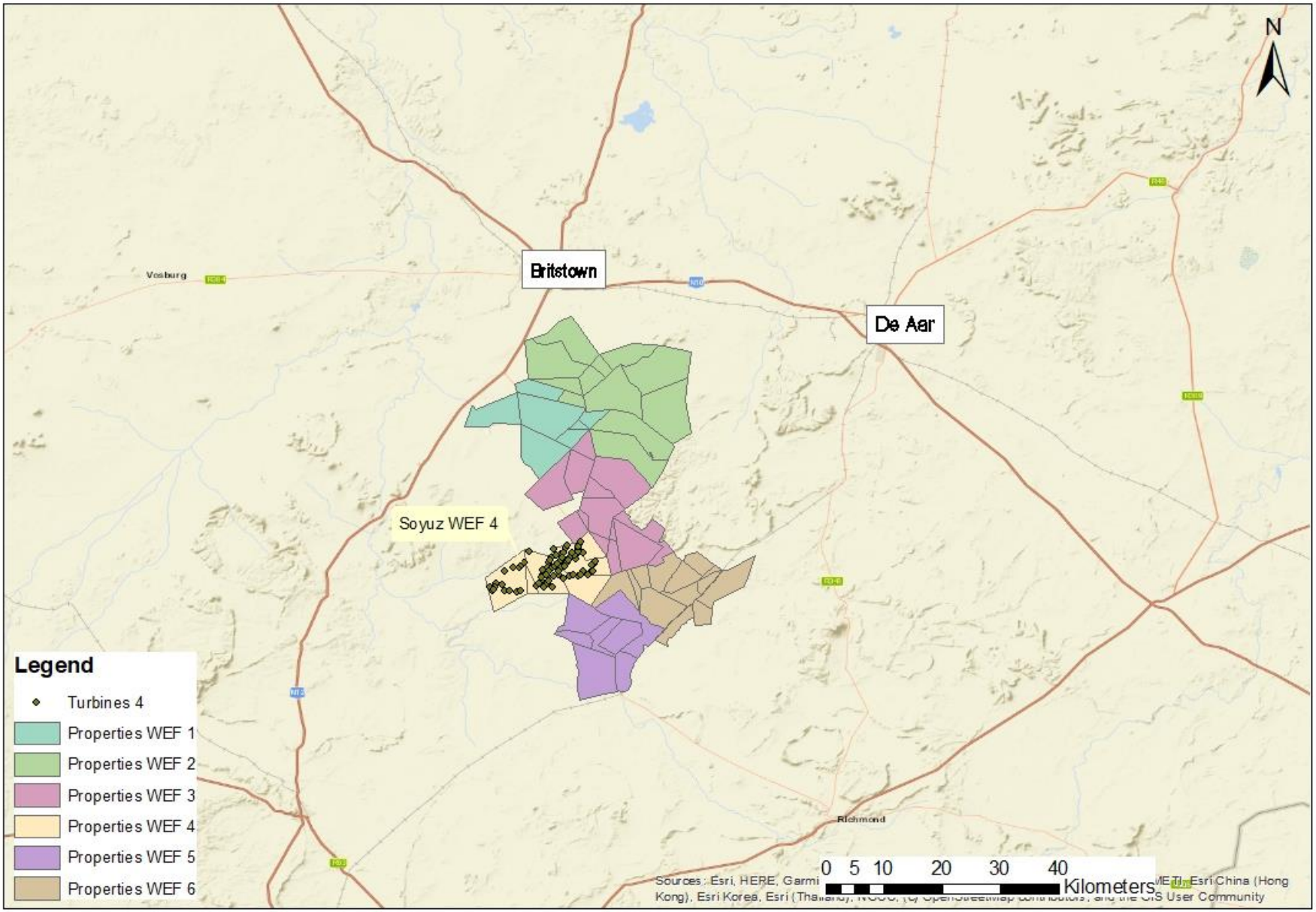

Figure 1.1: Location of the WEF cluster in relation to the towns of De Aar and Britstown. Soyuz 4 WEF, which is assessed in this report, is located within the south eastern corner.

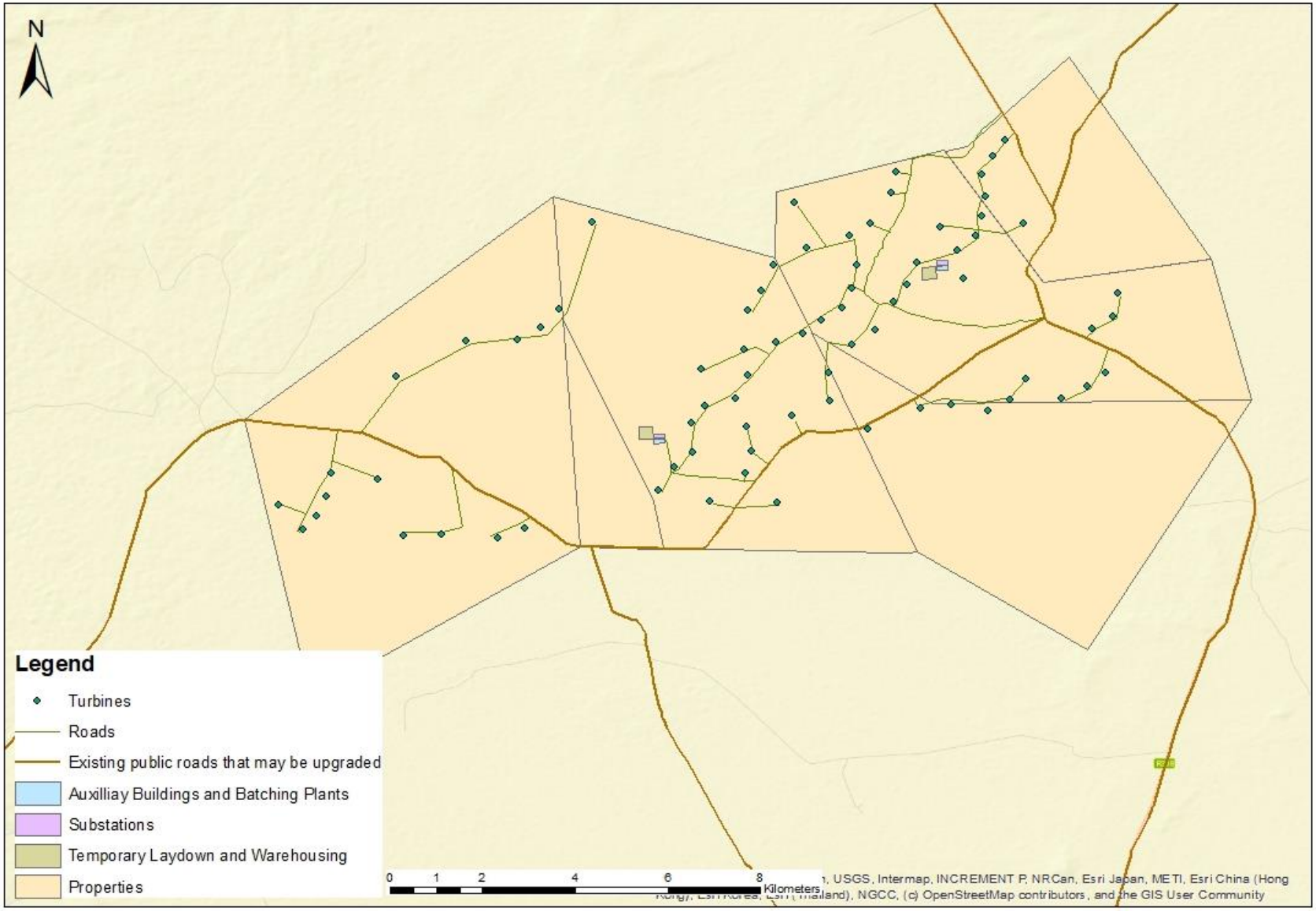

Figure 1.2: Infrastructure map showing the position of the turbines, internal roads, substations, temporary laydown areas and warehousing and auxiliary buildings and batching plants.

1.2. Objectives

The objectives of this faunal assessment are as follows:

- Undertake a desktop assessment to generate a faunal species list for the area and identify which of those species are species of conservation concern (SCC).
- Undertake a field survey, to record the following information:
    - Faunal species present.
    - Faunal species of conservation concern present.
    - Faunal habitat present and condition of each habitat.
- Assess the site ecological importance using the sensitivity analysis outlined in the Species Guideline Document (SANBI, 2021).

1.3. Limitations and Assumptions

This report is based on current available information and, as a result, the following limitations and assumptions are implicit:

- Sampling could only be carried out at one stage in the annual or seasonal cycle. The survey was conducted in late summer /early Autumn and some species that would have been more active early summer at the start of the rainy season, mainly amphibian species, may have gone undetected. However, the timing and time available in the field, and information gathered during the survey was sufficient to provide enough information to determine the status of the affected area.
- This report only covers the terrestrial vertebrate faunal taxon's of amphibians, reptiles and mammals (excluding bats). Birds, bats and botanical aspects are covered in separate reports.
- The assessment has been undertaken to meet the Protocol for the Specialist Assessment and Minimum Report Requirements for Environmental Impacts on terrestrial Biodiversity (2020), Species Environmental Assessment Guidelines (SANBI, 2021) and Performance Standard 6 of the International Finance Corporation (IFC) (2012).
- The IFC sometimes a critical habitat assessment and some faunal species may form part of this assessment. However, this report does not include the assessment of fauna as a trigger for Critical Habitat, if required this will be dealt with in a separate report.

2. METHODOLOGY

2.1. DFFE Screening Report

The DFFE Screening report identifies environmental sensitivities for the project site. This is based on available desktop data and requires that a suitably qualified specialist verify the findings. Of relevance to this report is the animal species theme and the terrestrial biodiversity theme (refer to Table 2.1). Comment has been provided in the table below indicating how these themes have been assessed is this report.

Table 2.1: Summary of DFFE screening report themes relevant to this study

Theme	Sensitivity	Assessment
Animal Species Theme	Medium • Possible presence of *Bunolagus monticularis* (Riverine Rabbit)	The likelihood of occurrence for this species was assessed based on distribution records, available habitat on site and camera traps.

2.2. International Finance Corporation

Since this project has to be compliant to lenders' standards, the survey and assessment needs to meet the standards set out by the International Finance Corporation (IFC). Of relevance to this project is IFC Performance Standard (PS) 6 and the accompanying guidance notes which are used to guide biodiversity assessments in modified, natural and critical habitats. The aim of this PS is to protect and conserve biodiversity, maintain ecosystem services and promote the sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development (IFC, 2012b). Biodiversity assessments should therefore include the following:

- Direct and indirect project-related impacts on biodiversity and ecosystem services that include consideration of threats such as habitat loss, degradation and fragmentation, invasive alien species, overexploitation, hydrological changes, nutrient loading, and pollution.
- Baseline studies should include a literature review, stakeholder engagement and consultation, in-field surveys and other relevant assessments.
- For sites with potentially significant impacts on natural and critical habitats and ecosystem services, the baseline should include in-field surveys over multiple seasons. In-field surveys/assessments should be recent and data should be acquired for the actual site of the project's facilities, including related and associated facilities, and the project's area of influence.
- Existing spatial data and landscape mapping should be included in the analysis, especially for areas located in natural and critical habitats.
- An accurate account of threats, including regional level threats that are relevant to the study area and its area of influence should be provided and any pre-existing threats and the extent to which the project might exacerbate them must be described.

South African Environmental Legislation is rigorous and aligned with the principals set out in the IFC. As such, the requirements listed above have been addressed in this report, with the exception of stakeholder engagement which is addressed in the environmental assessment process.

2.3. Project Area

Faunal species where researched and sampled within the project area and project area of influence, defined as follows:

- The “project area” or “impacted project site” is defined as the area that will be directly impacted by project infrastructure such as the footprint of the turbine hardstands, roads and offices.
- The project area of influence (PAOI) refers to the broader area around the project area that faunal species may be indirectly impacted by project activities. Some faunal may not have a distribution which includes the project area but may rely of services that originate or pass through the site e.g. A project could directly impact a river in the project area and have secondary impact on a range restricted amphibian species that occurs downstream.
- Study Area is defined as the broader area within which the project area falls, the study area has similar habitats to those found in the project area.

2.4. Desktop Assessment

The known diversity of the vertebrate fauna in the project area was determined by a literature review. Species known from the region, or from adjacent regions whose preferred habitat(s) were known to occur within the study area, were also included. Literature sources included:

- Amphibians –Du Preez & Carruthers (2017), FrogMap (ADU, 2021), iNaturalist (2022) and IUCN (2022).
- Reptiles – Branch (1998), ReptileMap (ADU, 2021), iNaturalist (2022) and IUCN (2022).
- Mammals – Stuart & Stuart (2014), MammalMap (ADU, 2021), iNaturalist (2022) and IUCN (2022).

To establish which of those species identified in the literature review are Species of Conservation Concern (SCC), the following sources were consulted:

- Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland (Bates *et al*., 2014).
- Atlas and Red List of Frogs of South Africa, Lesotho and Swaziland (Minter *et al*., 2004).
- Red List of Mammals of South Africa, Swaziland and Lesotho.
- International Union of for Conservation of Nature (Accessed: 7-05-2022).
- Northern Cape Nature Conservation Act No. 9 of 2009.
- National Environmental Management: Biodiversity Act (2004): Amendment of Critically Endangered, Endangered, Vulnerable and Protected Species List.
- CITES Appendix I and II.

A species list was compiled for the site and the likelihood of occurrence assessed for species listed as Critically Endangered, Endangered, Vulnerable and Near Threatened (refer to Section 4.3).

2.5. Field Survey

A field survey was undertaken during early autumn from 10-20 March 2022. The purpose of the survey was to determine faunal habitats present within the site that could support species of conservation concern and to record the species present.

2.5.1. Habitat establishment

The desktop research revealed two vegetation types, namely, the Eastern Upper Karoo and the Upper Karoo Hardeveld. These two vegetation types are considered broad habitats. On the first day of the field survey, the PAOI was driven before sampling began to establish the habitats present within the project area and PAOI, these are described in Section 4.1.

Sample sites were based in areas containing natural and modified habitat. Agricultural areas, i.e., those that are currently undergoing cultivation, which are classified as transformed, were noted for mapping purposes but not sampled.

2.5.2. Species confirmation

To establish which faunal species were present within the project area a variety of sampling techniques were employed (Table 2.2). These are described in detail below.

Table 2.2: Sampling techniques employed for each faunal taxon

Sampling Technique	Taxon		
	Amphibians	Reptiles	Mammals (excl. Bats)
Camera Traps			X
Sherman Traps			X
Drift Fence Trap Array	X	X	X
Active Searching	X	X	X
Night drive			
Active Acoustic survey	X		

Camera trapping

Bushnell camera traps were set to capture photographs and/or videos of mammal species across the project area (refer to Table 2.3). The cameras were set to take three photos and/or 10 second videos with a five second lapse between photo/video series for the entire day (24hrs). Cameras were placed approximately 50cm from the ground and secured to a post using cable ties, except for one camera which was wedged between rocks in a rocky outcrop. Cameras were placed in walkways/areas of frequently used by mammals such as drainage lines, burrows, roads and animal paths.

Table 2.3: Camera Trap deployment per habitat

Camera Trap #	Date (2022)		Location	
	In	Out	Latitude	Longitude

C1a	12 March	14 March	30°48'13.07"S	23°31'50.19"E
C1b	14 March	18 March	30°47'16.83"S	23°29'58.82"E
C2	12 March	18 March	30°46'49.77"S	23°29'11.78"E
C3a	12 March	15 March	30°51'18.02"S	23°28'22.60"E
C3b	15 March	18 March	30°46'2.82"S	23°28'3.17"E
C4	13 March	18 March	30°49'30.46"S	23°35'8.19"E
C5	?	17 March	30°47'6.25"S	23°23'59.27"E
C6	14 March	18 March	31° 9'25.21"S	23°33'19.02"E
C7	12 March	18 March	30°57'44.19"S	23°32'37.82"E
C8	12 March	18 March	30°57'45.76"S	23°32'35.43"E
C9	12 March	18 March	30°51'32.79"S	23°28'21.72"E

Sherman Traps

Sherman traps are used to capture small mammals. Transects were set using eight Sherman Traps per transect, placed approximately 10m apart yielding an 80m transect. Transects were set in four habitat types for six trapping nights (refer to Table 2.4). Traps were baited with a peanut butter and oat mixture and rebaited daily. Traps were placed in such a way that the trap was protected from natural elements under bushes, amongst grass and under logs etc. The traps were checked twice daily early morning and late afternoon/early evening and individuals captured were recorded and released approximately 50m from the trap array. Information recorded included: date, sample site (location), trap number, species and diagnostic photograph (side, top, bottom, hands and feet).

Table 2.4: Small mammal trapping location and length of deployment

Trap #	Date (2022)		Location			
			Start		End	
	IN	OUT	Latitude	Longitude	Latitude	Longitude
S1	12 March	18 March	30°48'13.36"S	23°31'49.85"E	30°48'12.47"S	23°31'52.20"E
S2	12 March	18 March	30°46'48.77"S	23°29'11.68"E	30°46'46.85"S	23°29'10.12"E
S3	12 March	18 March	30°51'18.10"S	23°28'22.82"E	30°51'17.69"S	23°28'24.94"E
S4	12 March	18 March	30°46'24.50"S	23°26'57.18"E	30°46'26.03"S	23°26'58.04"E

Drift Fence Trap Arrays:

Drift Fence Tray Arrays are used to capture reptiles, amphibians and small mammals. These were deployed in four habitats representative of the habitats that occur across the project area (refer to Table 2.5). The 30m linear drift fence was set with eight funnel traps, two at each end and two, one either side of the fence, at 10m and 20m (refer to Figure 2.1). All traps were inspected and emptied daily, and species recorded and released approximately 50m from the trap array. Information recoded included: date, sample site, funnel number, species and number of individuals and diagnostic photograph (side, top, bottom). Released specimens away from the after identification.

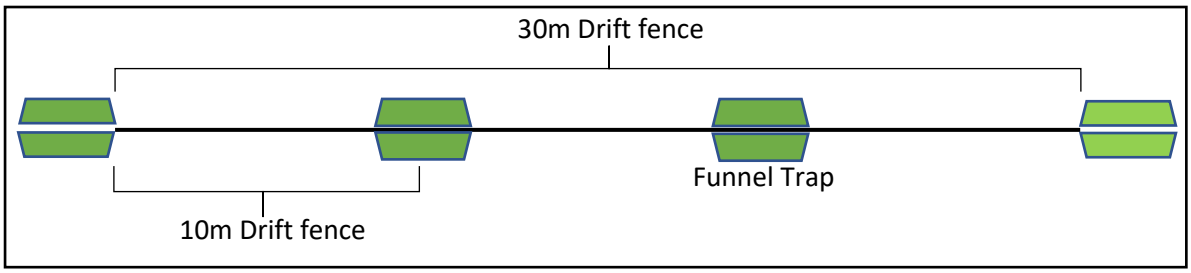

Figure 2.1: Aerial schematic of funnel trap placement along the 30m drift fence

Table 2.5: Drift Fence Funnel Trap Array location and length of deployment

Trap #	Date (2022)		Location			
			Start		End	
	In	Out	Latitude	Longitude	Latitude	Longitude
T1	12 March	18 March	30°48'14.06"S	23°31'49.93"E	30°48'13.63"S	23°31'50.95"E
T2	12 March	18 March	30°46'49.56"S	23°29'10.18"E	30°46'49.14"S	23°29'11.24"E
T3	12 March	18 March	30°51'17.86"S	23°28'22.04"E	30°51'17.51"S	23°28'23.08"E
T4	12 March	18 March	30°46'24.80"S	23°26'58.29"E	30°46'25.61"S	23°26'58.90"E

Active searching

Active searching is used for amphibians, reptiles and mammals (excluding bats). This method includes direct observation of individuals during the day and night and indirect observation. Refer to Figure 2.2 and Appendix 1 for Active Searching sites.

Direct observation was done by walking and driving through the project area and recording species seen. In addition, refuge sites were targeted to search for specific species:

- Reptiles and terrestrial amphibians were targeted in microhabitats by lifting rocks and logs, peeling away bark, scraping through leaf litter, etc.
- Amphibians were targeted at water bodies where individuals were searched for along the banks and verge vegetation, tadpoles were searched for using a net and in the evenings frog choruses were listened to.
- Night drives were conducted on roads within the project area using a high-powered spotlight to illuminate nocturnal mammal species.
- Camera and binoculars were used to view species from a distance without disturbing them.

Indirect observation is the searching for evidence of faunal presence and includes spoor, skat, roadkill, skulls, quills, dens, burrows, hairs, scrapings and diggings.

2.5.3. Data capturing

The faunal data compiled during the initial desktop assessment was supplemented by the field data to produce a consolidated faunal species checklist. This was, in turn, reviewed to identify Species of Conservation Concern (SCC). A habitat map was then produced, and the ecological sensitivities of habitats determined.

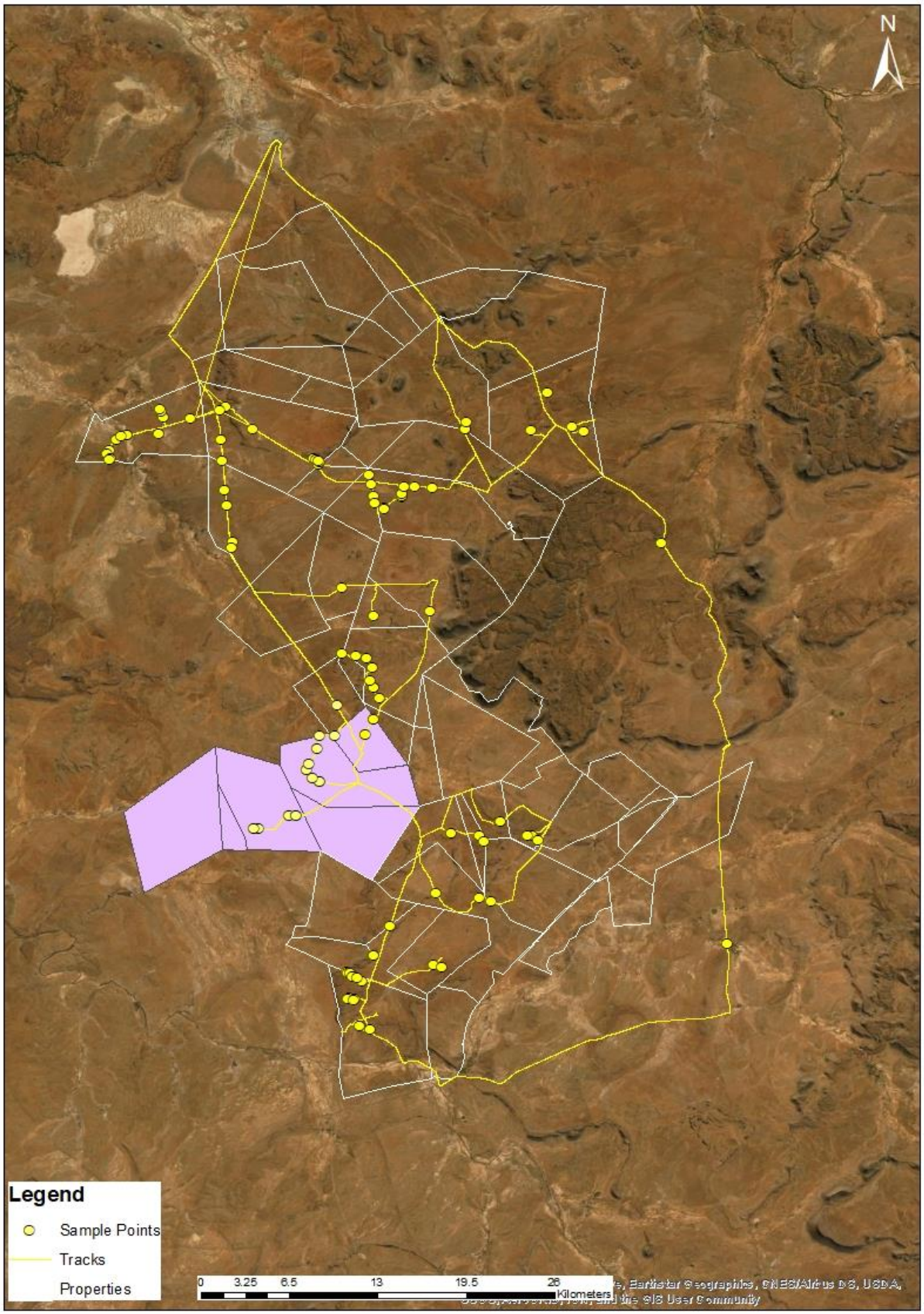

Figure 2.2: Map showing active searching sample sites and tracks in relation to the WEF cluster and the Soyuz 4 WEF.

2.6. Site Sensitivity Assessment

The Species Environmental Assessment Guideline (SANBI, 2021) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience (Table 2.6). The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings.

Table 2.6: Criteria for establishing Site Ecological importance and description of criteria

Criteria	Description
Conservation Importance (CI)	*The importance of a site for supporting biodiversity features of conservation concern present e.g., populations of Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.*
Functional Integrity (FI)	*A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.*
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	*The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.*
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR)	

2.7. Description of impact analysis methodology used

To ensure a balanced and objective approach to assessing the significance of potential impacts, a rating scale developed by CES has been created in accordance with the requirements outlined in Appendix 1 of the EIA Regulations (2014 and subsequent 2017 & 2021 amendments).

Impact significance pre-mitigation

This rating scale adopts six key factors to determine the overall significance of the impact prior to mitigation:

1. **Nature of impact:** Defines whether the impact has a negative or positive effect on the receiving environment.
2. **Type of impact:** Defines whether the impact has a direct, indirect or cumulative effect on the environment.
3. **Duration:** Defines the relationship of the impact to temporal scales. The temporal scale defines the significance of the impact at various time scales as an indication of the duration of the impact. This may extend from the short-term (less than 5 years, equivalent to the construction phase) to permanent. Generally, the longer the impact occurs the greater the significance of any given impact.

4. **Extent:** Describes the relationship of the impact to spatial scales i.e., the physical extent of the impact. This may extend from the local area to an impact that crosses international boundaries. The wider the spatial scale the impact extends, the more significant the impact is considered to be.
5. **Probability:** Refers to the likelihood (risk or chance) of the impact occurring. While many impacts generally do occur, there is considerable uncertainty in terms of others. The scale varies from unlikely to definite, with the overall impact significance increasing as the likelihood increases.
6. **Severity or benefits:** The severity/beneficial scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on the receiving environment. The severity of an impact can be evaluated prior and post mitigation to demonstrate the seriousness of the impact if it is not mitigated, as well as the effectiveness of the mitigation measures. The word 'mitigation' does not only refer to 'compensation', but also includes concepts of containment and remedy. For beneficial impacts, optimization refers to any measure that can enhance the benefits. Mitigation or optimisation should be practical, technically feasible and economically viable.

For each impact, the duration, extent and probability are ranked and assigned a score. These scores are combined and used to determine the overall impact significance prior to mitigation. They must then be considered against the severity rating to determine the overall significance of an activity. This is because the severity of the impact is far more important than the other three criteria. The overall significance is either negative or positive (Criterion 1) and direct, indirect or cumulative (Criterion 2).

Table 2.7: Evaluation Criteria.

Duration (Temporal Scale)		
Short term	*Less than 5 years*	
Medium term	*Between 5-20 years*	
Long term	*Between 20 and 40 years (a generation) and from a human perspective also permanent*	
Permanent	*Over 40 years and resulting in a permanent and lasting change that will always be there*	
Extent (Spatial Scale)		
Localised	*At localised scale and a few hectares in extent*	
Study Area	*The proposed site and its immediate environs*	
Regional	*District and Provincial level*	
National	*Country*	
International	*Internationally*	
Probability (Likelihood)		
Unlikely	*The likelihood of these impacts occurring is slight*	
May Occur	*The likelihood of these impacts occurring is possible*	
Probable	*The likelihood of these impacts occurring is probable*	
Definite	*The likelihood is that this impact will definitely occur*	
Severity Scale	*Severity*	*Benefit*
Very Severe/ Beneficial	An irreversible and permanent change to the affected system(s) or party(ies) which cannot be	A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this

	mitigated.	benefit.
Severe/ Beneficial	Long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming, or some combination of these.	A long-term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
Moderately severe/Beneficial	Medium to long term impacts on the affected system(s) or party (ies), which could be mitigated.	A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
Slight	Medium- or short-term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.
No effect/don't or can't know	The system(s) or party(ies) is not affected by the proposed development.	In certain cases, it may not be possible to determine the severity of an impact.

** In certain cases, it may not be possible to determine the severity of an impact thus it may be determined: Don't know/Can't know.*

Table 2.8: Description of Overall Significance Rating

Significance Rate		***Description***
Don't Know		*In certain cases, it may not be possible to determine the significance of an impact. For example, the primary or secondary impacts on the social or natural environment given the available information.*
NO SIGNIFICANCE		*There are no primary or secondary effects at all that are important to scientists or the public.*
LOW NEGATIVE	***LOW POSITIVE***	*Impacts of low significance are typically acceptable impacts for which mitigation is desirable but not essential. The impact by itself is insufficient, even in combination with other low impacts, to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural environment or on social systems.*
MODERATE NEGATIVE	**MODERATE POSITIVE**	*Impacts of moderate significance are impacts that require mitigation. The impact is insufficient by itself to prevent the implementation of the project but in conjunction with other impacts may prevent its implementation. These impacts will usually result in a negative medium to long-term effect on the natural environment or on social systems.*

HIGH NEGATIVE	***HIGH POSITIVE***	*Impacts that are rated as being high are serious impacts and may prevent the implementation of the project if no mitigation measures are implemented, or the impact is very difficult to mitigate. These impacts would be considered by society as constituting a major and usually long-term change to the environment or social systems and result in severe effects.*
VERY HIGH NEGATIVE	***VERY HIGH POSITIVE***	*Impacts that are rated as very high are very serious impacts which may be sufficient by itself to prevent the implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe effects or very beneficial effects.*

Impact significance post-mitigation

Once mitigation measures are proposed, the following three factors are then considered to determine the overall significance of the impact after mitigation.

1. **Reversibility Scale**: This scale defines the degree to which an environment can be returned to its original/partially original state.
2. **Irreplaceable loss Scale:** This scale defines the degree of loss which an impact may cause.
3. **Mitigation potential Scale:** This scale defines the degree of difficulty of reversing and/or mitigating the various impacts and ranges from very difficult to easily achievable. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 2.9: Post-mitigation Evaluation Criteria

Reversibility	
Reversible	*The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.*
Irreversible	*The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.*
Irreplaceable loss	
Resource will not be lost	*The resource will not be lost/destroyed provided mitigation measures are implemented.*
Resource will be partly lost	*The resource will be partially destroyed even though mitigation measures are implemented.*
Resource will be lost	*The resource will be lost despite the implementation of mitigation measures.*
Mitigation potential	
Easily achievable	*The impact can be easily, effectively and cost effectively mitigated/reversed.*
Achievable	*The impact can be effectively mitigated/reversed without much difficulty or cost.*
Difficult	*The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs.*
Very Difficult	*The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.*

The following assumptions and limitations are inherent in the rating methodology:

- **Value Judgements**: Although this scale attempts to provide a balance and rigor to assessing the significance of impacts, the evaluation relies heavily on the values of the person making the judgment.
- **Cumulative Impacts:** These affect the significance ranking of an impact because it considers the impact in terms of both on-site and off-site sources. This is particularly problematic in terms of impacts beyond the scope of the proposed development. For this reason, it is important to consider impacts in terms of their cumulative nature.
- **Seasonality:** Certain impacts will vary in significance based on seasonal change. Thus, it is difficult to provide a static assessment. Seasonality will need to be implicit in the temporal scale, with management measures being imposed accordingly (e.g., dust suppression measures being implemented during the dry season).

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1. Biophysical Description

The project site is located within the Nama-Karoo Biome which is situated on the central plateau of the western half of South Africa extending into south-eastern Namibia (Mucina *et al.,* 2011). This region is characterised by an arid climate with most rainfall occurring over the summer months (December to April). Mean Annual Rainfall (MAR) increases from 70mm in the north west (near the desert biome) to 500mm in the south east with rainfall quantity and reliability increasing eastwards. The project site is located in the north-eastern portion of the biome, near Britstown which receives a MAR of 165mm per annum (meteoblue.com, Accessed: 16-04-22) with mean annual highs reaching 32 ^{o}C and mean annual lows of 2^{o}C.

The Nama-Karoo is underlain by a succession of sedimentary rocks that includes the Cape Supergroup followed by Dwyka tillites and then other fossil rich sediments of the Karoo Supergroup (Mucina *et al.,* 2011). Volcanic activity in the area has resulted in intrusions of igneous rock resulting in the formation of dolerite sills and dykes. Igneous rock is more resistant to weathering than sedimentary rock resulting in the formations of mesas, buttes and plateaus within the biome. These features are often characterised by a higher plant species diversity than the low-lying flat areas.

Soils that have arisen from the sedimentary and igneous rock are typically weakly structured and skeletal (Mucina *et al.,* 2011). The project area is characterised by moderately deep, calcareous, sandy-clay loams which contain calcrete and calcareous horizons in the flat areas and shallow soils on the slopes and plateaus of the mesas and buttes.

The climatic variation, geology and soils associated with this region have given rise to a complex of plains and Hardeveld dominated by dwarf succulent shrubs interspersed with grasses, geophytes and annual herbs (Mucina *et al.,* 2011). Variation in the timing of the rainfall and the amount received between years has resulted in variation in the structure, cover and productivity of the vegetation present as well as a diversity of plant forms that range from ephemerals, annuals, geophytes, C_3 and C_4 grasses, succulents, deciduous and evergreen perennial shrubs and trees.

Other factors that influenced the structure and composition of the vegetation within the biome include grazing of domestic livestock and wildlife, fires and rainfall. Increased grazing pressure or fire events followed by heavy rainfall makes this biome prone to erosion.

3.2. Vegetation

Two vegetation types are present on site:

- The Eastern Upper Karoo which includes washes.
- Karoo Hardeveld.

These vegetation types are described in further detail below.

3.2.1. Eastern Upper Karoo

Eastern Upper Karoo occurs within the flat to gently sloping areas of the site and is broken up by high lying ridges of Upper Karoo Hardeveld. Although the vegetation present is near natural, it does show evidence of disturbance from grazing.

Within the project site there were distinct differences in species assemblages within this vegetation type. Areas characterised by shallow calcrete soils and in the washes (characterised by a higher moisture content) were dominated by dwarf karoo scrub with a low grass cover. Deeper soils typically had a higher grass cover and fewer shrubs.

3.2.2. Upper Karoo Hardeveld

Upper Karoo Hardeveld was present on the slopes and plateaus of the mesas and dykes present within the site. These areas are typically more diverse than the Eastern Upper Karoo and includes species taller shrub/small tree species such as *Euclea coriacea, Lycium cinereum, Lycium horridus* and *Diospyros lycioides.*

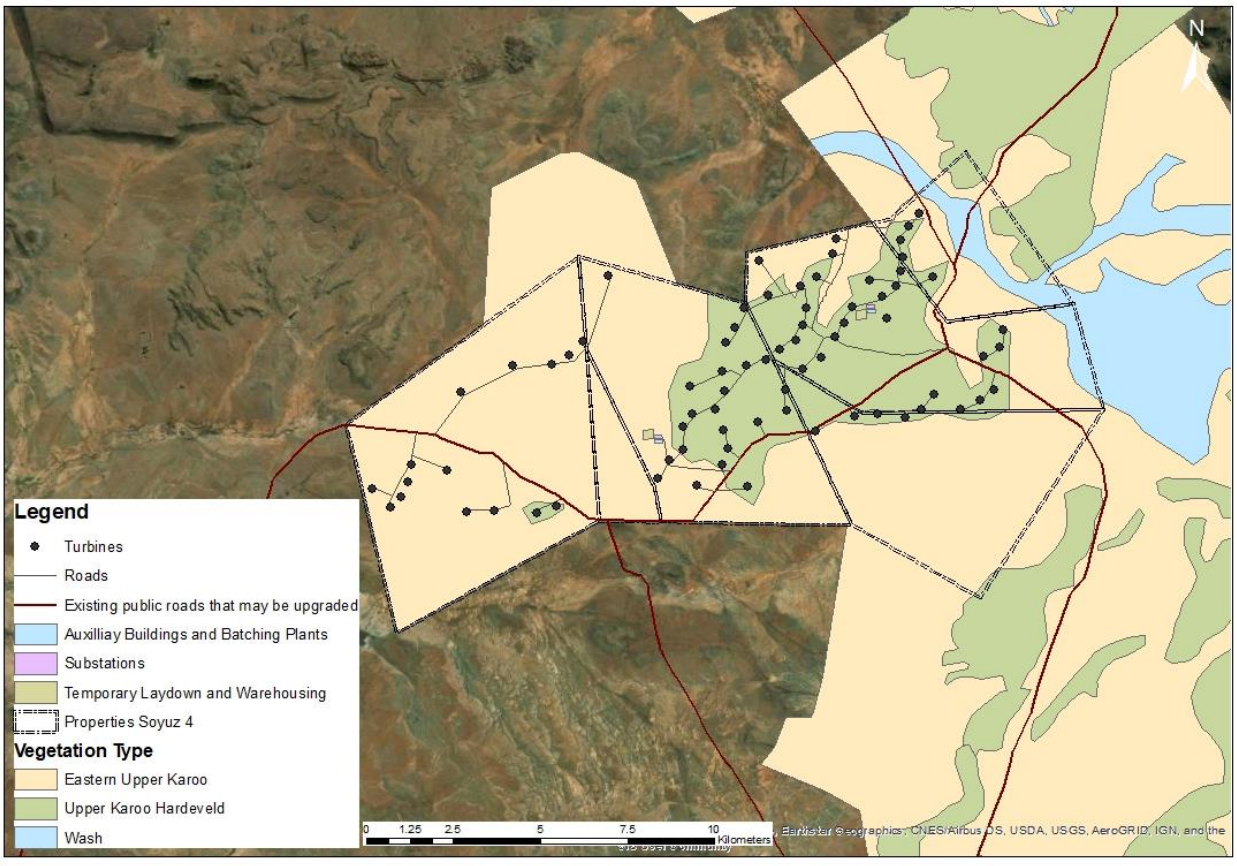

Figure 3.1: Vegetation map for the project site (Botanical Scoping Report, Biodiversity Africa, 2020)

4. RESULTS

4.1. Habitats

Habitats are defined in this study as the natural environment or place where faunal species *live, breed and/or forage*. Each habitat type has different environmental conditions and structure which influences a species distribution range. Five faunal habitats were identified in the study area, namely:

6. Grassland (subset of Eastern Upper Karoo).
7. Wash and Dwarf Succulent Karoo Shrubland (subset of Eastern Upper Karoo).
8. Rocky slopes and plateaus (subset of Upper Karoo Hardeveld).
9. Rivers (annual and perennial), wetlands and incidental pools.
10. Manmade.

Figure 4.1: Photo illustrating broad habitat types across the study site

4.1.1. Grassland

The grassland was present in the flat, low-lying plains of the project area. This habitat typically has a canopy cover of 75-90% in the summer months during which it is dominated by grasses but this decreases during the dry winter months to <50%, leaving the scattered dwarf shrubs visible. Vegetation structure was approximately 0.5m and uniform throughout the site. These areas typically had termite mounds and burrows, including confirmed burrows for bat-eared foxes.

Figure 4.2: Photo illustrating grassland habitat with scattered shrubs

4.1.2. Wash and Dwarf Succulent Karoo Shrubland

The washes typically had a higher moisture content but were structurally similar to the dwarf succulent karoo which occurred on shallow calcrete soils. Canopy cover was 50-75% and plant height were less than 0.5m. There were occasional larger shrubs of 1-1.5m in height scattered throughout this habitat.

Figure 4.3: Photo illustrating Dwarf Succulent Karoo Shrubland and calcrete soils in the foreground

Figure 4.4: Photo illustrating a Wash with interspersed with Dwarf Succulent Karoo Shrubland

4.1.3. Rocky Habitat (Slopes, Plateaus and slabs)

Plant cover on the rocky slopes was 25-50% and was interspersed between the rocks and boulders present. Structurally, the vegetation was more diverse with larger shrubs and small trees of 2 – 2.5m interspersed between grassland, herbs and succulent shrubs. Additionally, the rocky outcrops and ledges provided crevices for faunal species to hide. The rocky habitats present differently on the mesas, buttes and plateaus and dolerite sills and dykes.

Figure 4.4: Photo illustrating a dolerite dyke providing rocky habitat within the landscape

Figure 4.5: Photo illustrating a rock slab providing a different type of rocky habitat

4.1.4. Rivers, wetlands and incidental pools

The study area landscape offers a number of aquatic related habitat, including riverine systems, large bodies of water, saturated depressions creating temporary pools and vleis, wetlands or inundated grasslands. Each present a different structure for fauna to inhabit, wetlands provide vegetation for cover whereas incidental pools provide temporary access to water.

Figure 4.6: Photo of a dam in the project area with minimal fringe vegetation

Figure 4.7: Photo of a dry riverbed in the study area

4.1.5. Manmade

Built structures such as houses and sheds etc. offer faunal species shelter, some small faunal species often take refuge in the eaves of roofs and crevices in walls.

Figure 4.8: Photo of an outpost in a rocky hilled area.

4.2. Faunal species in relation to the project area

All species have a unique geographic range which describes the spatial area where a species is found. This is a species distribution. Some species have a range which covers most of the earth, this is known as a cosmopolitan distribution and others a very limited geographic area known as an endemic distribution. However, just because an area may be within a species distribution the species may no longer inhabit the area or may not inhabit it permanently. For example, large carnivores such as lion have a distribution which include the project area, but these animals no longer occur outside of reserves and private game farms. Further, a species may occur in the broader area (QDS/Pentad) where habitat is available and if its preferred habitat is not present onsite it is unlikely to occur. Therefore, the number of species that could occur in the PAOI and in the project area is often far fewer than species distributions.

The Nama Karoo Biome hosts approximately 50 frog species, 221 reptile species and 177 mammal species (CSIR, 2019). The Britstown project area is within the distribution range of 13 amphibian, 48 reptile species and 64 mammal species (FitzPatrick, 2022; IUCN, 2022; iNat, 2022).

4.2.1. Amphibians

Of the 13 amphibian species with a distribution that includes the project area, nine species have been confirmed within the study area (FitzPatrick, 2022; iNat, 2022). The field survey recorded three of these amphibian species, namely, the Tandy's Sand Frog (*Tomopterna tandyi*) was recorded from two drift fence funnel traps in the north of the study area, puddles in the road and from small pools in wash in the central east of the study area. Boettger's Caco (*Cacosternum boettgeri*) recorded from the northeastern drift fence funnel trap and storage dam in the north. The Giant African Bullfrog (*Pyxicephalus adspersus*) was recorded from the wash in the west of the study area.

Microhabitats important to amphibian species include terrestrial and aquatic habitats i.e., not all amphibians require permanent access to water, some species only require access to water for breeding and egg/tadpole development and some species do not require any water and are fully terrestrial.

Figure 4.9: Amphibians recorded from the study area. *Right* - Tandy's Sand Frog (*Tomopterna tandyi*) and *Left* - Giant African Bullfrog (*Pyxicephalus adspersus*)

4.2.2. Reptiles

Of the 48 reptile species with a distribution that includes the project area, 36 species have been confirmed within the study area (FitzPatrick, 2022; iNat, 2022). The field survey recorded three snake species, two tortoise, one terrapin and eight lizard species.

The Leopard Tortoise (*Stigmochelys pardalis*) was recorded from 14 locations across the study area with the majority see along the R398 road and in grassland habitats.

The Marsh Terrapin (*Pelomedusa galeata*) was recorded from a road puddle in the central east area of the study area.

The Cape Cobra (*Naja nivea*) was recorded from grassland habitat in Soyuz 6 WEF, and three of the drift fence funnel traps in the north of the study area trapped snakes including the Karoo Sand Snake (*Psammophis notostictus*), Spotted Skaapsteker (*Psammophylax rhombeatus*) and a juvenile Cape Cobra.

Rocky outcrops across the study site hosted lizards associated with the habitat including the Southern Rock Agama (*Agama atra*), Karoo Girdled Lizard (*Karusasaurus polyzonus*) and Western Rock Skink (*Trachylepis sulcate*). The Bibron's Gecko (*Chondrodactylus bibronii*) was also at rocky outcrops as well as at the buildings in the north of the study area capitalising on the insects attracted to the light. The Spotted Desert Lizard (*Meroles suborbitalis*), Spotted Sandveld Lizard (*Nucras intertexta*) and Karoo Sand Lizard (*Pedioplanis laticeps*) were recorded in the Grassland and Dwarf Succulent Karoo Shrubland habitats. The Common Ground Agama (*Agama aculeata*) and Variegated Skink (*Trachylepis variegate*) were common across the site with many *A. aculeata* sunning themselves on the roads.

Figure 4.10: Reptiles recorded from the study area.
Top left to bottom Right: Male and Female Western Rock Skink (*Trachylepis sulcate*), Variegated Skink (*Trachylepis variegata*) and Spotted Desert Lizard (*Meroles suborbitalis*).

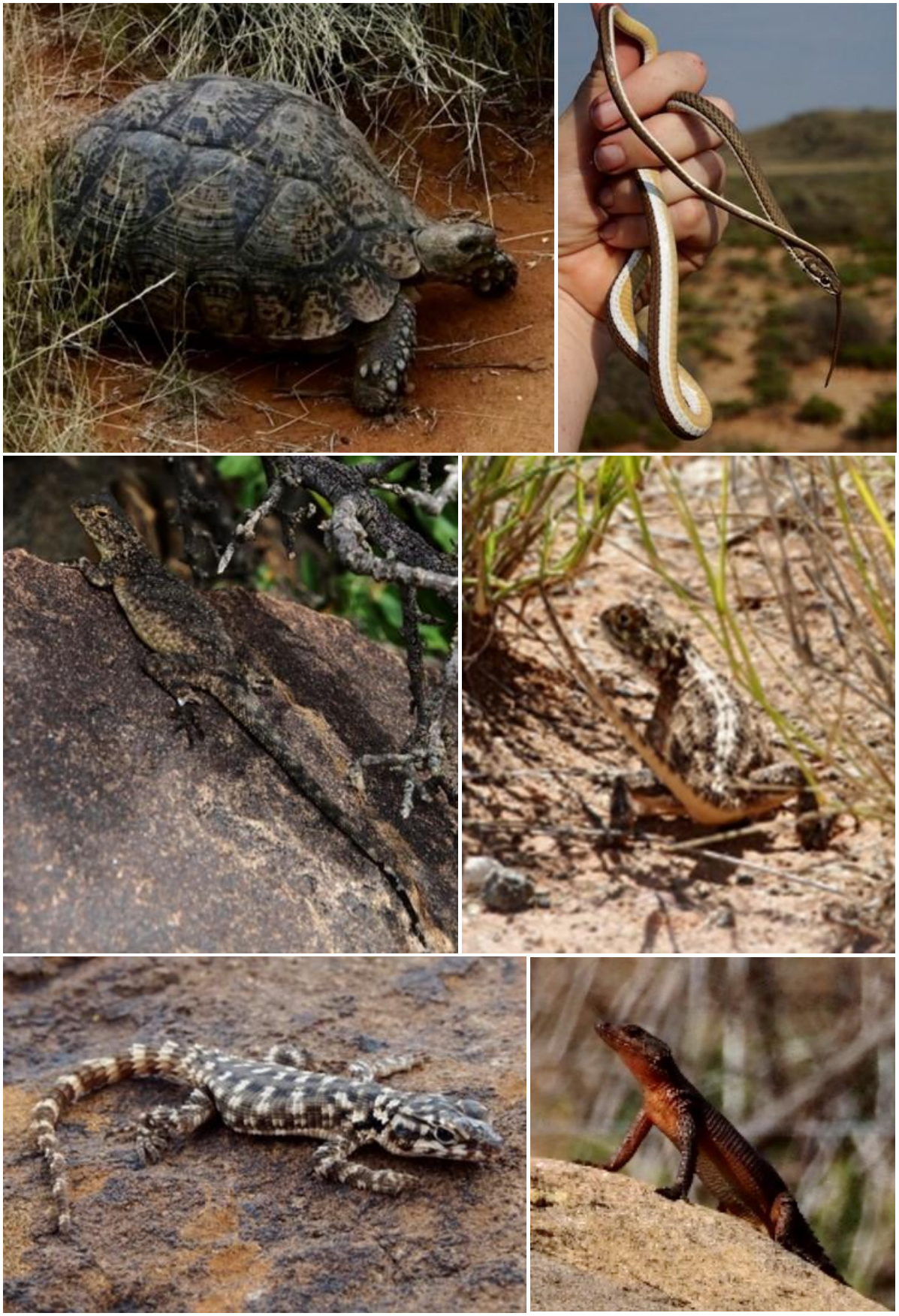

Figure 4.11: Reptiles recorded from the study area.

Top left to bottom Right: Leopard Tortoise (*Stigmochelys pardalis*), Karoo Sand Snake (*Psammophis notostictus*), Southern Rock Agama (*Agama atra*), Common Ground Agama (*Agama aculeata*), juvenile and adult Karoo Girdled Lizard (*Karusasaurus polyzonus*).

4.2.3. Mammals

Of the 64 mammal species with a distribution that includes the project area, 36 species have been confirmed within the study area (FitzPatrick, 2022; iNat, 2022). The field survey recorded 20 mammal species.

The field survey recorded seven carnivore species. At the southern trap array a number of burrows were found in the grassland habitat and camera traps confirmed the presence of Bat-eared Fox (*Otocyon megalotis*) and five individuals were seen one morning investigating the trap array. Two individuals were also found dead on the R398. Other roadkill included the African Wildcat (*Felis silvestris*), the Southern Aardwolf (*Proteles cristatus*) and Yellow Mongoose (*Cynictis penicillata*). A live Aardwolf was recorded on a camera trap in the large wash habitat in the central east portion of the study area. The Yellow Mongoose (*Cynictis penicillata*) and Meerkat (*Suricata suricatta*) were the most prevalent diurnal carnivores recorded in the study area. In addition, the Slender Mongoose (*Herpestes sanguineus*) and Cape Grey Mongoose (*Herpestes pulverulentus*) was also recorded. Farmer in the area report the Black-backed Jackal (*Canis mesomela*) as a pest as they will prey on lambs.

Figure 4.12: Carnivores recorded from the study area.
Top left – bottom right: Bat-eared Fox (*Otocyon megalotis*); Southern Aardwolf (*Proteles cristatus*); Cape Grey Mongoose (*Herpestes pulverulentus*) and Meerkat (*Suricata suricatta*).

Six rodents were recorded from the study area with the most conspicuous being the Ground Squirrel (*Xerus inauris*), this diurnal species lives in colonies of up to 30 individuals and their extensive burrow

system is often within the road and road verges and was recorded as common across the study area. The Highveld Gerbil (*Gerbilliscus brantsii*), Pouched Mouse (*Saccostomus campestris*), Four-striped Grass Rat (*Rhabdomys pumilio*) and Pigmy Mouse (*Mus minutoides*) were captured in traps (Sherman or funnel). Evidence of the Cape Porcupine (*Hystrix africaeaustralis*) was found across the site e.g., quills, skat, burrows, and foraging sites.

Figure 4.13: Rodents recorded from the study area.
Top left – bottom right: Ground Squirrel (*Xerus inauris*), Highveld Gerbil (*Gerbilliscus brantsii*), Pouched Mouse (*Saccostomus campestris*) and Four-striped Grass Rat (*Rhabdomys pumilio*),

The study area host both naturally occurring antelope and introduced antelope. Introduced species include the Eland, Gemsbok, Sable and Kudu. Naturally occurring species include the Steenbok, Duiker, Grey Rhebok, Mountain Reedbuck, Blesbok and Springbok. Although some farms stock Springbok, vast herds of Springbok used to migrate through the region and small herds still occur naturally (CSIR, 2019). Five Antelope species were confirmed during the field survey including Steenbok, Mountain Reedbuck and Springbok were sited within the study area and the camera traps captured Steenbok, Springbok and Blesbok.

Figure 4.14: Antelope recorded from the study area. Left – Springbok and Right - Steenbok

Other mammal's species recorded in the study area include the Rock Sengi (*Elephantulus sp*.), recorded at three different rocky outcrops, an individual Vervet Monkey (*Chlorocebus pygerythrus*) recorded at an abandoned farmhouse in the central east of the study area, Rock Hyrax (*Procavia capensis*) recorded at multiple rocky outcrops across the study area and two Lagomorphs. A Rock Hare (*Pronolagus sp.)* was flushed on top of one of the meses and Scrub Hares (*Lepus sp.*) were seen at multiple sites across the study area while driving and walking.

Figure 4.15: Mammal species recorded from the study area. L-R: Cape Hare, Rock Sengi and Dassie

4.3. Faunal Species of Conservation Concern

Species of conservation concern are those species that are either nationally threatened and listed as critically endangered, endangered, vulnerable or near-threatened and/or endemic and/or range restricted. It refers to a species that may require conservation of what individuals remain to ensure the longevity of the species.

4.3.1. Amphibians

None of the amphibian species that have a distribution which includes the project area are of conservation concern.

4.3.2. Reptiles

Two reptile species of conservation concern have a distribution which includes a portion of the study area. Namely, the Karoo Dwarf Tortoise (*Chersobius boulengeri*) listed as Endangered and the Tent Tortoise (*Psammobates tentorius*) listed as Near-Threatened (Hofmeyr, *et. al*., 2018; Hofmeyr, Leuteritz & Baard, 2018).

The Karoo Dwarf Tortoise (*Chersobius boulengeri*) has a distribution which includes the north-western portion of the study area (Figure 4.7). This species is endemic to South Africa and inhabits dwarf shrubland (800-1500m asl) in portions of the Succulent Karoo, Nama Karoo and Albany Thicket biome were dolerite ridges and rocky outcrops associated with succulent and grassy vegetation elements occur. It shelters under rocks in vegetated areas or in rock crevices (Hofmeyr, *et. al*., 2018). It has an EOO: 135,090km^2 and an AOO: 4 708 km^2. The nearest recent record is from near Loxton approximately 140km SW (iNat, 2022).

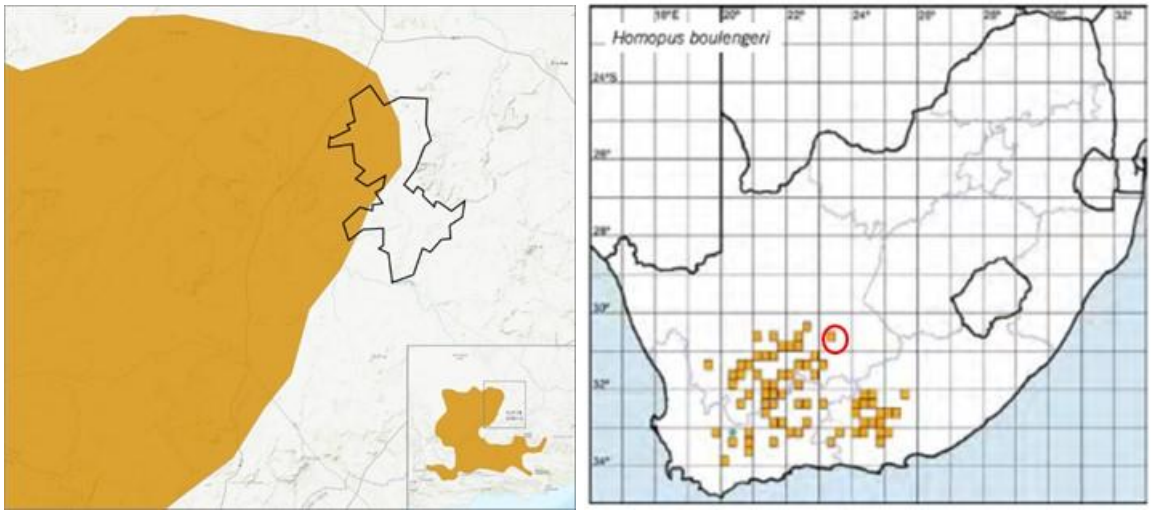

Figure 4.16: Karoo Dwarf Tortoise (*Chersobius boulengeri*) distribution and know occurrences in relation to the study area (black outline and red circle respectively) (Hofmeyr, *et. al.*, 2018; Hofmeyr & Baard, 2014).

This species has a *high likelihood of occurrence* within the study area that contains rocky outcrop habitat. The actual footprint of all six wind energy facilities is estimated at 9km^2 (900ha), which is 0.007% of the species extent of occurrence. This species is considered to be well protected within south African conservation areas (Tolley, *et. al.,* 2019). Given the size of the proposed project in relation to the species area extent of occurrence and that it is considered well protected the project, is unlikely to negatively influence the viability of this species. However, it is still an endangered species and mitigation measures must be implemented to prevent further loss of this species by this project.

The Tent Tortoise (*Psammobates tentorius)* is listed as Near-threatened and is restricted to South Africa and Namibia to areas below 1500m asl (Hofmeyr, Leuteritz & Baard, 2018). Although widespread (EOO: 595,920km^2) the population density is generally low with 5-6 sub-populations representing three subspecies, namely, *Psammobates t. tentorius*; *Psammobates t. trimeni and Psammobates t. verroxii* (Figure 4.8) (Hofmeyr, Leuteritz, & Baard, 2018). Subspecies distribution appears is linked to rainfall and elevation; however, all subspecies inhabit shrubland. P.t. *tentorius* occurs in scrubland with succulents, annuals, grasses and geophytes and *P.t. trimeni* occurs in areas dominated by dwarf succulent shrubs and annuals (Hofmeyr, Leuteritz, & Baard, 2018).

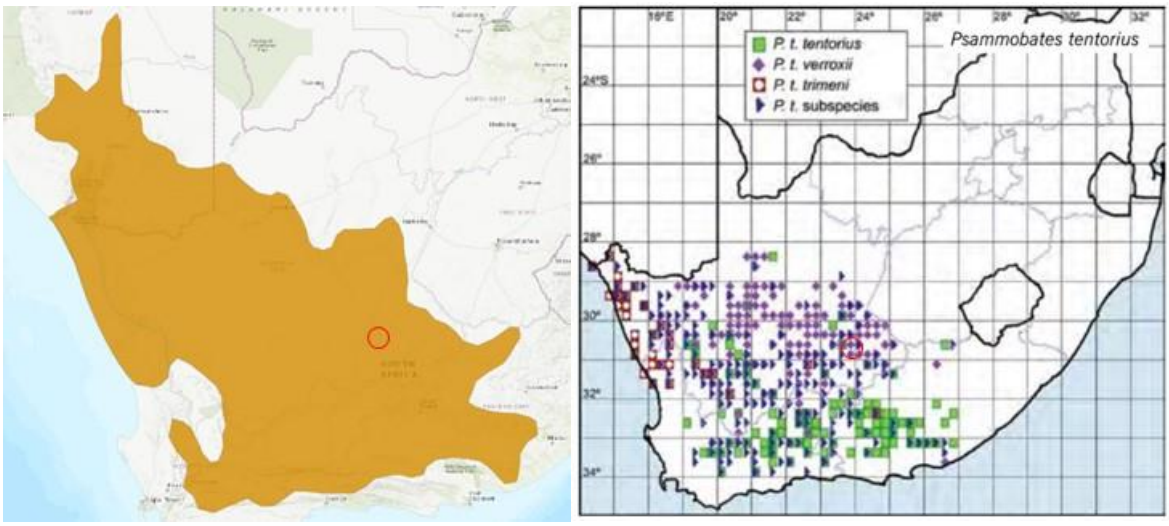

Figure 4.17: Tent Tortoise (*Psammobates tentorius)* distribution and know occurrences of subspecies in relation to the study area (red circle) (Hofmeyr, *et. al.*, 2018; Hofmeyr & Baard, 2014).

This species was *confirmed* within the study area, three individuals were recorded from the R398, the road bisecting the study area (Figure 4.9). This species is therefore highly likely to occur throughout the study area. Given the proposed project is 0.002% of this species EOO and that it is considered well protected, the project is unlikely to negatively influence the viability of this species. However, it is still near-threatened and mitigation measures must be implemented to prevent further loss of this species by this project.

Figure 4.18: *Psammobates tentorius verroxi* individuals recorded within the study area.

4.3.3. Mammals

The study area intersects the distribution of eight mammal species of conservation concern, five threatened and three near-threatened species. Threatened species includes the Riverine Rabbit (*Bunolagus monticularis*), Mountain Reedbuck (*Redunca fulvorufula*), Black-footed Cat (*Felis nigripes*), African White-tailed Mouse (*Mystromys albicaudatus*) and Leopard (*Panthera pardus*). Near-threatened species includes the Grey Rhebok (*Pelea capreolus*), Brown Hyaena (*Parahyaena brunnea*) and Cape Clawless Otter (*Aonyx capensis*). Two species, Black-footed Cat (Felis nigripes) and African White-tailed Mouse (*Mystromys albicaudatus*), have a high likelihood of occurrence in the study area and the Mountain Reedbuck (*Redunca fulvorufula*) was confirmed at two locations within the study area. These are presented in detail in the Table 4.1 below.

The Riverine Rabbit (*Bunolagus monticularis*) was flagged by the DFFE Screener as Medium sensitivity due to the proximity of the existing population and the potential for suitable habitat within the study area (Figure 4.10). Riverine Rabbit (*Bunolagus monticularis*) is listed as critically endangered and occurs mainly outside of formally protected areas. There are three known populations with 12 subpopulations (9 in the northern range and 3 southern range). It has an EOO of 54,227 km^2 and an AOO of 2,943 km^2. The Riverine Rabbit inhabits dense, discontinuous vegetation fringing the seasonal rivers and constructs burrows in soft and deep alluvial soils along the river courses for breeding. It is a browser strongly associated with selected plant species such as *Pteronia erythrochaetha, Kochia pubescens, Salsola glabrescens* and *Mesembryanthemaceae.* The Riverine Rabbit is considered a cryptic species, it is predominately solitary and nocturnal.

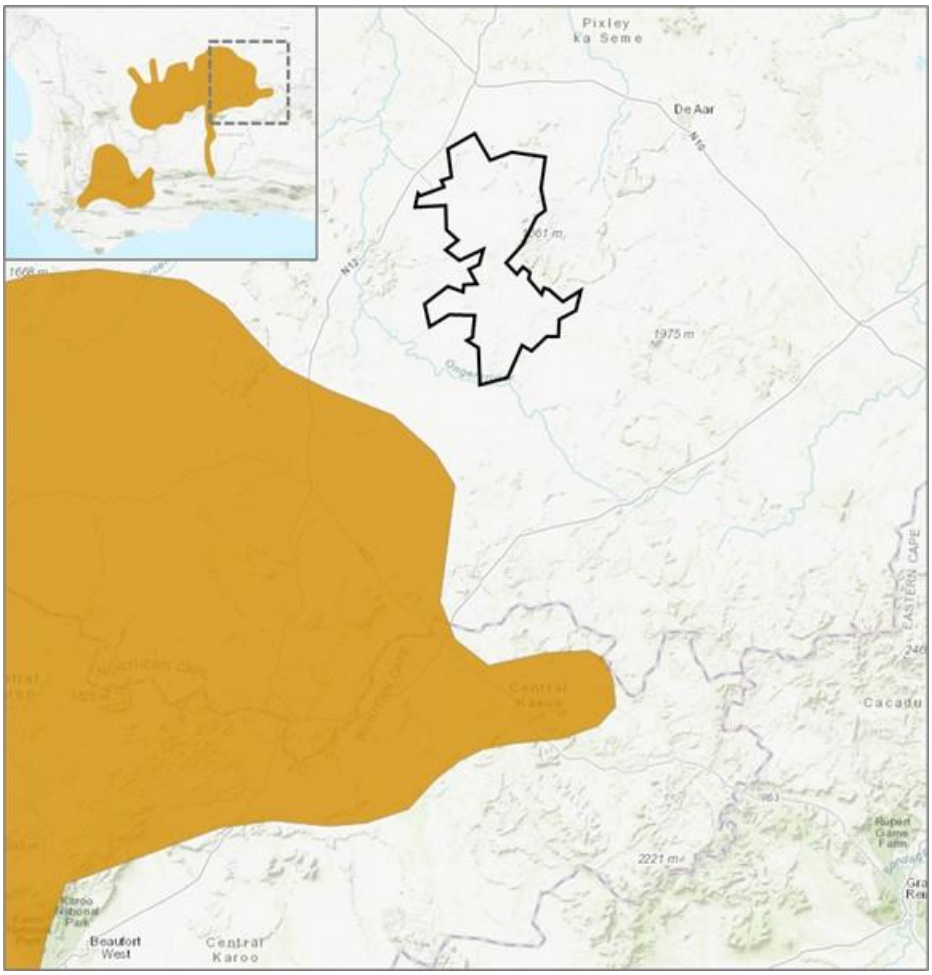

Figure 4.19: Riverine Rabbit (*Bunolagus monticularis*) northern subpopulation distribution in relation to the study area (black shape).

Table 4.1: Mammal Species of Conservation Concern likelihood of occurrence within the study area

Name	Treat Status			Habitat	Known Occurrence	Likelihood of Occurrence
	Global (IUCN)	National (SA red list, 2016)	TOPS			
Riverine Rabbit *Bunolagus monticularis*	*CR	CR	CR	See above.	Nearest records include a Museum specimen found +/- 50km SSE of Britstown near Deelfontein i.e. on the western border of Soyuz 6 WEF. Greatest number of records are 100km SW of Britstown between Loxton and Victoria West.	**Moderate** Within the Wash habitat and along seasonal rivers
Southern Mountain Reedbuck *Redunca fulvorufula*	*EN	EN	None	Mountain Reedbuck are typically found in high altitude grasslands and rocky ridges and hillsides from 1,500 – 5,000m above sea level (IUCN, 2017 and Taylor *et al.*, 2016). They are predominantly grazers and occur in drier hilly areas (such as the Nama Karoo) utilising steep slopes and bases of hills that have a higher moisture content and therefore greener, softer grasses. They avoid open areas with no cover. The availability of drinking water is crucial to their survival and therefore existence. In 1999 this species was estimated to have a population of approximately 33,000 individuals but in 2016 was reported to have unexpectedly declined by 73% (IUCN, 2017; Taylor *et al.*, 2016).	Recorded 20km to the west and east of the proposed project area (iNat, 2022). This species was recorded during the field survey from the south east of the study area.	**Very High** Suitable habitat is present within the site including water sources for drinking and rocky hilly slopes that offer protection.
Black-footed Cat	*VU	VU	Protected	The Black-footed cat is typically a solitary, ground dweller that is crepuscular[1] and nocturnal (Sliwa *et al.'* 2016). During the day it makes use of dens, preferring hollowed termite	There are two records on naturalist from 2016 confirming this species	**High**

[1] (of an animal) appearing or active in twilight.

Felis nigripes				mounds when available but also making use of burrows dug by other animals (e.g., Springhares, Ground Squirrels and Aardvark). It hunts small rodents and ground-dwelling birds found in short, open grasslands and is found in dry, open grasslands, savannah and karoo semi-desert. The estimated EOO is 930,000 km^2 and individual home ranges for males have been recorded to be approximately 16-20km^2 and for females were 9-10km^2.	occurs 30km east of the proposed project area.	Suitable habitat and available prey are present within the site and there are multiple dens and burrows of various species that would provide suitable shelter for this species.
African White-tailed Rat *Mystromys albicaudatus*	VU	VU	None	African White-tailed Rats are endemic to South Africa and Lesotho occurring in the highveld grasslands and succulent karoo in southern Mpumulanga, Free State, high-lying areas of KwaZulu Natal, Eastern Cape, south-eastern North-West and marginally into the Northern Cape *(Avenant et al., 2016 and 2019). With an* AOO of 3,719km^2 Little is known about this species in the wild. They are often associated with calcrete soils in grasslands and are not found on soft, sandy substrates, rocks, wetlands or riverbanks (Avenant *et al.*, 2016 and 2019). There is evidence that they survive in disturbed areas and sparse grasslands but are not associated with transformed habitat (e.g., agricultural land). This species is nocturnal living in burrows and crevices.	There is one record of this species 30km east of the project site on iNaturalist. The record is from 2017.	**High** Suitable habitat is present within the site (i.e., grasslands and karoo scrub underlain by calcrete).
Leopard *Panthera pardus*	VU	VU		Densely wooded and rocky areas are preferred habitat although across its distribution it has a wide habitat tolerance (grassland savannah, coastal scrub, shrubland and semidesert) (Swanepoel, et al., 2016; Stein, et al., 2020).	No records in close proximity to the study area.	**Low** Although possible as suitable habitat and available prey is present within the site.
Brown Hyaena *Parahyaena brunnea*	NT	NT		Inhabits desert areas (<100 mm MAR), semi-desert, open scrub and open woodland savannah (<700 mm). Avoids	No records in close proximity to the study area. The nearest record	**Low** Suitable habitat is present within the site

				developed areas but can survive close to them. It is estimated that there are 800–2,200 individuals in SA.	is ±260km SE of the study area.	(i.e., grasslands and karoo scrub)
Grey Rhebok *Pelea capreolus*	NT	NT		The Grey Rhebok is endemic to South Africa, Lesotho and Swaziland occurring in areas of suitable habitat. This species is associated with the rocky hills of mountain fynbos and the little Karoo and are typically browsers. Of consequence, they are largely water independent as they get most of their water from their food (Taylor, Cowell, & Drouilly, 2017; Taylor et al., 2016).	Recorded 80km SE of the study area.	**Moderate** Suitable habitat (rocky hills) is present within the site.
African Clawless Otter *Aonyx capensis*	NT	NT		This species is the most widely distributed otter species in Africa, with a range stretching from Senegal and Mali throughout most of West Africa to Sudan and Ethiopia, and then southwards throughout East Africa to the Western Cape of South Africa (Jacques *et al., 2021).* Provided freshwater (0.5–1.5 m deep) is available this species can occur in a variety of habitats. Permanent habitation is dependent on the availability of prey and shelter and females may exhibit territoriality in these areas (Okes, et al., 2016). Although this species can tolerate high levels of pollution, eutrophication, and disturbance (traffic, dogs, etc) in developed areas this is only in moderation (Okes, et al., 2016).	No records in close proximity to the study area. The nearest records are ±160km SE of the study area.	**Moderate** In habitat available along rivers within the site and washes during the wet season.

*CR – Critical; ED -Endangered; VU – Vulnerable

5. SENSITIVITY ASSESSMENT

5.1. Site sensitivity

The Species Environmental Assessment guideline (SANBI, 2021) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience, the combination of these resulted in a rating of SEI (Table 6.2).

A sensitivity map illustrating where areas of very high, high, medium and low sensitivity occur has been provided in Figure 5.1.

Table 5.1: Sensitivity assessment for each habitat type within the project site

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
Grassland	High The VU Black-footed Cat inhabits grassland.	Very High Grassland offers a very large (> 100 ha) intact area with high habitat connectivity and minimal current negative ecological impacts	Very High	Very High Species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	**Medium**
Washes and Rivers in Dwarf Succulent Karoo	High Although outside its predicted range should the CR Riverine Rabbit occur within the study area it will likely occur in the Wash habitat given the Dwarf Succulent Karoo vegetation offers its preferred diet and have soft alluvial soils to construct burrows.	High Large area of good habitat connectivity with minor current negative ecological impacts	High	Low Species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	**Very High**
Dwarf Succulent Karoo	Medium Confirmed or highly likely occurrence of populations of	High Good habitat connectivity of near-intact vegetation that shows some	Medium	High High likelihood of remaining at a site even when a disturbance or impact is occurring, or	**Low**

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
	NT Tent Tortoise	evidence of past and current disturbance		species that have a high likelihood of returning to a site once the disturbance or impact has been removed.	
Rocky Slopes, Slabs and Plateaus within Southern Mountain Reedbuck Range	High The endangered Southern Mountain Reedbuck is likely to occur within this habitat type.	High Good habitat connectivity of near-intact vegetation that shows some evidence of past and current disturbance	High	High Direct impacts associated with the construction and operation of the project on this species will be of low to moderate significance. Although the WEF will result in the loss of some habitat, this is a relatively small percentage of available habitat. The Mountain Reedbuck is highly mobile and will most likely leave the site during construction due to increased noise and activity, however, it is likely to return to site within 5-10 years after the disturbance as sufficient habitat will remain on site for it to forage and breed.	**Medium**
Rocky Slopes, Slabs and Plateaus within Karoo Dwarf Tortoise Range	High The endangered Karoo Dwarf Tortoise is likely to occur within this habitat type.	High Good habitat connectivity of near-intact vegetation that shows some evidence of past and current disturbance	High	Medium The Mountain Reedbuck is highly mobile and will most likely leave the site during construction and has a moderate likelihood returning once construction has stopped. The less mobile Karoo Dwarf Tortoise may remain in the rocky areas within and adjacent to construction sites, which may leave them vulnerable to injury or death due to construction activities.	**High**
Rivers, wetlands and incidental pools	Low No confirmed or highly likely populations of SCC	High Good habitat connectivity with potentially functional ecological corridors.	Medium	High Species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or	**Low**

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
Manmade & Agricultural	Low	Very Low	Very Low	Very High	**Very Low**
	< 50% of receptor contains natural habitat with limited potential to support SCC	Small with minimal habitat connectivity		Given the faunal species that inhabit these areas are generalists and used to disturbance these species have a very high likelihood of remaining at a site	

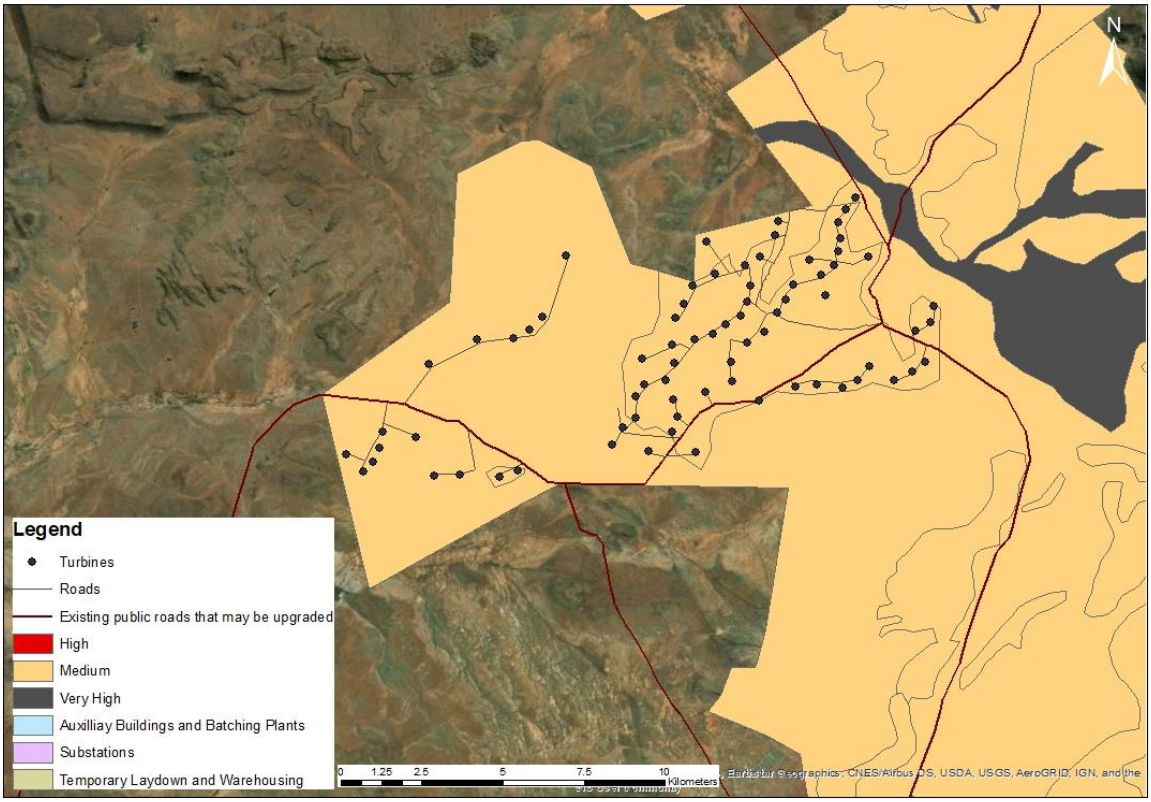

Figure 5.1: Sensitivity map for faunal habitat within the site

6. IMPACT ASSESSMENT

6.1. Construction and Operational Phase Impacts

The clearing of habitat for the construction of the WEF facility, access roads and associated infrastructure could result in the following impacts:

- The direct and permanent loss of faunal habitat.
- Faunal mortality due to roadkill and persecution.
- Disturbance to faunal species due to construction and operation activities that generate noise, dust, vibrations and lighting. This disturbance may cause faunal species to leave the area or disrupt foraging and/or breeding behaviour of those that remain.

The spatial extent, temporal scale and impact significance will vary for each impact, and these will be individually assessed in the faunal impact assessment report. This scoping report does not include an assessment of impacts.

The mitigation hierarchy was applied to all impacts. For negative impacts that can often not be avoided, the mitigation hierarchy then aims to minimise the impact, and should residual impacts remain, mitigation measures are then applied and in extreme cases offsets may be required. Some impacts will remain the same despite mitigation measures having been applied. For example, the development footprint will replace faunal habitat, this cannot be avoided and although it can be minimised the habitat will no longer exist and will not be able to re-establish itself for the lifetime of the project. It should be noted that although a mitigation measure may not reduce the impact significance rating (high, medium and low) they must still be applied because the impact has not been avoided in its entirety and the 'Duty of Care' is placed on the applicant/developer.

Impacts will be rated in the Environmental Impact Assessment phase.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions

Several amphibian, reptile and mammal species were recorded within the study area across all habitat types. The Grassland and Dwarf Succulent Karoo habitat types are extensive and for the most part unimpacted by the proposed development. Although road networks can be extensive these have been designed to utilise existing roads and tracks to reduce further loss of habitat. The rocky habitats appear to be where the majority of the turbine infrastructure will be placed. These are sensitive habitats and have a **High site ecological importance** to both the **endangered Southern Mountain Reedbuck and Karoo Dwarf Tortoise**. The project is unlikely to negatively influence the viability of these two species. However, they are still an endangered species and mitigation measures must be implemented to prevent further loss of this species by this project.

The Wash habitat and riverine areas within the Dwarf Succulent Karoo habitat would have a very high site ecological importance to the **critically endangered Riverine Rabbit** (*Bunolagus monticularis*) should it occur in the study area. The study area is located less than 50km northeast of the northern population of the Riverine Rabbit and suitable habitat is present. There is a moderate likelihood of this species occurring within the wash and riverine habitats. The majority of the project infrastructure avoids this habitat and effort should be made to avoid project related infrastructure (roads and cables) transecting this habitat.

7.2. Recommendations

It is recommended that the following conditions are included in the Final Environmental Management Programme (EMPr) as well as the conditions of the Environmental Authorisation (EA), if granted:

- Avoid wash and rivers in Dwarf Succulent Karoo as far as possible.
- Search and Rescue for the Karoo Dwarf Tortoise (*Chersobius boulengeri*) should be conducted immediately prior to clearing of its habitat.
- The development must consolidate road networks to minimise the loss of faunal habitat.
- Laydown areas must be rehabilitated with specific measures to create fauna habitat.
- Speed restrictions within the residential development for all vehicles (30km/h is recommended) should be in place to reduce the impact of killed fauna on the project roads.
- Development must be designed to allow unencumbered movement of this species. e.g., trenches with sloped side to allow faunal species to exit.
- A Storm Water Management Plan must be drafted and implemented to prevent runoff entering aquatic systems and causing siltation and pollution of this faunal habitat. Hard surfaces should be avoided.
- Should any fauna be encountered during construction and operation, these must be recorded (i.e. be photographed, GPS co-ordinates taken) and placed on iNaturalist
- Any faunal species that may die as a result of construction must be recorded (i.e. be photographed, GPS co-ordinates taken) and if somewhat intact preserved and donated to the nearest university, museum or SANBI.

- In addition to all mitigations listed above a clause must be included in contracts for ALL personnel working on site stating that: "*no wild animals will be hunted, killed, poisoned or captured. No wild animals will be imported into, exported from or transported in or through the province. No wild animals will be sold, bought, donated and no person associated with the development will be in possession of any live wild animal, carcass or anything manufactured from the carcass*." A clause relating to fines, possible dismissal and legal prosecution must be included should any of the above transgressions occur, especially for SCC.

7.3. Ecological Statement and Opinion of the Specialist

Project infrastructure should be designed to avoid very high sensitive features such as the washes. Further to the above, impacts on the faunal species and associated habitats can be reduced to acceptable levels through the implementation of mitigation measures. **The specialist is therefore of the opinion that the development can proceed *provided* the recommendations contained in this report are implemented.**

8. REFERENCES

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APPENDIX 1: AMPHIBIAN LIST

Family	Scientific name	Common name	Red list (Minter, et al., 2004)	Endemic	FrogMap			iNaturalist	Recorded during March 2022 Survey
					No. of QDS	No. of Records	Last recorded		
Brevicipitidae	*Breviceps adspersus*	Common Rain Frog	Least Concern	-				1	
Bufonidae	*Poyntonophrynus vertebralis*	Southern Pygmy Toad	Least Concern	SA	1	1	2000/01/16	4	1
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	Least Concern	-					
Bufonidae	*Vandijkophrynus gariepensis*	Karoo Toad	Least Concern	Near	1	1	2000/01/16		
Pipidae	*Xenopus laevis*	African Clawed Frog	Least Concern	-					
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	Least Concern (IUCN, 2017)	-					
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	Least Concern	SA	1	1	2000/01/16		
Pyxicephalidae	*Amietia poyntoni*	Poynton's River Frog	Least Concern (IUCN, 2017)	Near				1	
Pyxicephalidae	*Cacosternum boettgeri*	Boettger's Caco/Dainty Frog	Least Concern	-	3	4	2016/01/31	1	1
Pyxicephalidae	*Pyxicephalus adspersus*	Giant African Bullfrog	Least Concern (IUCN, 2013)	-	2	2	2022/02/08	2	2
Pyxicephalidae	*Strongylopus grayii*	Clicking Stream Frog	Least Concern	SA					
Pyxicephalidae	*Tomopterna cryptotis*	Tremelo Sand Frog	Least Concern	-	2	2	2000/12/13		
Pyxicephalidae	*Tomopterna tandyi*	Tandy's Sand Frog	Least Concern	-	1	1	2000/01/16		3
	13				**11**	**12**	**2000-01-16***	**9**	
							2000-01-16**		

APPENDIX 2: REPTILE LIST

Family	Scientific name	Common name	Red list (SARCA 2014)	Endemic	Protection Level (Tolley, et al., 2019)*	ReptileMap			iNaturalist	Recorded during March 2022 Survey
						No. of QDS	No. of Records	Last recorded		
Lizards										
Agamidae	*Agama aculeata*	Common Ground Agama	Least Concern	-	W	4	10	2021/03/19	1	1
Agamidae	*Agama atra*	Southern Rock Agama	Least Concern	SA	W	5	11	2017/10/31		1
Chamaeleonidae	*Bradypodion ventrale*	Southern Dwarf Chameleon	Least Concern	SA (FS, EC,WC, NC)	W					
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	Least Concern	Near Endemic	W	4	12	2021/03/19	1	1
Cordylidae	*Pseudocordylus microlepidotus*	Cape Crag Lizard	Least Concern	SA (EC, NC, WC)	W					
Gekkonidae	*Chondrodactylus angulifer*	Common Giant Ground Gecko	Least Concern	-	W					
Gekkonidae	*Chondrodactylus bibronii*	Bibron's Gecko	Least Concern	-	W	5	12	2017/12/26	2	1
Gekkonidae	*Pachydactylus capensis*	Cape Gecko	Least Concern	-	W	3	5	2021/10/22		
Gekkonidae	*Pachydactylus mariquensis*	Common Banded Gecko	Least Concern	SA (FS, EC,WC, NC)	W					
Gekkonidae	*Pachydactylus oculatus*	Golden Spotted Gecko	Least Concern	SA (FS, EC,WC, NC)	W	1	5	2006/01/28		

Gekkonidae	*Pachydactylus purcelli*	Purcell's Gecko	Least Concern	-	W	2	3	2006/01/28		
Gekkonidae	*Ptenopus garrulus*	Common Barking Gecko	Least Concern	-	W					
Gerrhosauridae	*Gerrhosaurus typicus*	Karoo Plated Lizard	Least Concern	SA (EC, NC, WC)	W					
Lacertidae	*Meroles suborbitalis*	Spotted Desert Lizard	Least Concern	-	W	1	1	1900/06/15		1
Lacertidae	*Nucras intertexta*	Spotted Sandveld Lizard	Least Concern	-	W	1	1	2006/01/27		1
Lacertidae	*Nucras livida*	Karoo Sandveld Lizard	Least Concern	SA (EC, NC, WC)	W	2	4	2006/01/26		
Lacertidae	*Pedioplanis laticeps*	Karoo Sand Lizard	Least Concern	SA (EC, NC, WC)	W					
Lacertidae	*Pedioplanis lineoocellata*	Common Sand Lizard	Least Concern	-	W	3	24	2020/02/12	2	
Lacertidae	*Pedioplanis namaquensis*	Namaqua Sand Lizard	Least Concern	-	W	4	15	2017/10/31	2	
Scincidae	*Acontias occidentalis*	Western (Okahandja) Legless Skink	Least Concern	-	W	1	1	2016/08/01	2	
Scincidae	*Trachylepis capensis*	Cape Skink	Least Concern	-	W	1	8	2006/01/28		
Scincidae	*Trachylepis occidentalis*	Western Three-striped Skink	Least Concern	-	W	1	1	2006/01/29		
Scincidae	*Trachylepis sulcata sulcata*	Western Rock Skink	Least Concern	-	W	4	15	2020/02/12	7	1
Scincidae	*Trachylepis variegata*	Variegated Skink	Least Concern	-	W	3	21	2020/10/09		1
Varanidae	*Varanus albigularis*	Rock Monitor	Least Concern	-	W	4	8	2021/03/19	3	
Varanidae	*Varanus niloticus*	Water Monitor	Least Concern	-	W					
Snakes										
Colubridae	*Dsypeltis scabra*	Rhombic Egg Eater	Least Concern	-	W					
Colubridae	*Telescopus beetzi*	Karoo Tiger Snake	Least Concern	-	W				1	

Elapidae	*Aspidelaps lubricus*	Coral Shield Cobra	Least Concern	-	W	4	4	2006/01/25		
Elapidae	*Elapsoidea sundevallii*	Highveld Garter Snake	Least Concern	-	W	1	1	2006/01/25		
Elapidae	*Naja nivea*	Cape Cobra	Least Concern	-	W	1	1	2005/06/15	2	1
Lamprophiidae	*Boaedon capensis*	Brown House Snake	Least Concern	-	W	1	1	2006/01/23		
Lamprophiidae	*Dipsina multimaculata*	Dwarf Beaked Snake	Least Concern	-	W	1	1	1900/06/15		
Lamprophiidae	*Lamprophis aurora*	Aurora House Snake	Least Concern	SA	W				1	
Lamprophiidae	*Prosymna sundevallii*	Sundevall's Shovel-snout	Least Concern	SA	W	1	2	2006/01/29		
Lamprophiidae	*Psammophis leightoni*	Cape Sand Snake	Least Concern	SA	W					
Lamprophiidae	*Psammophis notostictus*	Karoo Sand Snake	Least Concern	-	W	3	5	2006/01/29		1
Lamprophiidae	*Pseudaspis cana*	Mole Snake	Least Concern	-	W	2	2	1981/01/15		
Lamprophiidae	*Psammophylax rhombeatus*	Spotted Skaapsteker	Least Concern	Near Endemic	W					1
Typhlopidae	*Indotyphlops braminus*	Brahminy Blindsnake	Not Evaluated	Introduced	NE					
Typhlopidae	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake	Least Concern	-	W	3	3	2020/05/09		
Viperidae	*Bitis arietans*	Puff Adder	Least Concern	-	W	2	2	2005/06/15	1	
Viperidae	*Bitis caudalis*	Horned Adder	Least Concern	-	W				1	
Tortoises and Terrapins										
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin	Not evaluated	SA	W	3	4	2017/12/26	1	1
Testudinidae	*Chersobius boulengeri*	Karoo Drawf Tortoise (Padloper)	Endnagered (IUCN, 2018)	SA (EC, NC, WC)	W	1	1	1900/06/15		
Testudinidae	*Homopus femoralis*	Greater Padloper	Least Concern	SA	W	1	1	2017/12/25		
Testudinidae	*Psammobates tentorius*	Tent Tortoise	Near Threatened (IUCN, 2018)	SA	W	4	5	2005/06/15	3	3

Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	Least Concern	-	W	6	19	2021/03/20	25	14
	48		**2**	**8**		**88**	**227**	**2006-01-29***	**16**	
								2006-01-24**		

*(W: Well, M: Moderately, P: Poorly, N: Not Protected, EX: Extinct, NE: Not Evaluated)

APPENDIX 3: MAMMAL LIST

Family	Scientific name	Common name	Red list (Child, *et al.*, 2016)	Endemic	MammalMap			iNaturalist	Recorded during March 2022 Survey
					No. of QDS	No. of Records	Last recorded		
Artiodactyla									
Bovidae	*Antidorcas marsupialis*	Springbok	Least Concern		3	5	2021/03/20	2	1
Bovidae	*Damaliscus pygargus phillipsi*	Blesbok	Least Concern						1
Bovidae	*Hippotragus niger niger*	Southern Sable Antelope	Vulnerable					1	
Bovidae	*Oryx gazella*	Gemsbok	Least Concern						
Bovidae	*Pelea capreolus*	Grey Rhebok	Near Threatened					1	
Bovidae	*Raphicerus campestris*	Steenbok	Least Concern		3	4	2021/03/19	3	1
Bovidae	*Redunca fulvorufula*	Mountain Reedbuck	Endangered					2	1
Bovidae	*Sylvicapra grimmia*	Common Duiker	Least Concern						
Bovidae	*Tragelaphus oryx*	Common Eland	Least Concern						
Bovidae	*Tragelaphus strepsiceros*	Greater Kudu	Least Concern		1	1	2021/03/20		
Carnivora									
Canidae	*Canis mesomelas*	Black-backed Jackal	Least Concern		1	1	2016/01/28		
Canidae	*Otocyon megalotis*	Bat-eared Fox	Least Concern					1	1
Canidae	*Vulpes chama*	Cape Fox	Least Concern					1	
Felidae	*Caracal caracal*	African Caracal	Least Concern					1	
Felidae	*Felis nigripes*	Black-footed Cat	Vulnerable		4	6	2013/03/30	2	
Felidae	*Felis silvestris*	African Wildcat	Least Concern					1	1
Felidae	*Panthera pardus*	Leopard	Vulnerable						
Herpestidae	*Suricata suricatta*	Meerkat	Least Concern		3	6	2020/02/11	1	1
Herpestidae	*Herpestes sanguineus*	Slender Mongoose	Least Concern		1	2	2014/03/07		1

Herpestidae	*Herpestes pulverulentus*	Cape Grey Mongoose	Least Concern						1
Herpestidae	*Cynictis penicillata*	Yellow Mongoose	Least Concern		2	2	2016/01/28		1
Herpestidae	*Atilax paludinosus*	Water Mongoose	Least Concern						
Hyaenidae	*Parahyaena brunnea*	Brown Hyaena	Near Threatened						
Hyaenidae	*Proteles cristatus*	Southern Aardwolf	Least Concern					1	1
Mustelidae	*Aonyx capensis*	Cape Clawless Otter	Near Threatened					1	
Mustelidae	*Ictonyx striatus*	Southern Zorilla	Least Concern					1	
Mustelidae	*Mellivora capensis*	Honey Badger	Least Concern						
Viverridae	*Genetta genetta*	Common Genet	Least Concern						
Hyracoidea									
Procaviidae	*Procavia capensis*	Rock Hyrax	Least Concern					1	1
Lagomorpha									
Leporidae	*Lepus capensis*	Cape Hare	Least Concern		1	2	1979/02/14		1
Leporidae	*Lepus saxatilis*	Scrub Hare	Least Concern		2	3	2017/03/29	1	
Leporidae	*Pronolagus sp.*	Rock Hare sp.	Least Concern						1
Leporidae	*Pronolagus rupestris*	Smith's Red Rock Hare	Least Concern		1	1	1902/03/14		
Leporidae	*Pronolagus saundersiae*	Hewitt's Red Rock Hare	Least Concern						
Leporidae	*Bunolagus monticularis*	Riverine Rabbit	Critically Endangered						
Primates									
Cercopithecidae	Chlorocebus pygerythrus	Vervet Monkey	Least Concern						1
Macroscelidea									
Macroscelididae	*Elephantulus*	Rock Sengi sp.							1
Macroscelididae	*Elephantulus edwardii*	Cape Rock Sengi	Least Concern						
Macroscelididae	*Elephantulus myurus*	Eastern Rock Sengi	Least Concern						
Macroscelididae	*Elephantulus pilicaudus*	Karoo Rock Sengi	Data Deficient						
Macroscelididae	*Elephantulus rupestris*	Western Rock Sengi	Least Concern					1	

Macroscelididae	*Macroscelides proboscideus*	Round-eared Sengi	Least Concern		1	1	1902/04/09	1	
Rodentia									
Bathyergidae	*Cryptomys hottentotus*	African Mole Rat	Least Concern	Endemic					
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	Least Concern		1	1	2020/02/12	1	1
Muridae	*Desmodillus auricularis*	Short-tailed Gerbil	Least Concern						
Muridae	*Gerbilliscus brantsii*	Highveld Gerbil	Least Concern		1	2	1902/09/24		1
Muridae	*Gerbilliscus leucogaster*	Bushveld Gerbil	Least Concern						
Muridae	*Gerbillurus paeba*	Pygmy Hairy-footed Gerbil	Least Concern						
Muridae	*Mastomys coucha*	Multimammate Mouse	Least Concern						
Muridae	*Micaelamys granti*	Grant's Rock Rat	Least Concern	Endemic					
Muridae	*Micaelamys namaquensis*	Namaqua Rock Rat	Least Concern						
Muridae	*Mus minutoides*	Pigmy Mouse	Least Concern						1
Muridae	*Mus musculus*	House Mouse	Least Concern						
Muridae	*Otomys sloggetti*	Sloggett's Vlei Rat	Least Concern						
Muridae	*Otomys unisulcatus*	Karoo Bush Rat	Least Concern		1	2	1952/08/29		
Muridae	*Parotomys brantsii*	Brants's Whistling Rat	Least Concern		1	1	1902/03/19		
Muridae	*Parotomys littledalei*	Littledale's Whistling Rat	Least Concern		1	2	1952/08/29		
Muridae	*Rattus rattus*	House Rat	Least Concern						
Muridae	*Rhabdomys intermedius*	Karoo Four-striped Grass Rat	Least Concern	Endemic					
Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	Least Concern		1	3	1945/07/14		1
Nesomyidae	*Malacothrix typica*	Large-eared African Desert Mouse	Least Concern		1	1	1901/06/03		
Nesomyidae	*Mystromys albicaudatus*	African White-tailed Mouse	Vulnerable					1	
Nesomyidae	*Saccostomus campestris*	Pouched Mouse	Least Concern						1
Pedetidae	*Pedetes capensis*	South African Spring Hare	Least Concern		1	1	1902/05/03	2	

Sciuridae	*Xerus inauris*	South African Ground Squirrel	Least Concern		2	2	2021/03/20	2	1
Tubulidentata									
Orycteropodidae	*Orycteropus afer*	Aardvark	Least Concern		1	1	2020/02/12	4	
Eulipotyphla									
Soricidae	*Crocidura fuscomurina*	Bicolored Musk Shrew	Least Concern		1	1			
Soricidae	*Suncus varilla*	Lessor Dwarf Shrew	Least Concern						
Total	**64**				**37**	**67**	**2013-03-30***	**33**	**22**
							1964-02-01**		

APPENDIX 4: PROOF OF SACNASP REGISTRATION AND HIGHEST QUALIFICATION

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Amber Leah Jackson

Registration number: 100125/12

is registered as a

Candidate Natural Scientist

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

Environmental Science **15 August 2012**

15 August 2012
Pretoria

President

Executive Director

University of Cape Town • iYunivesithi yaseKapa • Universiteit van Kaapstad

we certify that

Amber Leah Jackson

was admitted to the degree of

Master of Philosophy

in Environmental Management

on 9 June 2011

Vice-Chancellor

Registrar

APPENDIX 5: CV

CONTACT DETAILS

Name	**Amber Jackson**
Name of Company	**Biodiversity Africa**
Designation	Director
Profession	Faunal Specialist and Environmental Manager
E-mail	amber@biodiversityafrica.com
Office number	+27 (0)78 340 6295
Education	2011 M. Phil Environmental Management (University of Cape Town) 2008 BSc (Hons) Ecology, Environment and Conservation (University of the Witwatersrand) 2007 BSc 'Ecology, Environment and Conservation' and Zoology (WITS)
Nationality	**South African**
Professional Body	**SACNASP**: South African Council for Natural Scientific Profession (100125/12) **ZSSA**: Zoological Society of Southern Africa **HAA**: Herpetological Association of Southern Africa **IAIASa**: Member of the International Association for Impact Assessments South Africa
Key areas of expertise	• Biodiversity Surveys and Impact Assessments • Environmental Impact Assessments • Critical Habitat Assessments • Biodiversity Management and Monitoring Plans

PROFILE

Amber has over ten years' experience in environmental consulting and has managed projects across various sectors including mining, agriculture, forestry, renewable energy, housing, coastal and wetland recreational infrastructure. Most of these projects required lender finance and therefore met both in-country, lender and sector specific requirements.

Amber completed the IFC lead and Swiss funded programme in Environmental and Social Risk Management course in 2018. The purpose of the course was to upskill Sub-Saharan African environmental consultants to increase the uptake of E&S standards by Financial Institutions.

Amber specialises in terrestrial vertebrate faunal assessments. She has conducted large scale faunal impact assessments that are to international lender's standards in Mozambique, Tanzania, Lesotho and Malawi. In South Africa her faunal impact assessments comply with the protocols for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity and follows the SANBI Species Environmental Assessment Guideline. Her specialist input goes beyond impact assessments and includes faunal opportunities and constraints assessments, Critical Habitat Assessments, Biodiversity related Management Plans and Biodiversity Monitoring Programmes.

Amber holds a BSc (Zoology and Ecology, Environment & Conservation) and BSc (Hons) in Ecology, Environment & Conservation from WITS University and an MPhil in Environmental Management from University of Cape Town. Amber's honours focused on the landscape effects on Herpetofauna in Kruger National Park and her Master's thesis focused on the management of social and natural aspects of environmental systems with a dissertation in food security that investigated the complex food system of informal and formal distribution markets

EMPLOYMENT EXPERIENCE

Director and Faunal Specialist, Biodiversity Africa

July 2021 - present

- Faunal assessments for local and international EIAs in Southern Africa
- Identifying and mapping habitats and sensitive areas
- Designing and implementing biodiversity management and monitoring plans
- Critical Habitat Assessments

- Large ESIA studies
- Managing budgets

Principal Environmental Consultant and Faunal,
Coastal and Environmental Services
September 2011-June 2021

- Faunal and ecological assessments for local and international EIAs in Southern Africa
- Identifying and mapping habitat and sensitive areas
- Designing and implementing biodiversity management and monitoring plans
- Critical Habitat Assessments
- Large ESIA studies
- Coordinating specialists and site visits
- Faunal Impact Assessment
- Project Management, including budgets, deliverables and timelines.
- Environmental Impact Assessments and Basic Assessments project
- Environmental Control Officer
- Public/client/authority liaison
- Mentoring and training of junior staff

COURSES

- **Herpetological Association of Southern Africa Conference- Cape St Frances** September 2019
- **International Finance Corporation Environmental and Social Risk Management (ESRM) Program** January – November 2018
- **IAIA WC EMP Implementation Workshop** 27 February 2018
- **IAIAsa National Annual Conference** August 2017
  Goudini Spa, Rawsonville.
- **Biodiversity & Business Indaba, NBBN** April 2017
  Theme: Moving Forward Together (Partnerships & Collaborations)
- **Snake Awareness, Identification and Handling course, Cape Reptile Institute (CRI)** November 2016
- **Coaching Skills programme, Kim Coach** November 2016
- **Western Cape Biodiversity Information Event, IAIAsa** May 2016
  Theme: Biodiversity offsets & the launch of a Biodiversity Information Tool
- **Photography Short Course** 2015.
  Cape Town School of Photography,
- **Mainstreaming Biodiversity into Business: WHAT, WHY, WHEN and HOW** June 2014 Hosted by Dr Marie Parramon Gurney on behalf of the NBBN at the Rhodes Business School
- **IAIAsa National Annual Conference** September 2013
  Thaba'Nchu Sun, Bloemfontein
- **St Johns Life first aid course** July 2012

CONSULTING EXPERIENCE

International Projects

- 2018-Crooks Brothers Post EIA Work- Environmental and Social EMPr, Policies, E&S Management Plans and Monitoring Programmes
- 2018-Triton Ancuabe Graphite Mine (ESHIA), Mozambique. IFC Standards.
- 2016-Bankable Feasibility Study of Simandou Infrastructure Project – Port and Railway Summary of critical habitat, biodiversity offset plan and monitoring and evaluation plan.
- 2016-Lurio Green Resources Forestry Projects ESIA project upgrade to Lender standards including IFC, EIB, FSC and AfDB.
- 2014-Green Resources Woodchip and MDF plant (EPDA).

- 2014-Niassa Green Resources Forestry Projects ESIA to Lender standards including IFC, EIB, FSC and AfDB.
- 2020-Kenmare Faunal Biodiversity Management Plan, Mozambique.
- 2020-Kenmare Faunal Monitoring Pogramme (year 1)- Baseline, Mozambique.
- 2019-Kenmare addendum ESIA Faunal Impact Assessment, Mozambique.
- 2019-Kenmare infrastructure corridor ESIA Faunal Impact Assessment, Mozambique.
- 2019/20-Olam Cocoa Plantation Faunal Impact Assessment, Tanzania.
- 2019-JCM Solar Voltaic project Faunal desktop critical habitat assessment, Cameroon.
- 2018-Suni Resources Balama Graphite Mine Project Faunal Impact Assessment, Mozambique.
- 2017/18-Battery Minerals Montepuez Graphite Mine Project Faunal Impact Assessment, Mozambique.
- 2017-Triton Minerals Nicanda Hills Graphite Mine Project Faunal Impact Assessment, Mozambique.
- 2017-Sasol Biodiversity Assessment, Mozambique.
- 2014-Lesotho Highlands Water Project Faunal Impact Assessment, Lesotho.
- 2012-Malawi Monazite mine Projects (ESIA) EMP ecological management contribution
- Liberia Palm bay & Butow (ESIA)
- PGS Seismic Project (ESIA), Mozambique.

South African Projects

- 2018-Port St Johns Second Beach Coastal Infrastructure Project - E&S Risk Assessment
- 2015-Blouberg Development Initiative- E&S Risk Assessment
- 2019-Boulders Powerline BA Faunal desktop impact assessment, WC, SA.
- 2019-Ramotshere housing development BA Faunal desktop impact assessment, NW, SA.
- 2019-Cape Agulhas Municipality Industrial development faunal impact assessment, WC, SA.
- 2019-SANSA Solar PV BA Faunal desktop impact assessment, WC, SA.
- 2019-Wisson Coal to Urea Faunal desktop assessment, Mpumalanga.
- 2019-Assessment Boschendal Estate Faunal Opportunities and Constraints, WC, SA.
- 2019-Ganspan-Pan Wetland Reserve Recreational and Tourist Development Avifaunal Impact Assessment, NC, SA.
- 2018-City of Johannesburg Municipal Reserve Proclamation for Linksfield Ridge and Northcliff Hill Faunal Assessment, South Africa.
- 2017-Augrabies falls hydro-electric project Hydro-SA Faunal Impact Assessment.
- Port St Johns Second Beach Coastal Infrastructure Project (EIA), South Africa.
- Woodbridge Island Revetment checklist.
- Belmont Valley Golf Course and Makana Residential Estate (EIA)
- Belton Farm Eco Estate (BA).
- Ramotshere housing development (BA).
- G7 Brandvalley Wind Energy Project (EIA)
- G7 Rietkloof Wind Energy Project (EIA)
- G7 Brandvalley Powerlines (BA)
- G7 Rietkloof Powerlines (BA)
- Boschendal wine estate Hydro-electric schemes (BA, 24G and WULA)
- Mossel Bay Wind Energy Project (EIA)
- Mossel Bay Powerline (BA) 132kV interconnection
- Inyanda Farm Wind Energy (EIA)
- Middleton Wind Energy (EIA)
- Peddie Wind Energy (EIA)
- Cookhouse Wind Energy Project (EIA)
- Haverfontein Wind Energy Project (EIA)

- Plan 8 Wind Energy Project (EIA)
- Brakkefontein Wind Energy Project (EIA)
- Grassridge Wind Energy Project (EIA) (Coega)
- St Lucia Wind Energy Project (EIA)
- ACSA ECO CT (Lead ECO)
- Enel Paleisheuwel Solar farm (Lead ECO)
- NRA Caledon road upgrade ECO
- Solar Capital DeAar Solar farm annual audits
- Eskom Pinotage substation WUL offset compliance