

# Terrestrial Animal Species Assessment

prepared in accordance with the  
*"Protocol for the Specialist Assessment and minimum report content requirements for  
environmental impacts on Terrestrial Animal Species"*

## Camden I Solar Energy Facility near Ermelo in Mpumalanga Province



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## Report for the proposed Camden I Solar Energy Facility near Ermelo in Mpumalanga Province.

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For:  
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1 July 2022

Report version: 2<sup>nd</sup> draft

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# SPECIALIST DETAILS & DECLARATION

This report has been prepared in accordance with the "Protocol for the specialist assessment and minimum report content requirements for environmental impacts on **terrestrial animal species**", as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020. It has been prepared independently of influence or prejudice by any parties.

The details of Specialists are as follows:

Specialist	Qualification and accreditation
Dr David Hoare	PhD Botany SACNASP (Pr.Sc.Nat.) Reg. no. 400221/05 (Ecology, Botany)

## Declaration of independence:

David Hoare Consulting (Pty) Ltd in an independent consultant and hereby declares that it does not have any financial or other vested interest in the undertaking of the proposed activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998). In addition, remuneration for services provided by David Hoare Consulting (Pty) Ltd is not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.

## Disclosure:

David Hoare Consulting (Pty) Ltd undertakes to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) and will provide the competent authority with access to all information at its disposal regarding the application, whether such information is favourable to the applicant or not.

Based on information provided to David Hoare Consulting (Pty) Ltd by the client and in addition to information obtained during the course of this study, David Hoare Consulting (Pty) Ltd presents the results and conclusion within the associated document to the best of the author's professional judgement and in accordance with best practice.



Dr David Hoare

1 July 2022

Date

# TERMS OF REFERENCE

The specialist study is required to follow the published Protocols, provided in full below for the assessment of impacts on Terrestrial Animal Species. Note that the Protocols require determination of the level of sensitivity, which then determines the level of assessment required, either a full assessment, or a Compliance Statement.

## PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL ANIMAL SPECIES

This site sensitivity assessment follows the requirements of The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020.

### General information

1.1 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “**very high**” or “**high**” sensitivity for terrestrial animal species, must submit a **Terrestrial Animal Species Specialist Assessment Report**.

1.2 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “**medium sensitivity**” for terrestrial animal species, must submit either a **Terrestrial Animal Species Specialist Assessment Report** or a **Terrestrial Animal Species Compliance Statement**, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.

1.3 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “**low**” sensitivity for terrestrial animal species, must submit a **Terrestrial Animal Species Compliance Statement**.

1.4 Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high” for terrestrial animal species sensitivity on the screening tool, and it is found to be of a “low” sensitivity, then a **Terrestrial Animal Species Compliance Statement** must be submitted.

1.5 Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial animal species sensitivity and it is found to be of a “very high” or “high” terrestrial animal species sensitivity, a **Terrestrial Animal Species Specialist Assessment** must be conducted.

1.6 If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol, means the area on which the proposed development will take place and includes the area that will be disturbed or impacted.

1.7 The **Terrestrial Animal Species Specialist Assessment** and the **Terrestrial Animal Species Compliance Statement** must be undertaken within the study area.

1.8 Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.

1.9 Where the nature of the activity is expected to have an impact on SCC beyond boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the study area must include the PAOI, as determined.

## **Terrestrial Animal Species Specialist Assessment**

2.1 The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professions (SACNASP), within a field of practice relevant to the taxonomic groups (“taxa”) for which the assessment is being undertaken.

2.2 The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline and must:

2.2.1 Identify the SCC which were found, observed or are likely to occur within the study area;

2.2.2 provide evidence (photographs) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);

2.2.3 identify the distribution, location, viability and detailed description of population size of the SCC identified within the study area;

2.2.4 identify the nature and the extent of the potential impact of the proposed development to the population of the SCC located within the study area;

2.2.5 determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;

2.2.6 determine the potential impact of the proposed development on the habitat of the SCC located within the study area;

2.2.7 include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation;

2.2.8 identify any dynamic ecological processes occurring within the broader landscape, that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;

2.2.9 identify any potential impact on ecological connectivity in relation to the broader landscape, resulting in impacts on the identified SCC and its long term viability;

2.2.10 determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC;

2.2.11 discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species, or roosting and breeding or foraging areas used by migratory species where these species show significant congregations, occurring in the vicinity; and

2.2.12 identify any alternative development footprints within the preferred development site which would be of “low” or “medium” sensitivity as identified by the screening tool and verified through the site sensitivity verification.

2.3 The findings of the assessment must be written up in a **Terrestrial Animal Species Specialist Assessment Report**.

## **Terrestrial Animal Species Specialist Assessment Report**

3.1 This report must include as a minimum the following information:

3.1.1 contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;

3.1.2 a signed statement of independence by the specialist;

3.1.3 a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;

3.1.4 a description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant;

3.1.5 a description of the mean density of observations/number of samples sites per unit area of site inspection observations;

3.1.6 a description of the assumptions made and any uncertainties or gaps in knowledge or data;

3.1.7 details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;

3.1.8 the online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area;

3.1.9 the location of areas not suitable for development and to be avoided during construction where relevant;

3.1.10 a discussion on the cumulative impacts;

3.1.11 impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);

3.1.12 a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and

3.1.13 a motivation must be provided if there were any development footprints identified as per paragraph 2.2.12 above that were identified as having “low” or “medium” terrestrial animal species sensitivity and were not considered appropriate.

3.2 A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.



## **Terrestrial Animal Species Compliance Statement**

5.1 The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Zoological Science or Ecological Science).

5.2 The compliance statement must:

5.2.1 be applicable within the study area;

5.2.2 confirm that the study area is of “low” sensitivity for terrestrial animal species; and

5.2.3 indicate whether or not the proposed development will have any impact on SCC.

5.3 The compliance statement must contain, as a minimum, the following information:

5.3.1 contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;

5.3.2 a signed statement of independence by the specialist;

5.3.3 a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;

5.3.4 a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;

5.3.5 the mean density of observations/ number of samples sites per unit area;

5.3.6 where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;

5.3.7 a description of the assumptions made and any uncertainties or gaps in knowledge or data;

5.3.8 any conditions to which the compliance statement is subjected.

A signed copy of the Terrestrial Animal Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.

# INTRODUCTION

## Project Background

ENERTRAG SOUTH AFRICA, a subsidiary of ENERTRAG AG, the German-based renewable energy company, is proposing to develop a Solar Energy Facility of up to 100 MW near Camden Power Station in Mpumalanga Province. This will be part of the Camden Renewable Energy Complex that will include:

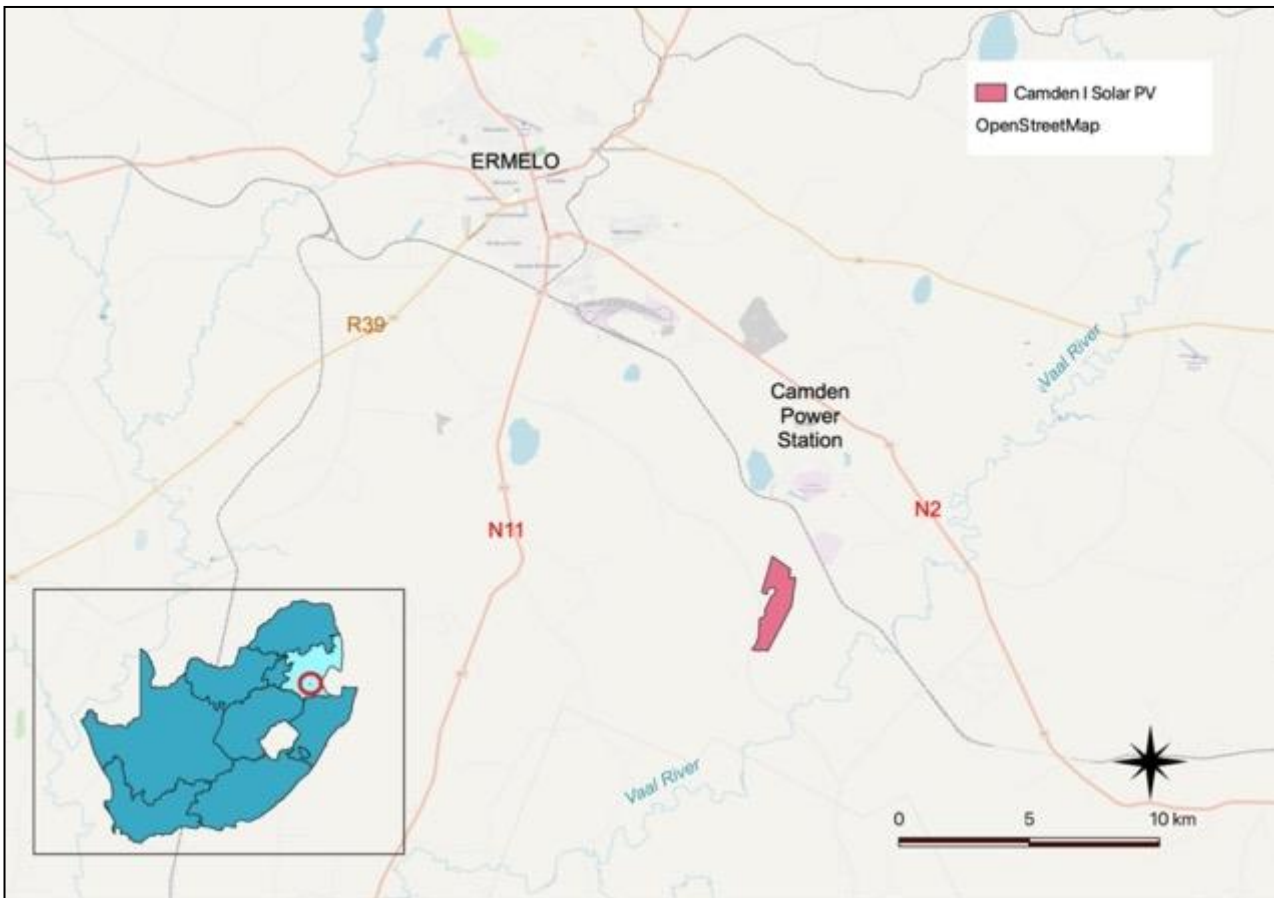
1. Camden I Wind Energy Facility (up to 200MW).
2. Camden I Wind Grid Connection (up to 132kV).
3. Camden up to 400kV Grid Connection and Collector substation.
4. **Camden I Solar up to 100MW.**
5. Camden I Solar up to 132kV Grid Connection.
6. Camden Green Hydrogen and Ammonia Facility, including grid connection infrastructure.
7. Camden II Wind Energy Facility (up to 200MW).
8. Camden II Wind Energy Facility up to 132kV Grid Connection.

ENERTRAG has appointed WSP as the independent Environmental Assessment Practitioner (EAP) to facilitate the Environmental Impact Assessment (EIA) Process. This report relates specifically to the **Camden I Solar (up to 100 MW)** (the Project). ENERTRAG appointed David Hoare Consulting (Pty) Ltd to undertake this specialist assessment for the Project.

## Project description

<b>Facility Name</b>	Camden I Solar Energy Facility
<b>Applicant</b>	Camden I Solar Energy Facility (RF) Propriety Limited
<b>Municipalities</b>	Msukaligwa Local Municipality of the Gert Sibande District Municipality
<b>Affected Farms</b>	Portion 1 of Welgelegen Farm No. 322
<b>Extent</b>	~ 297 ha
<b>Buildable area</b>	Approximately 280 ha, subject to finalization based on technical and environmental requirements
<b>Capacity</b>	Up to 100MW
<b>Power system technology</b>	Solar PV
<b>Operations and Maintenance (O&amp;M) building footprint:</b>	<p>Located near the substation.                      Septic/conservancy tanks with portable toilets                      Typical areas include:</p> <ul style="list-style-type: none"> <li>- Operations building – 20m x 10m = 200m<sup>2</sup></li> <li>- Workshop – 15m x 10m = 150m<sup>2</sup></li> </ul> <p>Stores - 15m x 10m = 150m<sup>2</sup></p>
<b>Construction camp and laydown area</b>	<p>Typical construction camp area 100m x 50m = 5,000m<sup>2</sup>.                      Typical laydown area 100m x 200m = 20,000m<sup>2</sup>.                      Sewage: Septic/conservancy tanks and portable toilets</p>
<b>Cement batching plant (temporary):</b>	Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo.

<b>Internal Roads:</b>	Width of internal road – Between 4m and 5m. Where required for turning circle/bypass areas, access or internal roads may be up to 20m to allow for larger component transport. Length of internal road – Approximately 8km.
<b>Cables:</b>	Communication, AC and DC cables.
<b>Independent Power Producer (IPP) site substation and battery energy storage system (BESS):</b>	<p>Total footprint will be up to 6.5ha in extent (5ha for the BESS and 1.5ha for the IPP portion of the substation). The substation will consist of a high voltage substation yard to allow for multiple (up to) 132kV feeder bays and transformers, control building, telecommunication infrastructure, access roads, etc.</p> <p>The associated BESS storage capacity will be up to 100MW/400MWh with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers.</p>



**Figure 1: Location of the study area in Mpumalanga Province.**

The project is located about 8 km south to south-east of Ermelo in Mpumalanga Provinces, South Africa (Figure 1). The site is halfway between the N11 (Ermelo to Amersfoort) and the N2 (Ermelo to Piet Retief). Camden Power Station (Eskom) is on the north-eastern border of the site. The roads on site are all gravel farm access roads.

## Identified Theme Sensitivities

A sensitivity screening report from the DFFE Online Screening Tool was requested in the application category:

Utilities Infrastructure | Electricity | Generation | Renewable | Solar

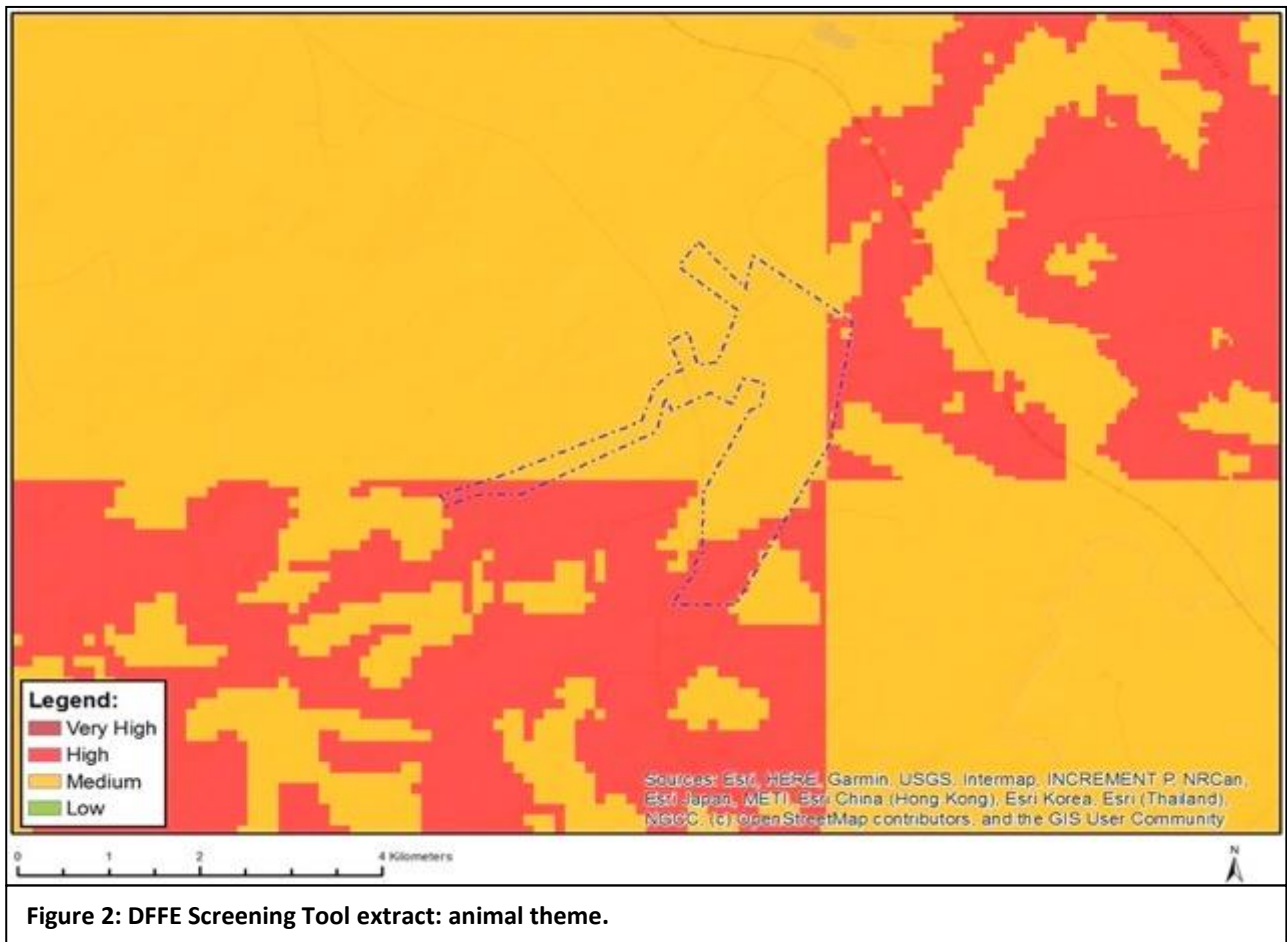
The DFFE Screening Tool report for the area (Figure 2) indicates the following ecological sensitivities:

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Animal Species Theme		X		

The animal species theme was highlighted as being of High sensitivity due the potential presence of the following species:

Sensitivity	Feature(s)
High	Sensitive species 2

High	Aves-Geronticus calvus
Medium	Aves-Tyto capensis
Medium	Sensitive species 2
Medium	Aves-Geronticus calvus
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Ourebia ourebi ourebi



# Listed species that could occur on site

## Animal species flagged for the study area

A separate Avifaunal Specialist Assessment is undertaken for this project, therefore the assessment of birds is a more general one in which favourable habitat for mostly terrestrial species is considered, along with the animal assessments.

The following species have been flagged for the site in the DFFE Screening Report:

### ***Sensitive species 2***

This is a large bird listed as Vulnerable. They are usually found in grasslands close to bodies of water or vleis. They prefer to nest near bodies of water that provide cover, but often feed in open savannas and grasslands. They can also be found in agricultural lands such as pastures, cropland, or fallow fields. They also often select habitats that include some trees, as they are able to roost in trees. A detailed avifaunal assessment has been undertaken for this project where additional information can be obtained regarding this species.

### ***Geronticus calvus (Southern Bald Ibis)***

The Southern Bald Ibis, listed as Vulnerable, is restricted to Lesotho, north-east South Africa and west Eswatini. The core range lies in the north-eastern Free State, Mpumalanga and the KwaZulu-Natal Drakensberg. The site is therefore near to the centre of its relatively restricted global distribution. It prefers high rainfall (>700 mm p.a.), sour and alpine grasslands, characterised by an absence of trees and a short, dense grass sward. It also occurs in lightly wooded and relatively arid country. It forages preferentially on recently burned ground, also using unburnt natural grassland, cultivated pastures, reaped maize fields and ploughed areas (Birdlife International 2022). A detailed avifaunal assessment has been undertaken for this project where additional information can be obtained regarding this species.

### ***Tyto capensis (African Grass Owl)***

The African Grass Owl is listed as Vulnerable. It is confined to the higher rainfall areas in the eastern half of South Africa, where it typically roosts and breeds in tall, rank grass or sedges associated with damp substrates, such as permanent and non-perennial wetlands and streams. The Vaal River is an important corridor for the species. A detailed avifaunal assessment has been undertaken for this project where additional information can be obtained regarding this species.

### ***Crocidura maquassiensis (Maquassie Musk Shrew)***

The Maquassie Musk Shrew (*Crocidura maquassiensis*), listed as Vulnerable, is endemic to South Africa, Eswatini and Zimbabwe, where it is found in moist grassland habitats in Savannah and Grassland Biomes. It appears to tolerate a wide range of habitats, although threats to the species have been inferred as being related to loss or degradation of moist, productive areas, such as rank grassland and wetlands (Taylor et al. 2016). The species is patchily distributed within the north-eastern part of South Africa. The study area is within the known distribution of this species in the sense that there are records in quarter degree grids throughout the Highveld, although not from the current grid or any nearby grids. It is, however, flagged in the DFFE Online Screening Tool as potentially occurring on site. It is therefore considered possible that it could occur on site and individuals could therefore possibly be affected by construction activities.

### ***Ourebia ourebi ourebi (Oribi)***

The Oribi (*Ourebia ourebi*), listed as Endangered in South Africa and Least Concern globally, has a geographical distribution that includes the study area. It is widely distributed in Africa, but the subspecies found in South Africa has a more limited distribution that includes South Africa and Mozambique. The species inhabits savanna woodlands, floodplains and other open grasslands from sea level to 2200 m asl (in Mpumalanga). They reach their highest density on floodplains and moist tropical grasslands. They prefer open grassland in good condition containing a mosaic of short grass for feeding and tall grass for feeding and shelter. It has not been recorded in the grid in which the site is located, which is one of a group of grids in south-western Mpumalanga where the species does not appear to occur. Nevertheless, the area is within the overall distribution range of the species. Based on the gap in the distribution of the species, there is a low likelihood that it could occur on site within any suitable habitat, although it is flagged for the project in the Screening Tool.

## Other listed species for the study area

Vertebrate species (mammals, reptiles, amphibians) with a geographical distribution that includes the study area are listed in Appendix 1. All threatened (Critically Endangered, Endangered or Vulnerable) or near threatened vertebrate animals that could occur in the study area and have habitat preference that includes habitats available in the study area are discussed further.

### Grey Rhebok

The Grey Rhebok (*Pelea capreolus*), listed as Near Threatened, is endemic to South Africa, Lesotho and parts of Eswatini. They are predominantly browsers, feeding on ground-hugging forbs, and largely water independent, obtaining most of their water requirements from their food. Local declines in their population have been attributed to increased densities of natural predators, such as Black-backed Jackal, Caracals and Leopards. It has not been recorded in the grid in which the site is located, but has been recorded in areas to the north-east and many areas further to the south, therefore the site is within the overall distribution range of the species. There is a moderate likelihood that it could occur on site within any suitable habitat. However, it is a relatively mobile species and not necessarily dependent on any particular habitat. It is likely to move away from the path of any construction and development of parts of the study area.

### Black-footed Cat

The Black-footed Cat (*Felis nigripes*), listed as Vulnerable, has been previously recorded in the grid in which the project is located, as well as in four surrounding grids. Its known distribution is inland throughout South Africa, except within the winter-rainfall part of the country. It also occurs in Botswana and Namibia. The current project area is towards the edge of the distribution range of the species. The species is nocturnal and carnivorous, favouring any vegetation cover that is low and not too dense. They make use of dens in the daytime, which can be abandoned termite mounds, or dens dug by other animals, such as aardvark, springhares or cape ground squirrels. Local declines in their population have been attributed to increased densities of natural predators, such as Black-backed Jackal, Caracals and Leopards. They are highly vulnerable to domestic carnivores. The study area is suited to this species and it has a high probability of occurring there.

### Leopard

The Leopard (*Panthera pardus*), listed as Vulnerable, has a wide habitat tolerance, but with a preference for densely wooded areas and rocky areas. They have large home ranges, males having ranges of about 100 km<sup>2</sup> and females 20 km<sup>2</sup>, but do not migrate easily. It has not been recorded in any of the adjacent or nearby grids and the overall distribution shows a gap in its distribution in current study area. There is therefore a low probability of this species occurring on site.

### African Marsh Rat

The African Marsh Rat (*Dasymys robertsii*), listed as Vulnerable, is patchily distributed in northern South Africa and Zimbabwe. Within South Africa it is found primarily in savanna and lowveld areas, where it is dependent on river and wetland systems. Its distribution coincides with the Limpopo watershed. Distribution records suggest that the species is not likely to occur in the study area.

### Spotted-necked Otter

The Spotted-necked Otter (*Hydrictus maculicollis*), listed as Vulnerable, is widely but patchily distributed in the higher parts of the eastern half of South Africa. It is also found in lakes and large rivers throughout much of Africa south of 10°N. They are restricted to areas of permanent fresh water where there is good shoreline cover and an abundant prey base (small fishes). They prefer water that is not silt-laden and is unpolluted, although have been known to occur in polluted rivers. The site is within the known distribution of this species and there are historical records for one nearby grid to the north-east, although not from the current grid. There is potentially suitable habitat for this species on site within the small dams.

### Cape Clawless Otter

The Cape Clawless Otter (*Aonyx capensis*), listed as Near Threatened, is widely but patchily distributed throughout South Africa, and is also the most widely found otter in Africa. It is aquatic and seldom found far from permanent water, which needs to be fresh. The site is within the known distribution of this species and there are historical records for one

adjacent grid to the north-east, although not from the current grid. There is potentially suitable habitat for this species on site, although water quality may be an issue. It is therefore considered possible that it occurs on site.

#### African Striped Weasel

The African Striped Weasel (*Poecilogale albinucha*), listed as Near Threatened, is found throughout most of South Africa, except for the arid interior, and into central Africa. It has not been recorded in the grid in which the site is located, but has been recorded in two adjacent grids, and the site is within the overall distribution range for the species. It is found primarily in moist grasslands and fynbos, where adequate numbers of prey may be found. It is considered likely that it could occur on site.

#### Brown Hyaena

The Brown Hyaena (*Parahyaena brunnea*), listed as Near Threatened, is found in a band running down the centre of the country, expanding into the entire northern parts of the country. There is a gap in the distribution around the current study area, but there is a possibility that vagrant individuals could extend into this area. The species is found in desert areas, particularly along the west coast, semi-desert, open scrub and open woodland savannah (Mills & Hes 1997). It is a solitary scavenger that travels vast distances every day in search of food. It has a medium chance of occurring in the study area since the distribution range includes the study area, however there are no historical records from nearby. It is a mobile animal that is likely to move away from the path of any construction and development of parts of the site is therefore highly unlikely to have any negative effect on the species. It is considered that there is a low likelihood of it occurring on site.

#### South African Hedgehog

The South African Hedgehog (*Atelerix frontalis*), listed as Near Threatened, is found in a large part of the central part of South Africa, extending down to the south-eastern coast, and is also found in Namibia, Botswana, Zimbabwe, Lesotho and Eswatini. It requires ample ground cover for cover, nesting and foraging and prefers dense vegetation and rocky outcrops. The site is well-within the known distribution of this species and there are historical records for nearby grids in all directions, and it has been recorded from the current grid. There is therefore a high probability of the study area being suitable for this species. It is considered likely that it could occur on site.

#### Swamp Musk Shrew

The Swamp Musk Shrew (*Crocidura mariquensis*), listed as Near Threatened, is found in the north-eastern part of South Africa, extending down to the south-eastern coast. It occurs in wetlands and waterlogged grasslands, predominantly in KwaZulu-Natal, Mpumalanga, Limpopo, Gauteng and North West Provinces. The site is well-within the known distribution of this species and there are historical records for nearby grids in all directions, and it has been recorded from the current grid. There is therefore a high probability of the study area being suitable for this species. It is considered likely that it could occur on site.

#### Highveld Golden Mole

The Highveld Golden Mole (*Amblysomus septentrionalis*), listed as Near Threatened, is found across the Mpumalanga Highveld from Wakkerstroom northwards to Ermelo and Barberton and westwards through Standerton to north-eastern Free State. It occurs within meadows and edges of marshes in high-altitude grassland in Mpumalanga. They are restricted to friable soils in valleys and on mountainsides. The site is within the known distribution of this species, although higher densities of records occur further east. There are historical records for an adjacent grid to the south-west, but it has not been recorded from the current grid. There is therefore a medium probability of the study area being suitable for this species. It is considered possible that it could occur on site and individuals could be affected by construction activities, if suitable habitat is damaged.

#### White-tailed Rat

The White-tailed Rat (*Mystromys albicaudatus*), listed as Vulnerable, is endemic to South Africa and Lesotho, where it is found primarily in Highveld grasslands, but extending into adjacent Fynbos and Karoo areas. It is terrestrial, but never found in soft, sandy substrates, rocks, wetlands or river banks, and do not occur in transformed habitat. The study area is on the edge of the known distribution of this species, with most of Mpumalanga appearing to be a gap in the occurrence of the species. There is therefore a low probability of the study area being suitable for this species. It is considered unlikely that it would occur on site.

#### Vlei Rat



The Vlei Rat (Grassland-type) (*Otomys auratus*), listed as Near Threatened, is near-endemic to South Africa, occurring in the north-eastern half of the country, associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions. It is likely to be associated with sedges and grasses in densely-vegetated wetlands with wet soils. The study area is well within the known distribution of this species and there are historical records for the grid in which the study area is located, as well as two adjacent grids. There is therefore a high probability of the study area being suitable for this species. It is considered likely that it occurs on site and the proposed development could therefore affect this species.

#### Coppery grass lizard

The Coppery Grass Lizard (*Chamaesaura aenea*), listed as Near Threatened, is endemic to South Africa, where it is found in western Eswatini, Limpopo, Mpumalanga, Gauteng, KwaZulu-Natal, north-eastern Free State and Eastern Cape. It is found on grassy slopes and plateau of the eastern escarpment and Highveld, where it probably shelters in the base of grass tussocks. The study area is within the known distribution of this species and there are historical records for two adjacent grids to the north and south, although not from the current grid. There is therefore a moderate probability of the study area being suitable for this species, including suitable habitat within the project area.

#### Large-scaled grass lizard

The Large-scaled Grass Lizard (*Chamaesaura macrolepis*), listed as Near Threatened, is endemic to South Africa, Eswatini and Zimbabwe. In South Africa it is found in Limpopo, Mpumalanga, and KwaZulu-Natal. It is found in grassland, especially rocky, grassy hillsides. Its main distribution is within the Indian Ocean Coastal Belt part of KwaZulu-Natal, but there are scattered records on the Highveld. The study area is marginally within the known distribution of this species in the sense that there are records in quarter degree grids up to Gauteng and there are historical records for one nearby grid to the north-east, although not from the current grid. There is therefore a moderate to low probability of the study area being suitable for this species, including suitable habitat within the project area. It is considered a low likelihood that it could occur on site.

#### Breyer's Long-tailed Seps

The Breyer's Long-tailed Seps (*Tetradactylus breyeri*), listed as Vulnerable, is endemic to South Africa, where it is found in Free State, Mpumalanga, and KwaZulu-Natal. It is found in montane and Highveld grassland. The study area is marginally within the known distribution of this species in the sense that there are records in quarter degree grids throughout the Highveld, extending from Blyde River Canyon to the Drakensberg, although not from the current grid or any nearby grids. There is therefore a low probability of the study area being suitable for this species, including suitable habitat within the project area. It is considered unlikely that it would occur on site.

#### Striped Harlequin Snake

The Striped Harlequin Snake (*Homoroselaps dorsalis*), listed as Near Threatened, is endemic to South Africa, where it is found in western Eswatini, Limpopo, Mpumalanga, Gauteng, KwaZulu-Natal, and Free State. It is partly fossorial and known to inhabit old termitaria in grassland habitat. Most of its range is at moderately high elevations, but it also occurs close to sea level in KwaZulu-Natal. The study area is within the known distribution of this species and there are historical records for one adjacent grid to the north, although not from the current grid. There is therefore a moderate probability of the study area being suitable for this species, including suitable habitat within the project area. It is considered likely that it could occur on site.

#### The Giant Bull Frog

The Giant Bull Frog (*Pyxicephalus adspersus*) previously listed as Near Threatened, is found in seasonal shallow grassy pans, vleis and other rain-filled depressions in open flat areas of grassland or savanna and, at the limits of its distribution, in Nama Karoo and thicket. For most of the year the species remains buried up to 1 m underground. They emerge only during the peak of the rainy season to forage and breed. If conditions are extremely dry, they may remain cocooned underground for several years. Long distances often separate suitable breeding sites. In order to breed, they require shallow, rain-filled depressions that retain water long enough for the tadpoles to metamorphose. Before and after breeding, bullfrogs forage in open grassland, feeding mostly on insects, but also on other frogs, lizards, snakes, small birds and rodents. After breeding males generally bury themselves within 100 m of the breeding site, but females may disperse up to 1 km away. Based on habitat requirements, there is a medium probability that this species occurs in the study area.

## Protected animals

There are a number of animal species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (see Appendix 3). According to this Act, *“a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7”*. Such activities include any that are *“of a nature that may negatively impact on the survival of a listed threatened or protected species”*. This implies that any negative impacts on habitats in which populations of protected species occur or are dependent upon would be restricted according to this Act.

Those species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) that have a geographical distribution that includes the site are listed in Appendix 3, marked with the letter “N”. This includes the following species:

1. Black Wildebeest (does not occur on site),
2. Oribi (unlikely to occur on site),
3. White Rhinoceros (doesn't occur on site),
4. Black-footed Cat,
5. Serval,
6. Leopard (probably does not occur on site),
7. Cape Clawless Otter,
8. Spotted-necked Otter,
9. Cape Fox,
10. Honey Badger,
11. South African Hedgehog,
12. Brown Hyena, and
13. Giant Bullfrog.

There are additional species protected under the Mpumalanga Nature Conservation Act (Act No. 10 of 1998) (see Appendix 2). These include the following that have a geographical distribution that includes the site:

1. Giant Bullfrog,
2. South African Hedgehog,
3. Honey Badger,
4. Aardwolf,
5. Brown Hyaena,
6. Mountain Reedbuck,
7. Black Wildebeest,
8. Klipspringer,
9. Orbi,
10. Steenbok,
11. Eland,
12. Cape Clawless Otter
13. Spotted-necked Otter,
14. All species of reptiles, except the water leguaan, rock leguaan and all species of snakes, of which the following have a geographical distribution that includes the site:
  - Marsh terrapin
  - Leopard tortoise
  - Common dwarf gecko
  - Spotted dwarf gecko
  - Van Son's gecko
  - Delalande's sandveld lizard
  - Burchell's sand lizard
  - (Spotted sand lizard)
  - Coppery grass lizard
  - Cape grass lizard
  - Large-scaled grass lizard
  - Common girdled lizard

- Common crag lizard
- Yellow-throated plated lizard
- Breyer's long-tailed seps
- Short-headed legless skink
- Thin-tailed legless skink
- Wahlberg's snake-eyed skink
- Cape skink
- Red-sided skink
- Speckled rock skink
- Variable skink
- Montane dwarf burrowing skink
- Common flap-necked chameleon
- Eastern ground agama
- Southern rock agama

# METHODOLOGY

The detailed methodology followed as well as the sources of data and information used as part of this assessment is described below.

## Survey timing

The study commenced as a desktop-study followed by a site-specific field study on 3–7 February 2020. The site is within the Grassland Biome with a peak rainfall season in summer, which occurs from October to March (Figure 3). There is, however, a delay between rainfall and vegetation growth, which means the peak growing season is from November to April, with most perennial species characteristic of the vegetation being easily identifiable from January to March. The timing of the survey was therefore ideal in terms of assessing the vegetation condition in terms of suitable animal habitat on the site.

## Field survey approach

During the field survey, all major natural variation on site was assessed and select locations were traversed on foot.

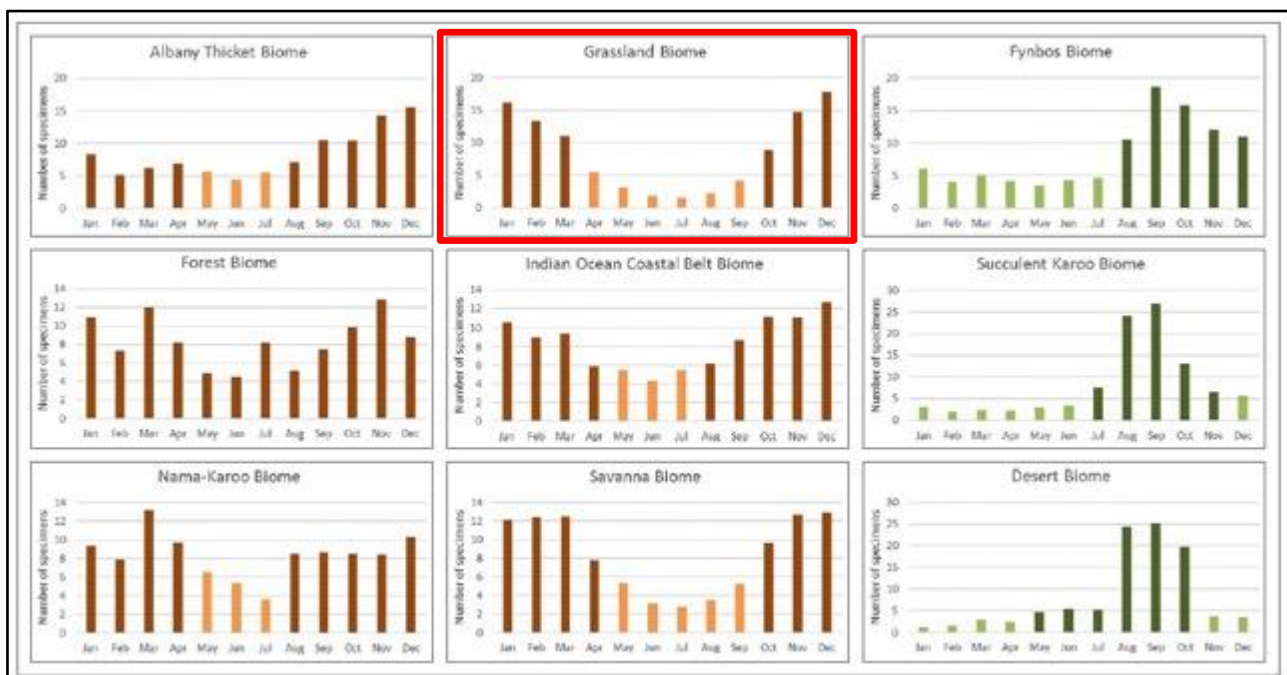


Figure 3: Recommended survey periods for different biomes (Species Environmental Assessment Guidelines).

Aerial imagery from Google Earth was used to identify and assess habitats suitable for animal species that could occur on site. Patterns identified from satellite imagery were verified on the ground. During the field survey, particular attention was paid to ensuring that all habitat variability was covered physically on the ground.

## Sources of information

Lists of animal species that have a geographical range that includes the study area were obtained from literature sources (Bates et al., 2014 for reptiles, du Preez & Carruthers 2009 for frogs, Mills & Hes 1997 and Friedmann and Daly, 2004 for mammals). This was supplemented with information from the Animal Demography Unit website ([adu.uct.ac.za](http://adu.uct.ac.za)) and literature searches for specific animals, where necessary.

## Limitations, Assumptions & Uncertainties

The following assumptions, limitations, uncertainties are listed regarding the assessment of the Hendrina site:

- Inventory surveys of animal species occurring on a site are difficult to achieve within the time-frames associated with an EIA. In order to compile a comprehensive site-specific list of the biota on site, studies would be required that would include different seasons and be undertaken a much longer timeframe and include extensive sampling. It is more important to know of fauna of value, as well as ecological processes. Therefore, the assessment attempts to identify threatened and other significant species, important habitats, and ecological processes.
- Compiling the list of species that could potentially occur on site is limited by the density of collection records for the area. The list of animal species that could potentially occur on site was therefore taken from a wider area and from literature sources that may include species that do not occur on site and may miss species that do occur on site.
- The assessment is based on a field survey conducted 3-7 February 2020. The current study is based on an extensive site visit as well as a desktop study of the available information. The time spent on site was adequate for understanding general patterns across affected areas. The seasons in which the fieldwork (peak summer flowering period) was conducted was ideal for assessing the composition and condition of the vegetation, which is also suitable for assessing habitat condition and suitability for animals.

# ASSESSMENT OUTCOMES

## Habitats on site

The site is within an area of natural grassland. The grassland contains variation due to changes in topography, slope inclination, surface rockiness and the influence of water-flow and water retention in the landscape. A broad classification of the natural habitat units on site, which also reflects relatively uniform plant species compositional units, is as follows:

Natural habitats:

1. **Natural grassland** (open grassland on undulating plains – the condition is not indicated in the habitat map although there is a gradient from heavily grazed poor condition to moderate condition);
2. **Wetlands** (permanent and seasonal wetlands in drainage valleys, including channels, where they occur);

The total amount of natural habitat remaining on site is 48% of the study area (2400 hectares), the low proportion due to loss of habitat from existing land-use, as well as degradation. The largest factor that has led to loss of natural habitat is cultivation – currently the combination of current cultivation and old lands is a total of 47% of the study area (2320 hectares).

Transformed and degraded areas:

3. **Old lands** (secondary grasslands on previously cultivated areas);
4. **Exotic trees** (stands of exotic trees);
5. **Degraded areas** (disturbed areas with bare ground, weeds or waste ground).
6. **Current cultivation** (areas currently cultivated and fallow lands);
7. **Transformed** (areas such as roads and buildings where there is no vegetation).

NATURAL VERSUS SECONDARY GRASSLAND	
Natural grassland	Areas of original vegetation in which the soil has not been mechanically disturbed, including areas that are in poor condition due to <b>overgrazing, trampling, invasion</b> by weeds or alien invasive species, <b>inappropriate fire regimes</b> , or any other factor that drives natural change in species composition or vegetation structure. The key factor is that the original plants continue to exist, often resprouting after defoliation from sub-surface stems or other storage organs.
Secondary grassland	Areas of vegetation where the original grassland vegetation has been lost through direct <b>disturbance of the soil</b> that results in physical removal of the original plants, the most common cause of which is ploughing, but could be other mechanical factors. The vegetation that then develops is a result of recolonization of the area through propagation.

A map of habitats within the study area and adjacent areas is provided in Figure 4.

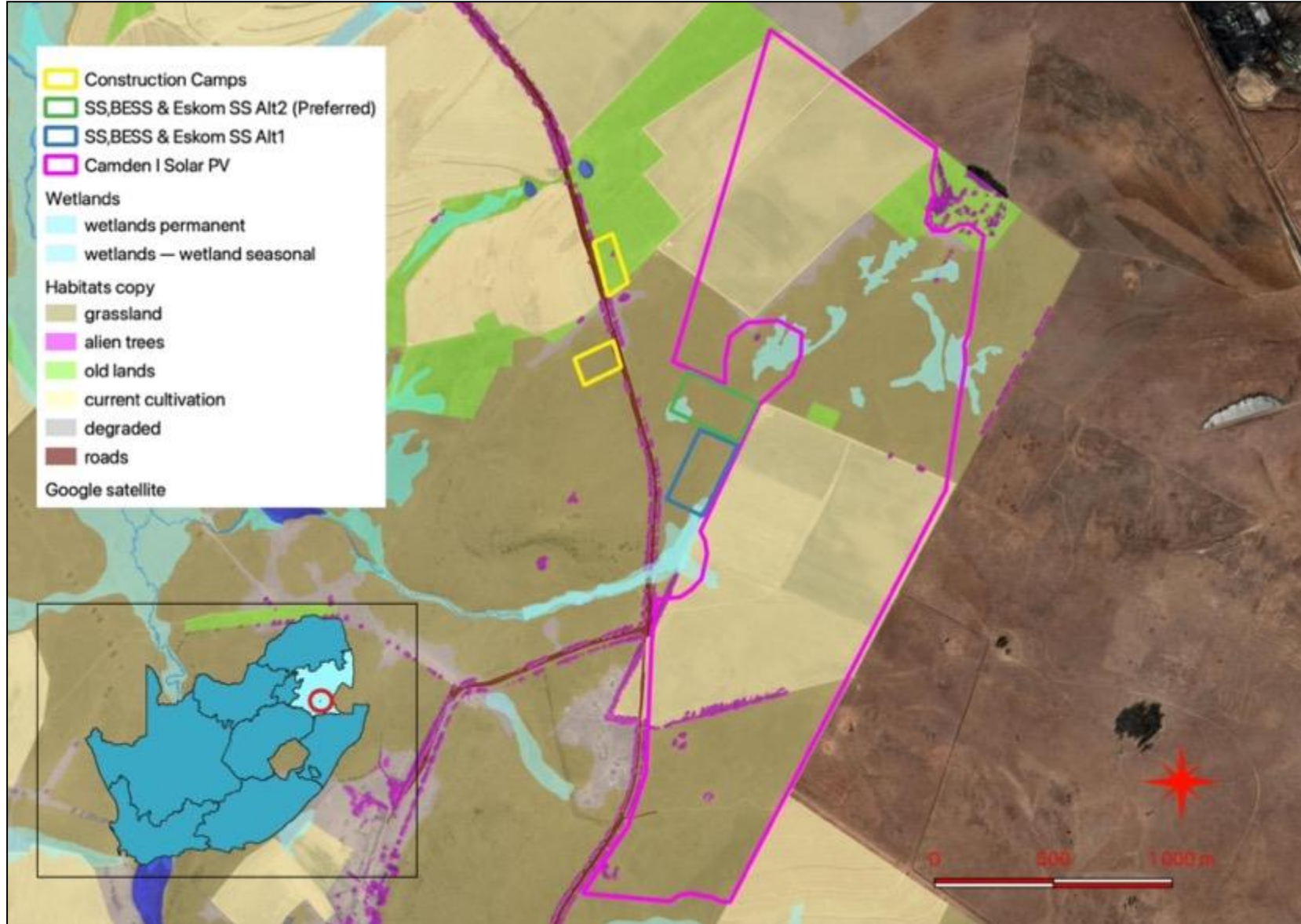


Figure 4: Main habitats of the study area.

### ***Grassland***

The general study area is characterised by an open grassland on the undulating hills and plains, and is representative of the listed ecosystem that occurs on site (Eastern Highveld Grassland). It is generally a short to moderate height tussock grassland with closed canopy cover. The soil depth varies, as does the amount of surface rock cover, but tends to have shallow soil. This is the most widespread vegetation community on site, occurring on all the relatively flat plains areas. It is also the area that has been most subject to cultivation.

### ***Wetlands***

There are numerous valley bottom wetlands in the study area, which starts as a flat, wide area in the upper reaches and become progressively more concentrated and channelled downstream. They flow north-westwards towards the Vaal River just outside of the study area. The drainage areas are important habitat for animals, providing refuge and shelter, water when it is available, palatable vegetation when surrounding areas are in drought, and softer and deeper soils for burrowing animals. The habitat is also an important flood-attenuation component of the landscape, and a reservoir for soil water. If it occurs on site, this is the habitat in which the protected Giant Bullfrog would be found.

### ***Current cultivation***

These are areas that, according to recent satellite imagery, are currently being cultivated, or were recently cultivated (within the last 5 years). If not under crops, they would be a ploughed land, or a fallow land with either weeds or a cover crop. From an ecological or biodiversity perspective, these areas have no natural habitat and have no plant or vegetation biodiversity value. The soil profile has been completely disturbed, removing all original vegetation, including geophytic and resprouting plant species. In the Grassland Biome of South Africa, a large proportion of the indigenous biodiversity consists of herbaceous and low shrubby species that re-sprout seasonally, after fire, or after defoliation from grazing animals, and can persist under these conditions. In cultivated areas, it is possible through natural succession, or through active rehabilitation, to restore a perennial cover of grasses, but the original biodiversity is permanently lost. They also have little value for animal biodiversity, except for species that forage in cultivated areas.

### ***Old lands***

These are areas that were previously ploughed for cultivation but have been left for an extended period without ploughing. Through natural succession processes, they generally develop a perennial cover of grasses, but these secondary grasslands are species poor and the original diversity of resprouting species is usually entirely absent. Non-grass species diversity usually consists of re-seeding and weedy species, and sometimes animal- and/or bird-dispersed woody species.

On aerial photographs and satellite images with adequate resolution, these areas are often recognisable by the presence of residual plough lines and other structural features often present in cultivated fields.

### ***Exotic trees***

There are planted windrows on the roadsides in various parts of the site, as well as within homestead complex areas. These are mostly deliberately planted some decades ago and are not alien invasive species. There are, however, various places on site where alien invasive species have become established in previously disturbed areas. In both cases, the underlying natural grassland is lost.

### ***Degraded areas***

Any areas where the original vegetation is lost due to continuous degradation, such as trampling, severe overgrazing, or some other factor, it is mapped as degraded. These areas are unlikely to restore to natural grassland, even with removal of the drivers of the degradation.

### ***Transformed areas***

Areas where natural habitat no longer exists due to development of infrastructure, such as roads, buildings, and other hard surfaces. Current cultivation is also transformed, but has not been replaced by built infrastructure, therefore the soil surface can be colonized by plants, if cultivation is stopped.



# DESCRIPTION OF POTENTIAL IMPACTS

## Proposed infrastructure in relation to sensitivities

Infrastructure locations relative to mapped Animal Theme sensitivities are shown in Figure 5. The proposed infrastructure includes the following:

### **Solar array**

This is the largest component of the project. The assessed area is 297 ha in size. The total amount of habitat within each landcover class is given in the table below. This shows that more than half of the assessed area is currently cultivated, about 37% is natural grassland, and about 10% is degraded.

#### **Amount of each type of habitat in the footprint of the solar array:**

Habitat	Status	Area in hectares	Proportion of total area
Grassland	Natural	109.46	36.81
Exotic trees	Degraded	10.65	3.58
Degraded areas	Degraded	10.60	3.56
Old lands	Secondary	9.13	3.07
Current cultivation	Transformed	157.56	52.98
<b>TOTAL</b>		<b>297.40</b>	<b>100.0%</b>

### **Construction camp and batching plants**

There are two construction camp locations, the southern one in grassland and the northern one in an old land. The areas of habitat are as given in the table below.

#### **Amount of each habitat affected by construction camps.**

Habitat	Status	Area in hectares	Proportion
Grassland	Natural	1.99	49.0
Exotic trees	Degraded	0.23	5.7
Degraded areas	Degraded	0.04	1.0
Old lands	Secondary	1.80	44.3
<b>TOTAL</b>		<b>4.06</b>	<b>100.0</b>

### **SS & BESS (2 alternative sites)**

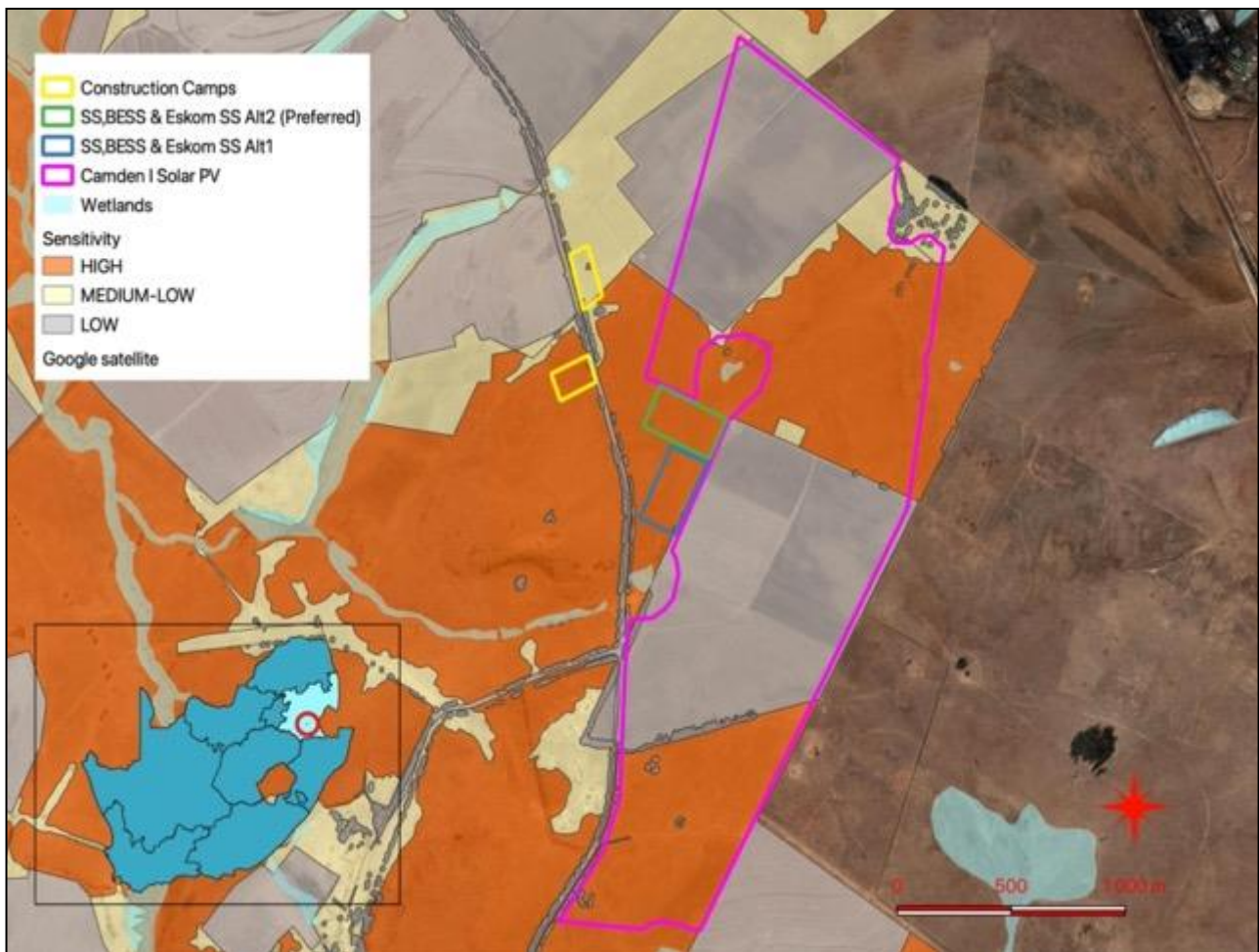
Both alternatives are in grassland (HIGH sensitivity).

#### **Amount of habitat affected by SS & BESS Alternative 1.**

Habitat	Status	Area in hectares	Proportion
Grassland	Natural	5.51	99.6
Exotic trees	Degraded	0.02	0.4
<b>TOTAL</b>		<b>5.53</b>	<b>100.0</b>

#### **Amount of habitat affected by SS & BESS Alternative 2 (preferred).**

Habitat	Status	Area in hectares	Proportion
Grassland	Natural	5.76	100.0
<b>TOTAL</b>		<b>5.76</b>	<b>100.0</b>



**Figure 5: Location of proposed infrastructure relative to plant species sensitivity of the study area.**

## Potential sensitive receptors in the general study area

A summary of the potential ecological issues for the study area is as follows (issues assessed by other specialists, e.g. on birds and on wetland and hydrological function, are not included here):

- Possible presence of various listed animal species on site.
- Presence of important habitat on site for animal species.
- Importance of the site as a corridor through the landscape, primarily due to connected areas of wetlands and grasslands.

## Construction Phase Impacts

Direct impacts include the following:

1. Loss of faunal habitat;
2. Direct mortality of fauna due to machinery, construction and increased traffic.

## Operational Phase Impacts

Ongoing direct impacts will include the following:

1. Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure.

## Decommissioning Phase Impacts

Direct impacts will include the following:

1. Loss of faunal habitat;
2. Direct mortality of fauna due to machinery, construction and increased traffic.

# ASSESSMENT OF IMPACTS

A detailed assessment, as per the requirements of the protocol for the specialist assessment and minimum report content requirements of environmental impacts on terrestrial animal species for activities requiring environmental authorisation, (20 March 2020), of the significance of all impacts during all phases of the project (Construction, Operation, Decommissioning and Cumulative) is provided below. This also includes all proposed mitigation measures and provides assessment before and after the implementation of proposed mitigation measures.

The proposed site is identified by the national web-based environmental screening tool as being medium or high sensitivity for Animal Species, and the protocol therefore requires that the sensitivity be confirmed on site, and the level of assessment determined by the outcome of the sensitivity verification. If animal SCC are confirmed or suspected to occur on site then the results must be written up in a Terrestrial Animal Species Assessment Report.

Detailed discussion of each impact, including justification for assigned scores, is provided below.

## Construction Phase Impacts

<b>Impact 1</b>		<b>Loss of faunal habitat</b>	
<b>Issue</b>	Clearing of natural habitat for construction		
<b>Description of Impact</b>			
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat.			
<b>Type of Impact</b>	Direct		
<b>Nature of Impact</b>	Negative		
<b>Phases</b>	Construction		
<b>Criteria</b>	<b>Without Mitigation</b>	<b>With Mitigation</b>	
<b>Extent</b>	1	1	
<b>Duration</b>	5	5	
<b>Reversibility</b>	3	3	
<b>Magnitude (severity of impact)</b>	2	1	
<b>Probability</b>	4	3	
<b>Significance</b>	<b>44 (MODERATE)</b>	<b>30 (LOW)</b>	
<b>Mitigation actions</b>			
<b>The following measures are recommended:</b>	<ul style="list-style-type: none"> <li>No driving of vehicles off-road outside of construction areas.</li> <li>Apply mitigation measures recommended in the Terrestrial Biodiversity Assessment to minimise loss of natural vegetation.</li> </ul>		
<b>Monitoring</b>			
<b>The following monitoring is recommended:</b>	As per management plans.		

### ***Direct mortality of fauna due to machinery, construction and increased traffic***

<b>Impact 2</b>		<b>Direct mortality of fauna</b>	
<b>Issue</b>	Direct mortality of fauna due to presence of traffic and heavy machinery		
<b>Description of Impact</b>			
Construction activities will require use of heavy machinery and vehicles, as well as placement of various obstructions that may be hazardous			

Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	Without Mitigation	With Mitigation
Extent	1	1
Duration	2	2
Reversibility	1	1
Magnitude (severity of impact)	2	1
Probability	3	2
Significance	18 (LOW)	10 (VERY LOW)
<b>Mitigation actions</b>		
The following measures are recommended:	<ul style="list-style-type: none"> <li>• It is a legal requirement to obtain permits for specimens or protected species that will be lost due to construction of the project.</li> <li>• Conduct a pre-construction walk-through of natural habitat within the development footprint prior to construction activities commencing in order to move any individual animals, such as tortoises, where required.</li> <li>• Personnel on site should undergo environmental induction training, including the need to abide by speed limits, to minimise risk of collisions with wild animals on roads in rural areas.</li> <li>• Proper waste management must be implemented, ensuring no toxic or dangerous substances are accessible to wildlife. This should also apply to stockpiles of new and used materials to ensure that they do not become a hazard.</li> <li>• No collecting, hunting or poaching of any animal species.</li> <li>• Personnel to be educated about protection status of species, including distinguishing features, to be able to identify protected species.</li> <li>• Appropriate lighting should be installed to minimize impacts on nocturnal animals, as per visual specialist assessment.</li> </ul>	
<b>Monitoring</b>		
The following monitoring is recommended:	As per management plans.	

## Operational Phase Impacts

### *Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure*

<b>Impact 3</b>	<b>Direct mortality of fauna</b>
Issue	Direct mortality of fauna due to presence of traffic and heavy machinery
<b>Description of Impact</b>	
Construction activities will require use of heavy machinery and vehicles, as well as placement of various obstructions that may be hazardous	
Type of Impact	Direct
Nature of Impact	Negative
Phases	Construction

Criteria	Without Mitigation	With Mitigation
Extent	1	1
Duration	4	4
Reversibility	1	1
Magnitude (severity of impact)	2	1
Probability	3	2
Significance	24 (LOW)	14 (VERY LOW)
<b>Mitigation actions</b>		
The following measures are recommended:	<ul style="list-style-type: none"> <li>It is a legal requirement to obtain permits for specimens or protected species that will be lost due to construction of the project.</li> <li>Personnel on site should undergo environmental induction training, including the need to abide by speed limits, the increased risk of collisions with wild animals on roads in rural areas.</li> <li>Proper waste management must be implemented, ensuring no toxic or dangerous substances are accessible to wildlife. This should also apply to stockpiles of new and used materials to ensure that they do not become a hazard.</li> <li>No collecting, hunting or poaching of any animal species.</li> <li>Personnel to be educated about protection status of species, including distinguishing features, to be able to identify protected species.</li> <li>Appropriate lighting should be installed to minimize impacts on nocturnal animals, as per visual specialist assessment.</li> </ul>	
<b>Monitoring</b>		
The following monitoring is recommended:	As per management plans.	

## Decommissioning Phase Impacts

Decommissioning phase impacts are identical in nature and rating to that of the construction phase impacts. Please refer to the construction phase for assessment.

## Cumulative Impacts

### **Cumulative impacts on faunal habitat from construction clearing due to a number of projects**

Cumulative impacts on faunal habitat from construction clearing due to a number of projects		
<b>Impact 4</b>	Cumulative impacts on faunal habitat from construction clearing due to a number of projects	
<b>Issue</b>	Loss of faunal habitat	
<b>Description of Impact</b>		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in possible loss of habitat for populations of SCC.		
<b>Type of Impact</b>	Direct	
<b>Nature of Impact</b>	Negative	
<b>Phases</b>	Construction	
<b>Criteria</b>	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
<b>Extent</b>	1	3

Duration	5	5
Reversibility	3	3
Magnitude (severity of impact)	2	3
Probability	4	4
Significance	44 (MODERATE)	56 (MODERATE)

**Cumulative impacts of direct faunal mortality due to a number of projects: construction phase**

<b>Impact 5</b>		
Cumulative impacts of direct faunal mortality due to a number of projects		
Issue	Loss of faunal habitat	
Description of Impact		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in possible loss of habitat for populations of SCC.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	1	3
Duration	2	2
Reversibility	1	1
Magnitude (severity of impact)	2	3
Probability	3	4
Significance	18 (LOW)	36 (MODERATE)

**Cumulative impacts of direct faunal mortality due to a number of projects: operational phase**

<b>Impact 6</b>		
Cumulative impacts of direct faunal mortality due to a number of projects		
Issue	Loss of faunal habitat	
Description of Impact		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in possible loss of habitat for populations of SCC.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Operation	
Criteria	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	1	3
Duration	4	4
Reversibility	1	1
Magnitude (severity of impact)	2	3
Probability	3	4
Significance	24 (LOW)	44 (MODERATE)

## Summary of mitigation measures

The following mitigation measures are recommended to address known potential impacts:

- No driving of vehicles off-road outside of construction areas.
- It is a legal requirement to obtain permits for specimens or protected species that will be lost due to construction of the project.
- Conduct a pre-construction walk-through of natural habitat within the development footprint, where possible undertaken in the correct season, prior to construction activities commencing in order to move any individual animals, such as tortoises, where required.
- Personnel on site should undergo environmental induction training, including the need to abide by speed limits, the increased risk of collisions with wild animals on roads in rural areas.
- Proper waste management must be implemented, ensuring no toxic or dangerous substances are accessible to wildlife. This should also apply to stockpiles of new and used materials to ensure that they do not become a hazard.
- No collecting, hunting or poaching of any animal species.
- Personnel to be educated about protection status of species, including distinguishing features, to be able to identify protected species.
- Appropriate lighting should be installed to minimize impacts on nocturnal animals, as per visual specialist assessment.



# DISCUSSION AND CONCLUSIONS

There are a number of threatened animal species that are flagged for the site, as well as others not directly flagged that may occur there. The majority of the flagged animal species are birds, which are assessed in a dedicated avifaunal assessment and not covered in detail here. The two non-bird species flagged for the site are the Maquassie Musk Shrew and the Oribi. Both could possibly occur on site, but the likelihood is not high. These animals may make use of various habitats available on site, which consists mostly of grasslands and wetlands within shallow drainage valleys.

The proposed project consists of an array of solar panels, substations, and construction camps. The proposed layout for solar panels has a moderately small footprint area relative to the entire cluster of projects. Those natural areas that are affected are generally in relatively poor condition due to overgrazing. It has been calculated here that if all infrastructure components are placed within natural areas (worst-case scenario) then it affects a total of 117 hectares of natural habitat of a total of 3222 hectares of natural habitat on the site of the entire cluster of projects (approximately 3.5%). The solar project therefore potentially has a very small footprint area which results in a small area of impact.

The main concern in terms of threatened animal species is direct loss of habitat, but this will be limited for this project. Fragmentation of habitat is assessed but will be very limited due to the placement of infrastructure as well as existing patterns of transformation on site. There may also be direct mortality of individual animals, but this is not very likely due to the placement of most of the infrastructure away from natural habitats.

An assessment of these impacts indicates that they will have a significance of low or very low.

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# APPENDICES:

## Appendix 1: Animal species with a geographical distribution that includes the study area.

### Notes:

1. Species of conservation concern are in red lettering.
2. Species protected according to the National Environmental Management: Biodiversity Act of 2004 (Act 10 of 2000) marked with "N"

### **Mammals:**

#### ARTIODACTYLA:

##### Bovidae:

Red hartebeest

Springbok

<sup>N</sup>Black wildebeest

Blue wildebeest

Blesbok

Plains zebra

Klipspringer

<sup>N</sup>Oribi EN

Grey rhebok NT

Warthog

Bushpig

Steenbok

Mountain reedbuck

Common duiker

Eland

Bushbuck

#### PERRISODACTYLA:

##### Rhinocerotidae:

<sup>N</sup>White rhinoceros

#### HYRACOIDEA:

##### Procavidae:

Rock hyrax

#### CARNIVORA:

##### Felidae:

Caracal

<sup>N</sup>Black-footed cat VU

African wild cat

<sup>N</sup>Serval

<sup>N</sup>Leopard VU

##### Mustelidae:

<sup>N</sup>Cape clawless otter NT

Striped polecat

<sup>N</sup>Spotted-necked otter NT

<sup>N</sup>Honey badger

African striped weasel NT

##### Herpestidae:

Water mongoose

Yellow mongoose

Slender mongoose

Dwarf mongoose

Banded mongoose

White-tailed mongoose

Suricate

##### Canidae:

Black-backed jackal

<sup>N</sup>Cape fox

##### Viveridae:

Small-spotted genet

Large-spotted genet

##### Hyaenidae:

<sup>N</sup>Brown hyaena NT

Aardwolf

#### INSECTIVORA:

##### Eulipotyphla:

<sup>N</sup>South African hedgehog NT

Reddish-grey musk shrew

Greater musk shrew

Tiny musk shrew

Maquassie musk shrew VU

Swamp musk shrew NT

Lesser grey-brown musk shrew

Dark-footed forest shrew

Forest shrew

Least dwarf shrew

Lesser dwarf shrew

##### Chrysochloridae:

Highveld golden mole NT

#### LAGOMORPHA:

##### Leporidae:

Cape/desert hare

Scrub/savannah hare

Natal red rock rabbit

Hewitt's red rock rabbit

#### PRIMATA:

##### Cercopithecidae:

Vervet monkey

#### RODENTIA:

##### Muridae:

Tete veld rat

Namaqua rock mouse

Common mole rat  
Grey climbing mouse  
Brant's climbing mouse  
Chesnut climbing mouse  
Multimammate mouse  
Pygmy mouse  
**White-tailed rat VU**  
Angoni vlei rat  
**Vlei rat (grassland type) NT**  
Striped mouse  
Pouched mouse  
Fat mouse  
Highveld gerbil  
Tree rat  
Bathyergidae:  
Cape mole-rat  
Myoxidae:  
Woodland dormouse  
Rock dormouse  
Hystricidae:  
**Cape porcupine**  
Thryonomyidae:  
Greater cane rat

MACROSCELIDEA:  
Macroscelididae:  
Eastern rock sengi

TUBULIDENTATA:  
Orycteropodidae:  
**Aardvark**

### **Reptiles:**

Pelomedusidae:  
(Marsh terrapin)  
Testudinidae:  
(Leopard tortoise)  
Gekkonidae:  
(Common dwarf gecko)  
Spotted dwarf gecko  
Van Son's gecko  
Amphisbaenidae:  
Lacertidae:  
Delalande's sandveld lizard  
Burchell's sand lizard  
(Spotted sand lizard)  
Cordylidae:  
**Coppery grass lizard NT**  
Cape grass lizard  
**(Large-scaled grass lizard NT)**  
Common girdled lizard  
Common crag lizard  
Platysauridae:  
Gerrhosauridae:  
Yellow-throated plated lizard  
**(Breyer's long-tailed seps VU)**

Scincidae:  
Short-headed legless skink  
Thin-tailed legless skink  
Wahlberg's snake-eyed skink  
Cape skink  
Red-sided skink  
Speckled rock skink  
Variable skink  
Montane dwarf burrowing skink  
Varanidae:  
**(Southern rock monitor)**  
Nile monitor  
Chamaeleonidae:  
(Common flap-necked chameleon)  
Agamidae:  
Eastern ground agama  
Southern rock agama  
Typhlopidae:  
Bibron's blind snake  
Leptotyphlopidae:  
Peter's thread snake  
Pythonidae  
Viperidae:  
Puff adder  
Rhombic night adder  
Lamprophiidae:  
Black-headed centipede eater  
(Bibron's stiletto snake)  
**Striped harlequin snake NT**  
Spotted harlequin snake  
Common house snake  
Aurora snake  
Yellow-bellied snake  
Spotted rock snake  
Olive ground snake  
Dusky-bellied water snake  
Brown water snake  
Cape wolf snake  
(Short-snouted grass snake)  
Cross-marked grass snake  
Spotted grass snake  
Striped grass snake  
Many-spotted snake  
South African slug eater  
Mole snake  
Elapidae:  
Sundevall's garter snake  
Rinkhals  
Colubridae:  
Red-lipped snake  
Southern brown egg-eater  
Rhombic egg eater  
(Boomslang)  
(Southeastern green snake  
Western Natal green snake  
Spotted bush snake

## **Amphibians**

Bushveld rain frog  
Mozambique rain frog  
Guttural toad  
Flat-backed toad  
Raucous toad  
Red toad  
Painted reed frog  
(Yellow-striped reed frog)  
Bubbling kassina  
Rattling frog  
Snoring puddle frog  
Striped grass frog  
Common platanna  
Boettger's caco  
Bronze caco  
(Mountain caco)  
Common river frog  
Cape river frog  
**N**Giant bullfrog  
Striped stream frog  
Clicking stream frog  
Tremolo sand frog  
Natal sand frog  
Tandy's sand frog

## Appendix 2: Fauna protected under the Mpumalanga Nature Conservation Act No. 10 of 1998.

### SCHEDULE 1: SPECIALLY PROTECTED GAME (SECTION 4 (1) (a))

Common name	Scientific name
Elephant	<i>Loxodonta africana</i>
All species of rhinoceros	All species of the Family Rhinocerotidae

### SCHEDULE 2: PROTECTED GAME (SECTION 4 (1) (b))

Common name	Scientific name
AMPHIBIANS, REPTILES AND MAMMALS	
bullfrog	<i>Pyxicephalus adspersus</i>
All species of reptiles excluding the water leguaan, rock leguaan and all species of snakes	All species of the Class Reptilia excluding <i>Varanus niloticus</i> , <i>Varanus exanthematicus</i> and all species of the Sub Order Serpentes
Riverine rabbit	<i>Bungolagus monticularis</i>
hedgehog	<i>Atelerix frontalis</i>
Samango monkey	<i>Cercopithecus mitis</i>
bushbaby	<i>Otolemur crassicaudatus</i>
Lesser bushbaby	<i>Galago moholi</i>
Honey-badger	<i>Mellivora capensis</i>
pangolin	<i>Manis temminckii</i>
aardwolf	<i>Proteles cristatus</i>
Cape hunting dog	<i>Lycaon pictus</i>
Brown hyaena	<i>Hyaena brunnea</i>
antbear	<i>Orycteropus afer</i>
Mountain zebra	<i>Equus zebra zebra</i>
Hartmann's zebra	<i>Equus zebra hartmannae</i>
hippopotamus	<i>Hippopotamus amphibius</i>
giraffe	<i>Girrafa camelopardalis</i>
nyala	<i>Tragelaphus angasi</i>
Red duiker	<i>Cephalophus natalensis</i>
Blue duiker	<i>Philantomba monticola</i>
reedbuck	<i>Redunca arundinum</i>
Mountain reedbuck	<i>Redunca fulvorufula</i>
Sable antelope	<i>Hippotragus niger</i>
Roan antelope	<i>Hippotragus equinus</i>
Black wildebeest	<i>Connochaetes gnou</i>
tsessebe	<i>Damaliscus lanatus</i>
Lichtenstein's hartebeest	<i>Alcelaphus lichtensteinii</i>
klipspringer	<i>Oreotragus oreotragus</i>
oribi	<i>Ourebia ourebi</i>
steenbok	<i>Raphicerus campestris</i>
Sharpe's grysbok	<i>Raphicerus sharper</i>
sunni	<i>Neotragus moschatus</i>
Grey rhebok	<i>Pelea capreolus</i>
eland	<i>Taurotragus oryx</i>
waterbuck	<i>Kobus ellipsiprymnus</i>
Cape clawless otter	<i>Aonyx capensis</i>
Spotted necked otter	<i>Lutra maculicollis</i>

SCHEDULE 4: PROTECTED WILD ANIMALS (SECTION 4 (1) (d))

<b>Common name</b>	<b>Scientific name</b>
Spotted hyaena	Crocuta Crocuta
Cheetah	Acinonyx jubatus
Leopard	Panthera pardus
Lion	Panthera leo
African buffalo	Syncerus caffer

# Appendix 3: Vertebrate animal species protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)

(as updated in R. 1187, 14 December 2007)

## **CRITICALLY ENDANGERED SPECIES**

### **Reptilia**

Loggerhead sea turtle  
Leatherback sea turtle  
Hawksbill sea turtle

### **Aves**

Wattled crane  
Blue swallow  
Egyptian vulture  
Cape parrot

### **Mammalia**

Riverine rabbit  
Rough-haired golden mole

## **ENDANGERED SPECIES**

### **Reptilia**

Green turtle  
Giant girdled lizard  
Olive ridley turtle  
Geometric tortoise

### **Aves**

Blue crane  
Grey crowned crane  
Saddle-billed stork  
Bearded vulture  
White-backed vulture  
Cape vulture  
Hooded vulture  
Pink-backed pelican  
Pel's fishing owl  
Lappet-faced vulture

### **Mammalia**

Robust golden mole  
Tsessebe  
Black rhinoceros  
Mountain zebra  
African wild dog  
Gunning's golden mole  
Oribi  
Red squirrel  
Four-toed elephant-shrew

## **VULNERABLE SPECIES**

### **Aves**

White-headed vulture

Tawny eagle  
Kori bustard  
Black stork  
Southern banded snake eagle  
Blue korhaan  
Taita falcon  
Lesser kestrel  
Peregrine falcon  
Bald ibis  
Ludwig's bustard  
Martial eagle  
Bataleur  
Grass owl

### **Mammalia**

Cheetah  
Samango monkey  
Giant golden mole  
Giant rat  
Bontebok  
Tree hyrax  
Roan antelope  
Pangolin  
Juliana's golden mole  
Suni  
Large-eared free-tailed bat  
Lion  
Leopard  
Blue duiker

## **PROTECTED SPECIES**

### **Amphibia**

Giant bullfrog  
African bullfrog

### **Reptilia**

Gaboon adder  
Namaqua dwarf adder  
Smith's dwarf chameleon  
Armadillo girdled lizard  
Nile crocodile  
African rock python

### **Aves**

Southern ground hornbill  
African marsh harrier  
Denham's bustard  
Jackass penguin

### **Mammalia**



Cape clawless otter  
South African hedgehog  
White rhinoceros  
Black wildebeest  
Spotted hyaena  
Black-footed cat  
Brown hyaena  
Serval  
African elephant  
Spotted-necked otter  
Honey badger  
Sharpe's grysbok  
Reedbuck  
Cape fox