



**SCIENTIFIC TERRESTRIAL SERVICES**

Reg No. 2005/122/329/23  
VAT Reg No. 4150274472  
PO Box 751779  
Gardenview  
2047  
Tel: 011 616 7893  
Fax: 086 724 3132  
Email: [admin@sasenvgroup.co.za](mailto:admin@sasenvgroup.co.za)  
[www.sasenvironmental.co.za](http://www.sasenvironmental.co.za)

**BIODIVERSITY ASSESSMENT AS PART OF THE  
ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR  
THE HALFGEWONNEN SOLAR PHOTOVOLTAIC (PV)  
PROJECT, NEAR HENDRINA, MPUMALANGA PROVINCE**

**Prepared for**



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**Part C: Faunal Assessment**

**Prepared by:** Scientific Terrestrial Services CC  
**Report author:** D. van der Merwe  
**Report reviewers:** C. Hooton  
K. Marais (Pr. Sci. Nat)  
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SAS Environmental Group of Companies

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# 1 INTRODUCTION

Scientific Terrestrial Services (STS) was appointed to conduct a Biodiversity Assessment as part of the Environmental Impact Assessment (EIA) process for the proposed Halfgewonnen Solar Photovoltaic (PV) Project, near Hendrina, Mpumalanga Province – henceforth referred to as the “**study area**”. The study area includes the full extent of the area assessed as part of the field investigation following the initial layout provided by the EAP. The study area is further associated with both linear developments (High-Voltage Line) and surface infrastructure, including the Solar PV Panels, BESS, Laydown Areas, Main Substation, O&M Building, Reference Pyranometer & Temperature Sensor, Site Offices, Weather Stations.

For a complete project description, refer to **Section 1.1**.

The purpose of this report is to define the faunal ecology of the study area as well as mapping and defining areas of increased Ecological Importance and Sensitivity (EIS) and to define the Present Ecological State (PES) of the study area. For the purposes of this report **fauna** refers to mammals, reptiles, amphibians, arachnids and insects. Birds have been considered in a separate report. This report, after consideration and the description of the ecological integrity of the study area, must guide the Environmental Assessment Practitioner (EAP), regulatory authorities and developing proponent, by means of the presentation of results and recommendations, as to the ecological viability of the proposed development activities.



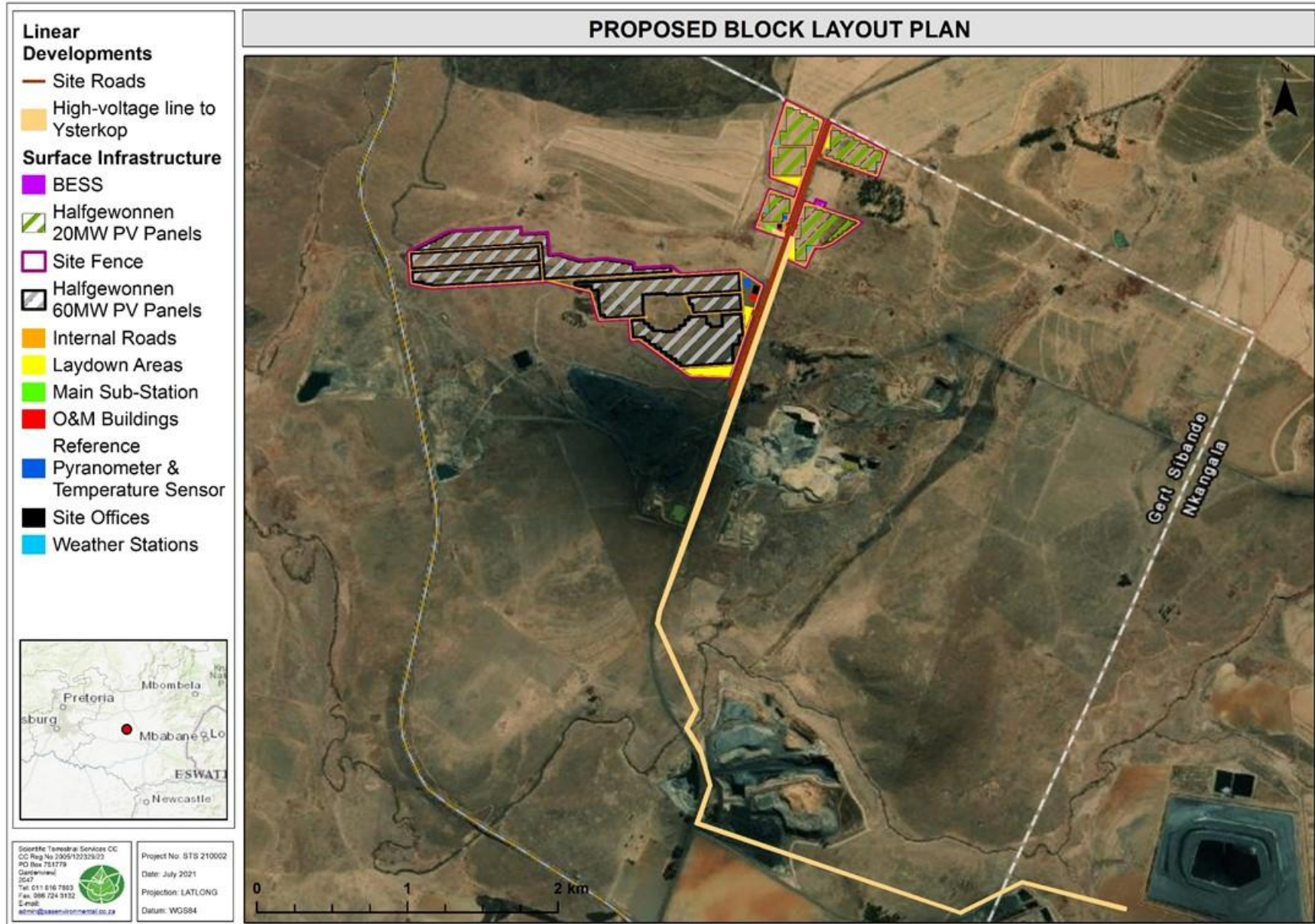


Figure 1. Proposed Layout map.





## 1.1 Scope of Work

Specific outcomes in terms of Part C of the report are as follows:

- To provide inventories of faunal species as encountered within the study area, this report will deal with mammals, reptiles, amphibians, arachnids and insects. A separate report has been completed for the avifauna;
- To determine and describe habitat types, communities and the ecological state of the study area and to rank each habitat type based on conservation importance and ecological sensitivity;
- To identify and consider all sensitive landscapes including rocky ridges, wetlands and/or any other special features;
- To conduct a Red Data Listed (RDL) species assessment as well as an assessment of other Species of Conservation Concern (SCC), including potential for such species to occur within the study area;
- To provide detailed information to guide the activities associated with the proposed development activities associated within the study area; and
- To ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements and the provision of ecological services in the local area.

## 1.2 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The site investigation was restricted to the proposed study area. For the surface infrastructure, a buffer of 100 m was placed around the proposed footprint areas for investigation and ground-truthing. For the proposed High-Voltage Line, a buffer of 30 m was applied and ground truthed. A smaller buffer was deemed adequate due to the nature of the proposed development, i.e., linear infrastructure and it being a powerline. Where the 100 m or 30 m buffer extended into the neighbouring mines where access was not granted, the area was not ground truthed;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal communities have been accurately assessed and considered and the information provided is considered sufficient to allow informed decision making to take place and facilitate integrated environmental management;
- Due to the nature and habits of most faunal taxa, the high level of surrounding anthropogenic activities, it is unlikely that all species would have been observed during



a field assessment of limited duration. Therefore, site observations were compared with literature studies where necessary;

- Due to the largely linear nature of the powerline development, a buffer of 30 m was implemented around this structure and the faunal assessment and habitat mapping. The greater habitat extent beyond this area was not mapped, although it was considered as part of the assessment findings;
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the footprint area may therefore have been missed during the assessment; and
- A field assessment was undertaken from the 3<sup>rd</sup> to the 5<sup>th</sup> of February 2021 (summer season), to determine the faunal ecological status of the study area, and to “ground-truth” the results of the desktop assessment (presented in Part A). A more accurate assessment would require that assessments take place in all seasons of the year. However, on-site data was significantly augmented with all available desktop data and specialist experience in the area, and the findings of this assessment are considered an accurate reflection of the ecological characteristics of the study area.

## 2 ASSESSMENT APPROACH

The field assessment was undertaken on the 3<sup>rd</sup> to the 5<sup>th</sup> of February 2021 (summer season), to determine the faunal ecological status of the study area. Further adhoc observations were undertaken during the winter assessment component of the Avifaunal report (24<sup>th</sup> and 25<sup>th</sup> of June 2021) for the study area. A reconnaissance ‘walkabout’ was initially undertaken to determine the general habitat types found throughout the study area, following this, specific study sites were selected that were considered to be representative of the habitats found within the study area, with special emphasis being placed on areas that may potentially support faunal SCC. Sites were investigated on foot in order to identify the occurrence of fauna within the study area.

A detailed explanation of the method of assessment is provided in Appendix A of this report. The faunal categories covered in this assessment are mammals, herperofauna and invertebrates. For the methodologies relating to the impact assessment and development of the mitigation measures, please refer to Appendix C of Part A of the study.



## **2.1 General approach**

In order to accurately determine the PES of the study area and capture comprehensive data with respect to faunal taxa, the following methodologies were applied:

- Maps and digital satellite images were consulted prior to the field assessment in order to determine broad habitats, vegetation types and potentially sensitive sites. An initial visual on-site assessment of the study area was made in order to confirm the assumptions made during consultation of the digital satellite imagery;
- A literature review with respect to habitats, vegetation types and species distribution was conducted;
- Relevant databases considered during the assessment of the study area included the Important Bird and Biodiversity Areas (IBA, 2015), South African Bird Atlas Project 2 (SABAP2), International Union for Conservation of Nature (IUCN), the Mpumalanga Biodiversity Sector Plan (MBSP, 2014, 2019 database) and the National Biodiversity Assessment (NBA, 2018);
- Specific methodologies for the assessment, in terms of field work and data analysis of faunal ecological assemblages are presented in Appendix A of this report; and
- For the methodologies relating to the impact assessment and development of the mitigation measures, please refer to Appendix C of Part A.

## **2.2 Sensitivity Mapping**

All the ecological features associated with the study area were considered, and sensitive areas were assessed. A Geographic Information System (GIS) was used to project these features onto satellite imagery and/or topographic maps. The sensitivity map should guide the final design and layout of the proposed development activities. Please refer to Section 4 of this report for further details.

# **3 FAUNAL ASSESSMENT RESULTS**

## **3.1 Faunal Habitat**

Habitat units are discussed briefly in terms of faunal utilisation and importance below and are visually depicted in Figure 2 and 3 below. A buffer of 100 m was placed around the proposed footprint areas of surface infrastructure. For linear infrastructure, a buffer of 30 m was





assessed, and the habitat was mapped therein. For a breakdown of the floral communities, habitat characteristics and conservation sensitivities associated with them, refer to Part B Section 3.2.1 – 3.2.4.

Based on the results of the field investigation of February 2021, four broad habitat units were distinguished for the study area:

- **Degraded and Transformed Habitat Unit:** This habitat unit is either currently mined or cultivated or comprises of land which has experienced historic mining without rehabilitation to the reference state. The historic disturbances and the reduced floral heterogeneity reduce the favourability of this habitat for fauna and as such it is only anticipated to host commonly occurring faunal species adapted to such areas;
- **Eastern Highveld Grassland Habitat Unit:** This unit comprised of intact grasslands with minimal alien vegetation and disturbances, meeting the definition of primary grassland<sup>1</sup>. This unit was composed of relatively short and open vegetation of high floral diversity. The high floral diversity will provide valuable forage for most fauna, however, the reduced amount of shelter will likely mean most larger fauna will only utilise this unit temporarily to forage. Invertebrates will favour this unit due to the higher habitat and forage availability. This unit includes a low density of rocky outcrops which would be utilized by arachnids and other rupicolous species. This unit will provide suitable habitat for SCC;
- **Secondary Grassland<sup>2</sup> Habitat Unit:** This habitat unit is composed of stretches of grassland where floral communities display evidence of historic disturbance as a homogenous floral assemblage was noted. The lower diversity of floral species corresponds to fewer forage opportunities, especially for invertebrates. Very little unique or niche habitat exists as a result of these disturbances; and
- **Wetland Habitat Unit:** This unit includes Channelled Valley Bottom Wetlands, Unchanneled Valley Bottom Wetlands, seep wetlands and a Pan. The central and western portions of the wetland habitat are still largely **intact**, comprising indigenous graminoids and forb species. The eastern Wetland Habitat has several portions where vegetation is **degraded**, i.e., where there is a clear dominance of alien forb species and a general lack of expected wetland graminoids. None the less the Wetland Habitat offers valuable niche habitat for many water dependent fauna (amphibians and

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<sup>1</sup> SANBI (2013): “**Primary grasslands** are those that have not been significantly modified from their original state; even though they may no longer have their full complement of naturally occurring species, they have not undergone significant or irreversible modification and still retain their essential ecological characteristics.”

<sup>2</sup> SANBI (2013): “**Secondary grasslands** are those that have undergone extensive modification and a fundamental shift from their original state (e.g. to cultivated areas), but have then been allowed to return to a ‘grassland’ state (e.g. when old cultivated lands are re-colonised by a few grass species). Although secondary grasslands may superficially look like primary grasslands, they differ markedly with respect to species composition, vegetation structure, ecological functioning and the ecosystem services they deliver.”



invertebrates). High abundances of invertebrates could be seen utilising flying this unit. This unit also preserves important movement corridors for all fauna within the study area.

Sections 3.2 – 3.4 below serve to discuss the faunal results of the fieldwork undertaken, with results presented in a dashboard format.



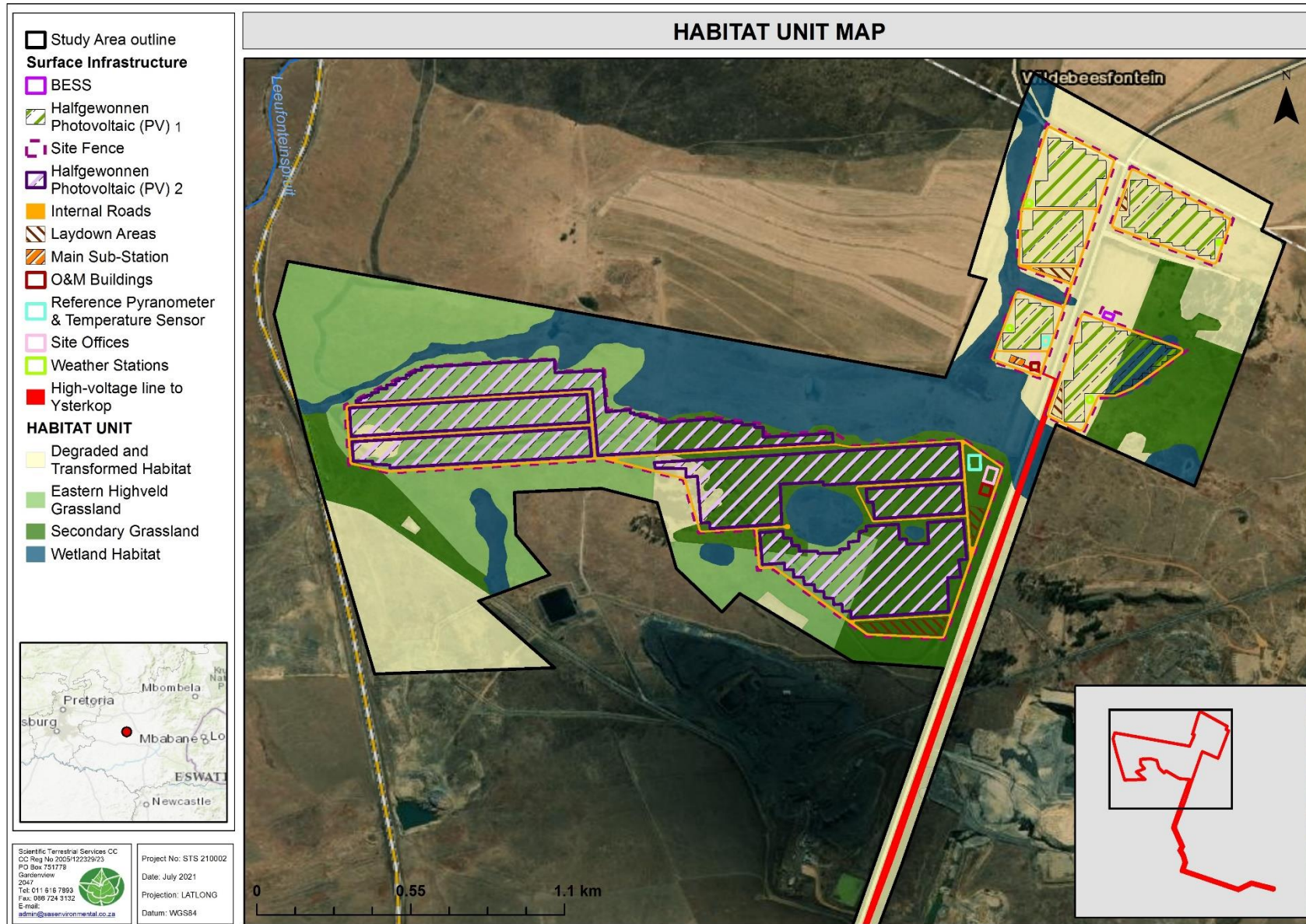


Figure 2. Conceptual illustration of habitat units associated with the northern section of the study area identified in the 2021 field assessment.





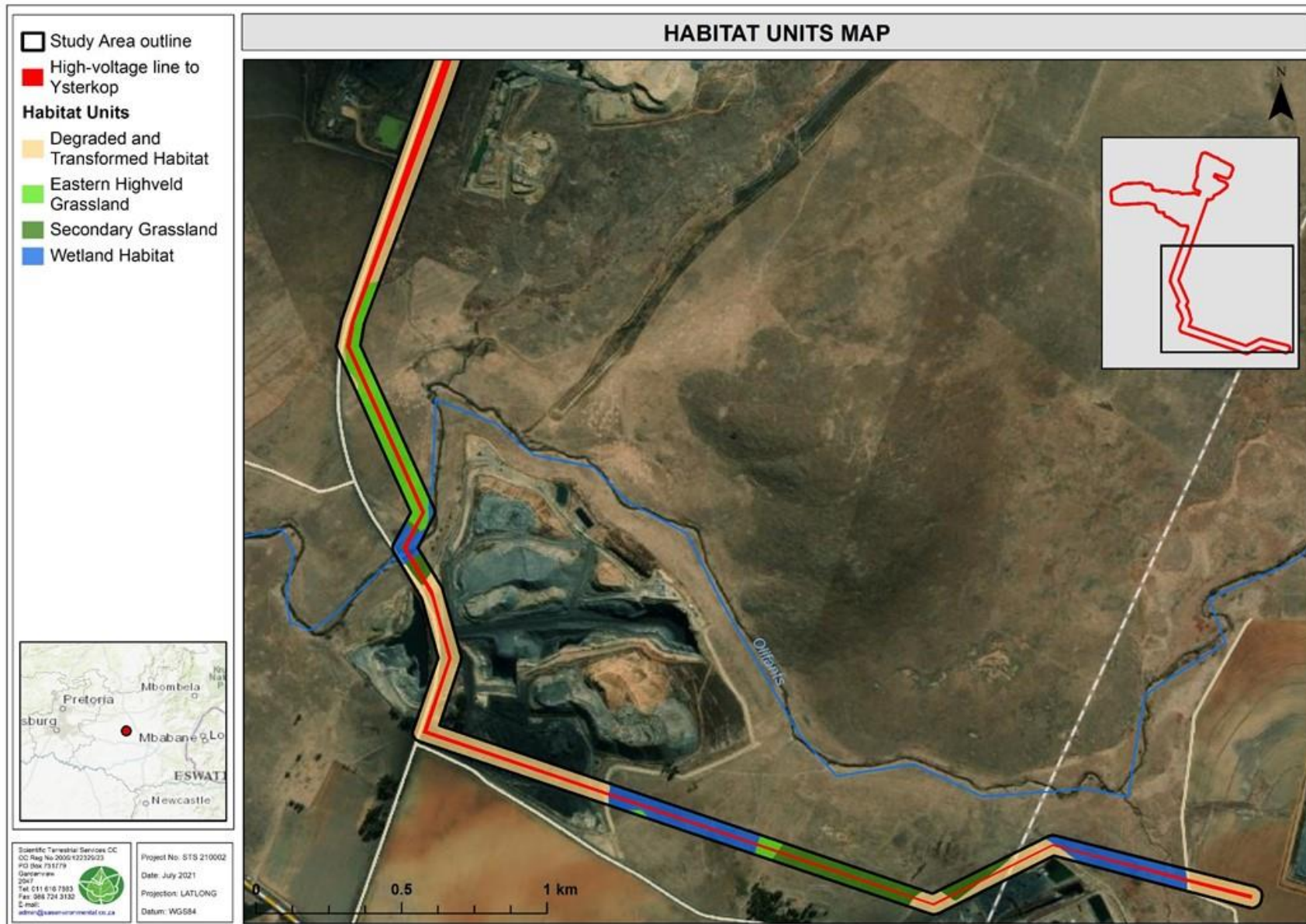


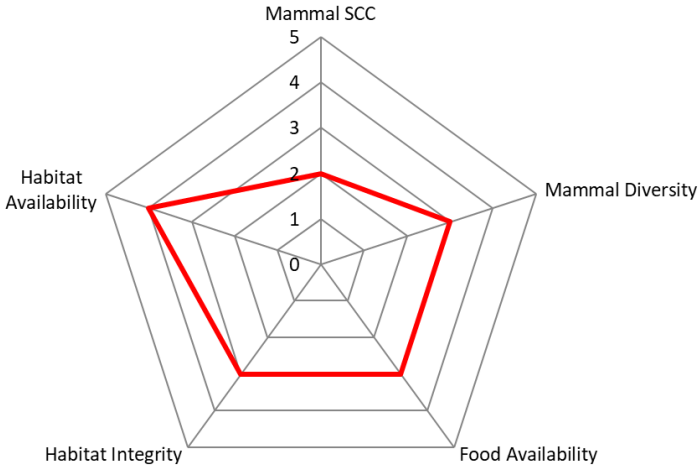





Figure 3: Conceptual illustration of the habitat units associated with the southern portion of the study area.



### 3.2 Mammals

**Table 1: Field assessment results pertaining to mammal species within the study area.**

<p><b>Mammal Habitat Sensitivity</b></p>	<p>Intermediate</p>	<p><b>Photographs:</b></p>		
<p><b>Photograph Notes:</b>  <b>Top: Left</b> – <i>Hystrix africaeaustralis</i> (Cape Porcupine, LC) diggings identified in the Eastern highveld Grassland. <b>Right</b> – <i>Lepus saxatilis</i> (Scrub hare, LC) droppings were observed throughout much of the study area. <b>Bottom: Left</b> – <i>Felis catus</i> (Domestic Cat) spoor observed adjacent the mine. <b>Centre</b> – Cattle carcass noted within the Wetland Habitat indicates historic grazing. <b>Right</b> – <i>Dendromus mesomelas</i> (Brant's Climbing Mouse, LC) observed within the Wetland Habitat.</p>				
<p><b>Mammal Sensitivity Graph:</b></p>  <p>The graph is a pentagonal radar chart with five axes: Mammal SCC (top, 0-5), Mammal Diversity (right), Food Availability (bottom-right), Habitat Integrity (bottom-left), and Habitat Availability (left). A red line connects the data points, showing a score of 2 for all four categories (Availability, Diversity, Integrity, Food).</p>				
<p><b>Mammal SCC</b></p>	<p>The National Screening Tool indicates that the study area is of medium sensitivity for the following species: <i>Ourebia ourebi</i> (Oribi, VU) and <i>Hydrictis maculicollis</i> (Spotted-necked Otter, NT). Habitat characteristics on site are not favourable to Spotted-necked Otter, yet, habitat for Oribi was observed in the Eastern Highveld Grassland. During the field assessment habitat for <i>Leptailurus serval</i> (Serval, NT) was noted in the Secondary Grassland, Wetland and Eastern Highveld Grassland Habitat and this species may potentially breed within the study area. Even though this species is listed as near threatened, it seems able to dwell amongst disturbed surroundings, frequently having been recorded near coal mines within the surrounding vicinity to this study area. Please see section 3.5 for a list of other mammal SCC that may occur within or near the study area.</p>			




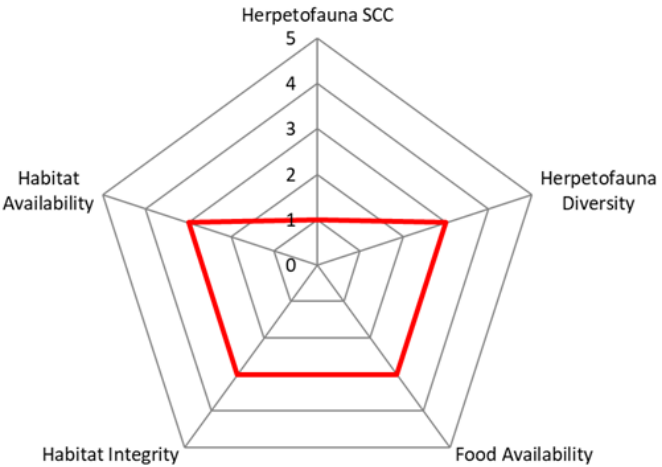



<p><b>Mammal Discussion</b></p>	<p>Historic and current agriculture have occurred within the central and eastern portions of the study area where Secondary Grassland and Degraded and Transformed Habitat exist. The area surrounding the study area has been exposed to mining and agricultural activities which reduce the overall integrity and food resources of the location. Furthermore, several small human settlements were noted within the broader surroundings and hunting dogs were observed within these areas, and are potentially used for hunting indigenous mammals. These impacts have restricted mammal diversity to mostly common species within the study area, by reducing habitat suitability. The mammal diversity and abundance observed at the time of the investigation was low with only 3 mammal species directly observed, yet the habitat available and information from database sources suggest the potential for an intermediate assemblage diversity exists, albeit mostly commonly occurring species that are resilient and adept to surviving within degraded habitats. The limited degree to which habitat will be altered for the linear powerline is not anticipated to impact on mammals within the study area.</p> <p>Mammal sightings were concentrated in the western portion of the study area where the western sections of the proposed PV 2 panels are to be established. Fewer signs or tracks of mammals, except for rodents, were observed within the Degraded and Transformed Habitat units. Higher mammal abundance within the Eastern Highveld Grassland is likely due to higher abundance and diversity of food and water resources. The higher avifaunal and small mammal diversity adjacent the wetlands and artificial dams, serve as a food resources for predators such as Jackal and Serval, whilst the dams provide suitable habitat for species such as Water Mongoose. The cultivated fields likely attract species such as common duiker, porcupine and small rodents.</p>
<p><b>Business Case and Conclusion</b></p>	<p>The overall mammal species diversity and sensitivity for the proposed development sites is deemed to be <b>intermediate</b>, with evidence of mammals largely restricted to restricted to the Wetland and Eastern Highveld habitat. Mammal diversity in the study area has been limited by historic and current anthropogenic disturbances and historic grazing.</p> <p>Due to the disturbed nature of the central and eastern portions of the study area (Transformed and Degraded Habitat and Secondary Grassland Habitat), the proposed PV 1 facility and linear developments are unlikely to contribute further loss of mammal species diversity and abundance in these locations. The proposed PV infrastructure within the Eastern Highveld Grassland will result in impacts on faunal diversity and abundance within the study area. The Powerline will result in limited disturbance and following construction the mammal assemblages utilising the habitat will recolonise these areas.</p>



### 3.3 Herpetofauna

**Table 2: Field assessment results pertaining to reptile and amphibian species within the study area.**

Herpetofauna Habitat Sensitivity	Intermediate	Photographs:		
<p><b>Photograph Notes:</b>  <b>Top: Left</b> – An <i>Amietia angolensis</i> (Common River Frog, LC) noted within the Wetland Habitat. <b>Centre</b> - Shallow wetland pans were noted within the Secondary Grassland habitat providing valuable habitat for amphibians. <b>Right</b> – Artificial impoundments provide year-round aquatic habitat, and will be important features during dry periods.  <b>Bottom: Left</b> – There was overall little rock and tree cover in the grassland areas, which limits habitat availability and basking and opportunities for arboreal reptiles. <b>Centre</b> – A large burrow observed within the Secondary Grassland could potentially provide snakes with an ideal breeding location. <b>Right</b> – Rodent burrows, prey for many snakes were observed at low densities throughout the study area, higher densities were noted in the Transformed and Degraded Habitat.</p>				
<p><b>Herpetofauna Sensitivity Graph:</b></p> 				




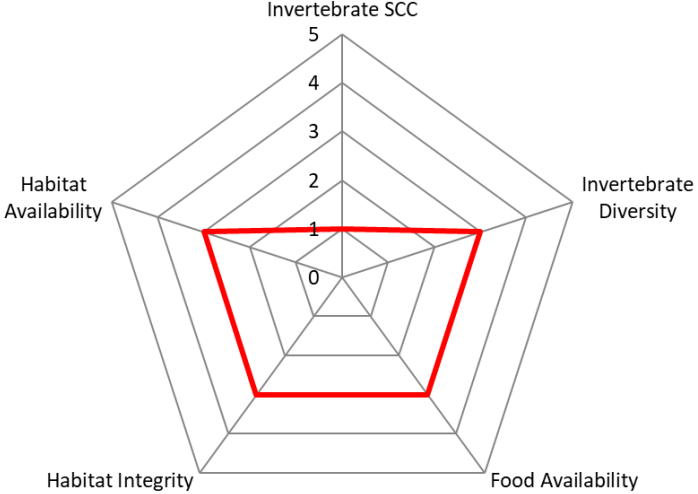

<p><b>Herpetofauna SCC</b></p>	<p>No amphibian or reptile SCC were observed during the assessment. It is unlikely that reptilian SCC will occur in the vicinity of the proposed developments due to their distributions not occurring within the study area. The limited habitat availability for reptiles on site likely results in high competition for the few rocky outcrops, shrubby areas or fallen or standing tree cover. The Giant Bullfrog (<i>Pyxicephalus adspersus</i>, VU and TOPS) has been historically recorded in the area and has breeding habitat within the Wetland habitat and will have suitable foraging habitat within the adjacent habitats. Should the proposed Solar PV development encroach upon the wetlands habitat for this species will be lost.</p>
<p><b>Herpetofauna Discussion</b></p>	<p>Herpetofauna diversity and abundances appeared moderately low during the field investigation, yet intermediate diversities are anticipated as a result of the Wetland Habitat and the portion of Eastern Highveld Grassland Habitat where more opportunities exist for breeding, basking and foraging. Although reptile and amphibian species are notoriously hard to detect, owing to their secretive nature, the degraded state of the Secondary Grassland and Degraded and Transformed habitat corroborated these lower-than-expected diversity levels in these locations. The Virtual Museum database indicates that 3 common frog and toad species have been observed in the study area's QDS (Quarter Degree Square) and may occur within the wetland systems and adjacent grasslands. Few reptile species are expected to occur within the proposed infrastructure development sites, except for those overlaying the Eastern highveld Grassland (PV 2 panels), owing to the lack of rocky outcrops and fallen tree cover, which is often more suitable at supporting greater diversities of reptiles, notably SCC. However, burrows were found throughout the grassland at low densities, in which reptiles may shelter. The Virtual Museum database indicates that nine common reptiles, including (<i>Psammophylax rhombeatus</i> (Spotted Grass Snake), <i>Pseudaspis cana</i> (Mole Snake), <i>Hemachatus haemachatus</i> (Rinkhals), <i>Afrotyphlops bibronii</i> (Bibron's Blind Snake), <i>Pachydactylus affinis</i> (Transvaal Gecko) and <i>Trachylepis punctatissima</i> (Speckled Rock Skink) have been recorded in the area (although no individuals were seen during the time of the field assessment).</p>
<p><b>Business Case and Conclusion</b></p>	<p>Overall, the herpetofauna sensitivity is deemed intermediate, owing to the historic and current disturbances in the central and eastern portions that are offset slightly by the natural Eastern Highveld Habitat. Although not observed during the assessment, several common amphibian species have been recorded in the study area's QDS and may occur in the five localised Wetland Habitat Units and the buffer zones. Few arboreal reptiles are expected to occur within the study area as a result of limited habitat yet grassland selecting species will be present. Mostly, common, and widely occurring reptiles will likely utilise burrows found in the veld and between agricultural areas.</p> <p>The proposed infrastructure developments are likely to contribute to the loss of herpetofauna diversity and abundance should extensive development occur within the Wetland Habitat. The loss of Giant Bullfrog (<i>Pyxicephalus adspersus</i>, VU) foraging habitat will likely be a result of the planned development, this may be partially mitigated through minimal vegetation clearance within the Eastern highveld Grassland. Several other amphibian and reptile species will lose foraging habitat through the proposed development. The resilient nature of reptiles will allow some species to re-establish within the development areas and thus although suitable natural habitat will be reduced, reductions in species richness within the study area are unlikely. Provided that development within the Wetlands Habitat is avoided and that the water quality in the wetlands is not contaminated by the activities associated with the proposed PV facility and the associated linear infrastructure, the proposed development is likely to have a limited impact of amphibian species diversity within the study area. Provided all mitigation measures are implemented, the development is unlikely to lead to further loss of habitat connectivity nor will the developments impact upon migration routes or corridors of movement of herpetofauna.</p>





### 3.4 Invertebrates

**Table 3: Field assessment results pertaining to insect species within the study area.**

Insect Habitat Sensitivity	Intermediate	Photographs:		
<p><b>Photograph Notes:</b>  <b>Top:</b> <u>Left</u> – <i>Astylus atromaculatus</i> (Spotted Maize Beetle), <i>Lagria vulnerate</i> (Hairy Darkling Beetle), <i>Trinervitermes</i> sp. (Snouted harvester termites) and <i>Popillia bipunctata</i> (Yellow Shining Leaf Chafer).  <b>Bottom:</b> <u>Left and Centre</u> – <i>Uroplectes triangulifer</i> (Highveld Lesser-Thickettail Scorpions). <u>Right</u> – Rocky areas which are often preferable to scorpions were present yet occurred at low densities.</p>				
<p><b>Insect Sensitivity Graph:</b></p> 				
		<p><b>Invertebrate SCC</b></p> <p>During the field assessment no invertebrate SCC were observed. <i>Metisella meninx</i> (Marsh Sylph, VU) has been previously recorded in the area, and its larval foodplant (<i>Leersia hexandra</i>) was observed in high densities within the Wetland Habitat. This species has a high potential of occurring within and along the Wetland Habitat within the study area.</p> <p>The Mpumalanga State of the Environment Report (2003) makes no provision for arachnid species within its protected species lists, however invertebrate species as listed under TOPS (2007) were considered during this assessment.</p>		



<p><b>Invertebrate Discussion</b></p>	<p>Observed invertebrate diversity and abundance across the various project development areas was intermediate, possibly owing to lower temperatures which peaked around 25 degrees Celsius. As it was with the mammal diversity, insect diversity was species poor, and abundances were low. The insect assemblage was dominated by Hemipterans, Coleopterans and Orthopterans. The Brown-veined White Butterfly (<i>Belenois aurota</i>) was the most abundant insect species observed, as it was migrating east through the study area in large numbers. Wetland habitat remains an important migratory corridor for many invertebrate species who may utilize the dense graminoid layer to shelter while satisfying moisture requirements.</p> <p>Habitat degradation in the central and eastern portions of the study area (Secondary Grassland and Degraded and Transformed Habitat) is a major factor contributing to reduced insect diversity and abundance due to the reduction in floral species richness and insect foraging opportunities. The Degraded and Transformed habitat and the Secondary Grassland habitat, which is some locations were infested with Alien Invasive Plants (AIP) offered sub-optimal floral species composition, limiting insect diversity, as suitable niche habitat and food resources are not readily available. To maintain important ecoservices and functions which invertebrates play, it is important to maintain ecological corridors and habitat for their movement and as such development within the wetland should be avoided as far as possible. The undisturbed nature of the Eastern Highveld Grassland provides valuable opportunities for invertebrates, however, the homogenous nature of the grassland habitat will limit the diversity of Families likely to utilize the study area. The decrease in abundance and diversity of insects directly impacts on arachnid species populations, as insects form the base food resource for arachnid species which were observed at low densities during the site visit.</p>
<p><b>Business Case and Conclusion</b></p>	<p>Overall, the invertebrate sensitivity is deemed to be intermediate. The Degraded and Transformed Habitat and the Secondary Grassland Habitat offer limited niche habitat and food resources and are not conducive to supporting a high diversity of invertebrate species, favouring mostly common invertebrates. Within the Eastern Highveld Grassland lower than anticipated abundances and diversities were observed, this may have been a result of cooler weather, however abundances and diversity within this portion of the study area proved higher than the central and eastern sections. Wetland habitat provided unique resources for invertebrates and plays an important role in invertebrate movement.</p> <p>Given the linear nature of the proposed Powerline development and its footprint, impact on invertebrate habitat is expected to be small. The proposed infrastructure within the Degraded and Transformed Habitat and the Secondary Grassland Habitat unit will not result in significant impacts. Any infrastructure within the Wetland Habitat or the Eastern Highveld Grassland will impact on an important movement corridor and/or valuable habitat for invertebrates. Lastly, the habitat observed likely supports a population of the SCC <i>Metisella meninx</i> (Marsh Sylph, VU), although they have a wide distribution, this species is under threat due to developments within and around wetland habitat. It is important that invertebrate corridors are maintained within the landscape and invertebrates are responsible for a variety of ecosystem functions and services.</p>





### **3.5 Faunal Species of Conservational Concern Assessment**

During field assessments, it is not always feasible to identify or observe all species within an area, largely due to the secretive nature of many faunal species, possible low population numbers or varying habits of species. As such, and to specifically assess an area for faunal SCC, a Probability of Occurrence (POC) estimation is used, considering several factors to determine the probability of faunal SCC occurrence within the study area. Species listed in Appendix B whose known distribution ranges and habitat preferences include the proposed infrastructure development sites were taken into consideration. Following the assessment of the SCC which are known to occur within the region, comparisons were drawn between these species space and habitat requirements and that which is available within the study area. The mostly natural state of the eastern portions of the study area will increase likelihood of faunal SCC residing or breeding within the study area.

Although no SCC were noted, should any faunal SCC as listed below (and in Appendix B) be encountered during the course of the proposed infrastructure development activities, all operations must be stopped immediately, and a biodiversity specialist must be consulted, to advise on the best way forward. Below is a tabulated list of SCC that have a **“Medium”** to **“High”** probability of occurring on site, as they have been historically recorded in the area or their habitat is available within or near the study area.



Table 4. List of faunal SCC potentially occurring in the study area

Scientific and Common Name	Habitat Description	Regional Status	POC (%)
<b>Mammals</b>			
<i>Ourebia ourebi</i> (Oribi)	<p><b>Range:</b> Northern-eastern, central-western and south-eastern Africa. Occurs in the eastern grasslands of South Africa, including all of Mpumalanga province</p> <p><b>Major habitats:</b> Moist tropical grasslands, open grassland in good condition and inland wetlands.</p> <p><b>Description:</b> Oribi are found in highest densities on floodplains and moist tropical grasslands, in association with large grazers. They require grassland in good condition, with a mosaic of short grass for feeding and long grass for shelter. They avoid feeding within and close to woodland patches even if these patches are small (for example, 2–6 m in diameter).</p> <p><b>Food:</b> selective grazers of short grass, requiring intact, primary grassland.</p> <p><b>Available habitat with the Subject Property:</b> Eastern Highveld Grassland</p>	VU	Medium
<i>Leptailurus serval</i> (Serval)	<p><b>Range:</b> Throughout Central Africa, extending into eastern portion of South Africa.</p> <p><b>Major habitats:</b> Forest, Savanna, Grassland and inland wetlands.</p> <p><b>Description:</b> The species has been recorded from a range of habitats which include: tropical dry forest, montane tropical moist forest, both dry and moist savanna, shrublands, and high altitude grassland. Animals have been encountered roosting in buildings, caves and dense vegetation (including rolled banana leaves).</p> <p><b>Food:</b> Small mammals, birds, reptiles and arthropods.</p> <p><b>Available habitat with the Subject Property:</b> Wetland and Grassland habitats.</p>	NT	High
<i>Poecilogale albinucha</i> (Striped Weasel)	<p><b>Range:</b> Southwestern Uganda and Kenya, eastern, central and western grasslands of side of South Africa, including Mpumalanga.</p> <p><b>Major habitats:</b> Moist Grassland or Savannah</p> <p><b>Description:</b> Has wide habitat tolerance but prefers grassy areas</p> <p><b>Food:</b> Warm blooded vertebrates, including other rodents.</p> <p><b>Available habitat with the Subject property:</b> Wetland and Grassland habitats</p>	NE	Medium
<i>Pyxicephalus adspersus</i> (Giant Bullfrog)	<p><b>Range:</b> Occurs from eastern Africa (Kenya) through Zambia to southern Angola to the Southern African interior.</p> <p><b>Major habitats:</b> Savanna, Shrubland and most forms of inland impoundments or wetlands.</p> <p><b>Description:</b> Generally, only active after the rains in drier savanna's. Remains buried for most of the year only emerging to breed in pools, pans and ditches.</p> <p><b>Food:</b> Mostly invertebrates but will consume anything it can swallow.</p> <p><b>Available habitat with the study area:</b> Wetland Habitat and adjacent habitat.</p>	VU	High
<i>Metisella meninx</i> (Marsh Sylph)	<p><b>Range:</b> Fragmented range within central and southern Africa. Within the region it predominantly occurs within high rainfall areas in the eastern half of the country.</p> <p><b>Major habitats:</b> Wetlands.</p> <p><b>Description:</b> The species breeds in wetlands between 1400 m and 1700 m and is associated with the <i>Leersia hexandra</i> during its larval stages.</p> <p><b>Food:</b> Larva associated with <i>Leersia hexandra</i>. Adult food plants are unknown.</p> <p><b>Available habitat with the Subject Property:</b> Freshwater Habitat.</p>	VU	High

VU= Vulnerable; NE=Not Evaluated; NT=Near Threatened



## 4 SENSITIVITY MAPPING

Figures 4 below conceptually illustrates the faunal ecological sensitivity for the study area. The habitat units are depicted according to their sensitivity in terms of the presence or potential for faunal SCC, habitat integrity, levels of disturbance and overall levels of diversity. Table 5 below presents the sensitivity of each habitat along with an associated conservation objective and implications for the proposed activities.

**Table 5. A summary of the sensitivity of each habitat unit and implications for the proposed activities**

Sensitivity	Habitat Unit	Development Implications
Low Sensitivity	<p><b>Degraded and Transformed Habitat</b>  <u>Conservation Objective for areas of Low Sensitivity:</u>            Optimise development potential.</p>	<p>These habitats are deemed to be of low sensitivity for fauna due to their altered state and lack of heterogeneity and habitat. Development within these areas is unlikely to lead to high impacts to faunal habitat or species diversity provided mitigation measures are implemented, as discussed in Section 5.4.</p>
Moderately Low Sensitivity	<p><b>Secondary Grassland</b>  <u>Conservation Objective for areas of Moderately Low Sensitivity:</u>            Optimise the development potential while improving the biodiversity integrity of the surrounding natural habitat and managing edge effects.</p>	<p>The habitat integrity and thus faunal habitat sensitivity of these habitat units are considered moderately low and has been degraded as a result of historic agricultural and the resultant alien plant invasion. Two faunal SCC, <i>Leptailurus serval</i> (Serval, NT) and the <i>Poecilogale albinucha</i> (Striped Weasel) may utilise the Secondary Grassland for foraging purposes, however due to the degraded nature of the habitat and the adjacent agriculture it not likely that these species will rely on this habitat for breeding. As such, the development is unlikely to reduce breeding productivity or potential of the SCC. Development within these habitat units is not expected to have a significant negative impact on the local or regional ecology of the area, provided mitigation measures are adhered to.</p>
Moderately High Sensitivity	<p><b>Eastern Highveld Grassland</b></p> <p><b>Wetland Habitat</b>  <u>Conservation Objective:</u>            Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance</p>	<p>These areas are of moderately high sensitivity from a faunal perspective. The sensitivity generally reflects the absence of any large-scale human disturbances ensuring that these systems have moderately high integrity and remain ecologically functional. These habitats offer sufficient forage and suitable breeding locations for their respective faunal communities and only show minor transformation by alien species invasion and edge effects. SCC species with a high probability of occurring within the study area are largely restricted to these units. Due to these habitat units providing suitable habitat for SCC, they are of increased species richness, ecological functionality and sensitivity from a faunal perspective and development within this habitat unit should be avoided and alternatives should be considered. Additionally, the Wetland Habitat in particular acts as a corridor within the landscape and by being saturated for much of the year provides valuable niche habitat for fauna associated with wetland habitats.</p> <p>Planned activities in this area should follow the mitigation hierarchy. Since it has been determined that avoidance is not possible, measures to minimise the impact should be sought with particular mention of rehabilitation and support of biodiversity in the operational phase of the development. Where areas of moderately high sensitivity occur in CBAs or Protected Areas, there is a conflict between the intended land use and the conservation requirements for the region. The requirements for authorization in this regard should be determined through consultation with the relevant provincial conservation authorities.</p>



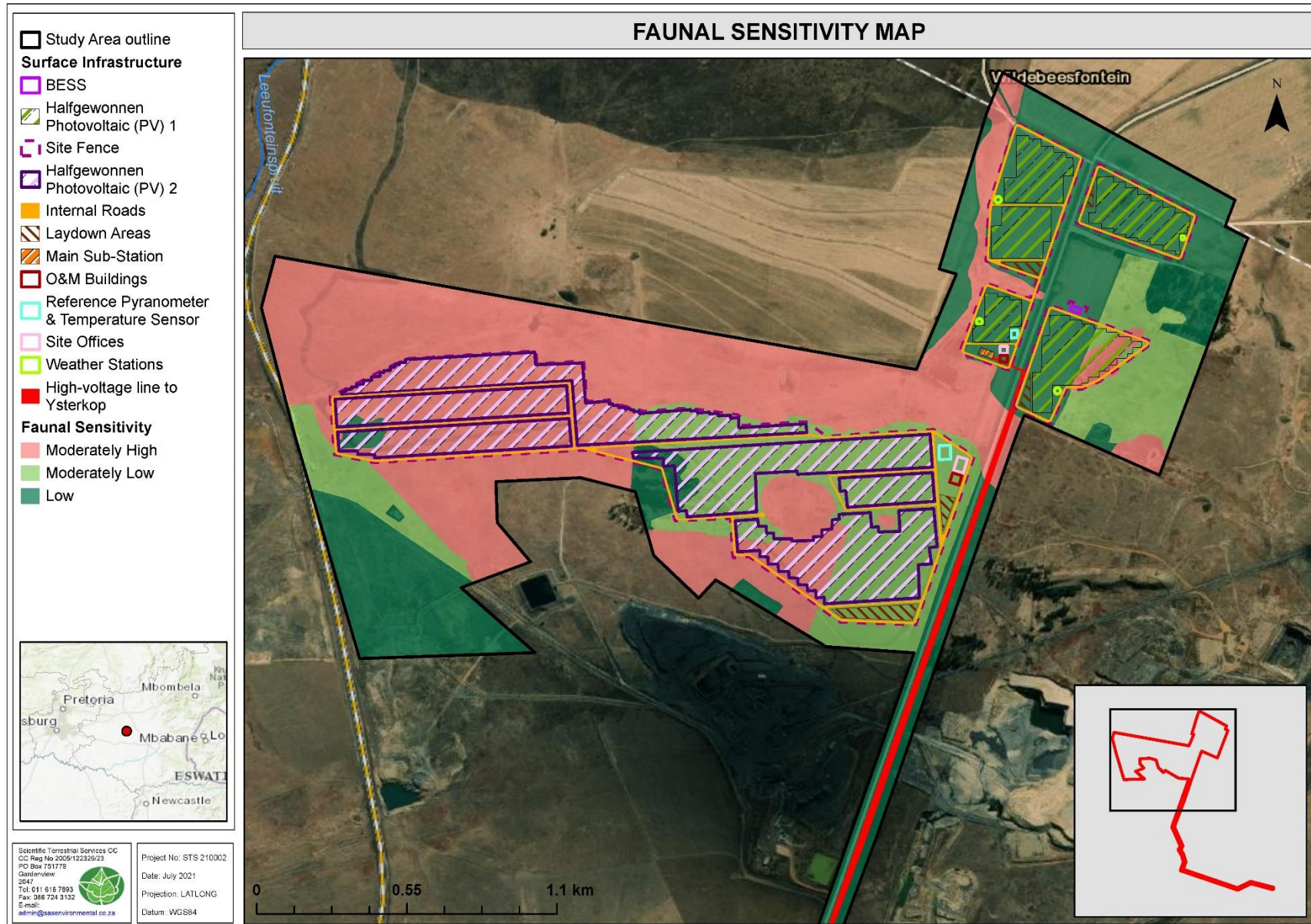


Figure 4: Faunal habitat sensitivity delineations for the northern portion of the study area





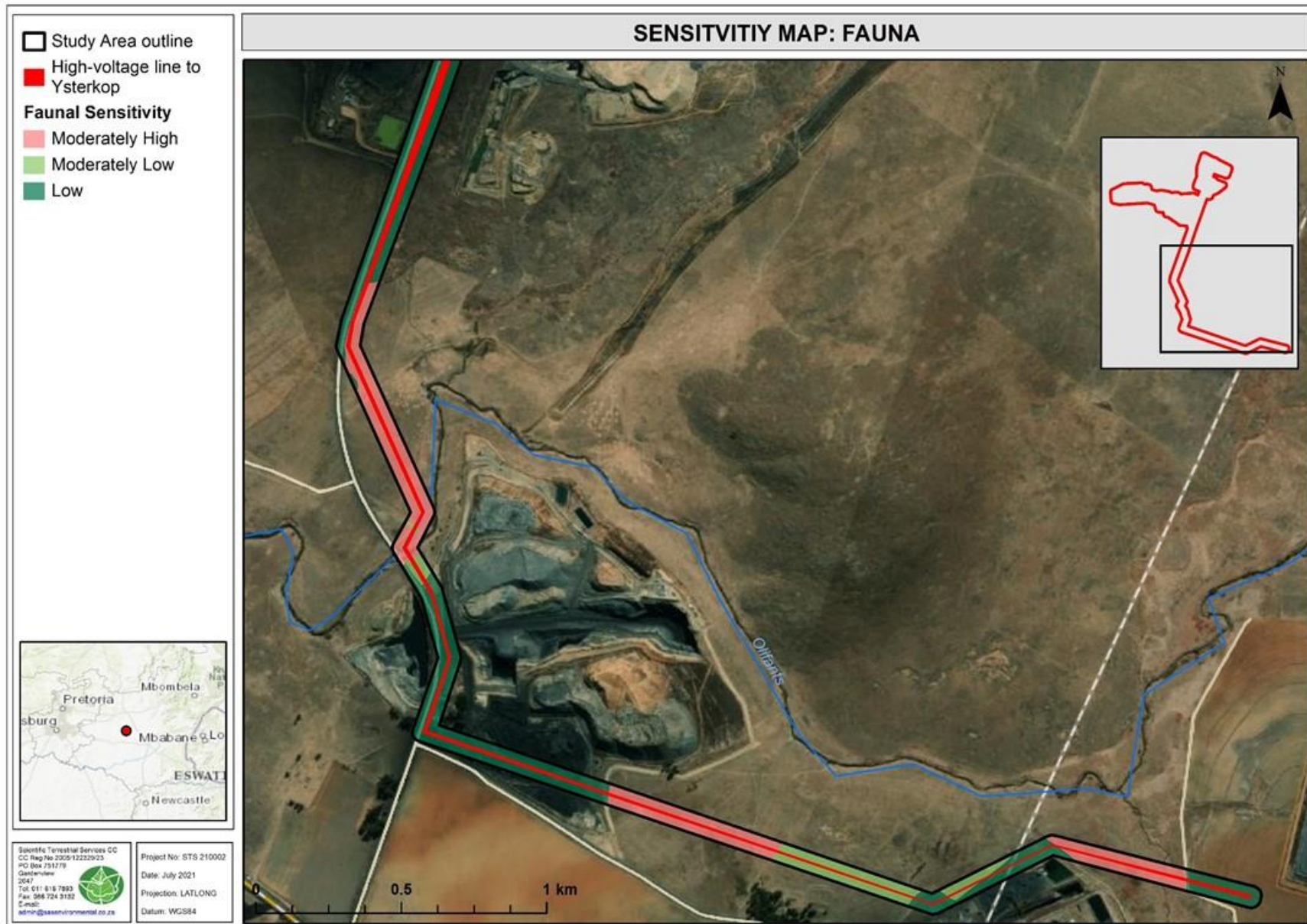


Figure 5: Faunal habitat sensitivity delineations for the southern portion of the study area





## 5 IMPACT ASSESSMENT

The sections below provide the significance of perceived impacts arising from the proposed PV facility development for the study area.

An impact discussion and assessment of all potential pre-construction, construction, operational and maintenance phase impacts are provided in Section 5.2 and 5.3. All mitigatory measures required to minimise the perceived impacts are presented in Section 5.4.

### Proposed Activity Description:

Surface developments will include the PV 1 (anticipated 34 Ha) and PV 2 Panels (anticipated 88 Ha), the Main Substation ( $\pm 0.3$  Ha), additional Buildings ( $\pm 0.3$  Ha), and the Battery Storage area ( $\pm 3.3$  Ha). Linear developments for the project include the Main Pipelines running between the Solar Panels, as well as a High-Voltage Line ( $\pm 6.2$  km) that is recommended to connect the Main Substation to the Ysterkop substation.

For a depiction of the proposed layout, refer to Figure 1.

In the initial stages of the project, the proposed Halfgewonnen Solar Photovoltaic (PV) Project was planned with a large portion of the footprint of the PV array in the wetland system. Once this became evident, the project layout was revisited to reduce the risk to the receiving environment – based on recommendations from STS and Scientific Aquatic Services CC (SAS). Areas outside and adjacent to the study area that were highlighted as “Low Sensitivity” for the Plant Species Theme by the National Web Based Environmental Screening Tool were investigated as alternatives but were deemed unsuitable due to the various technical reasons below:

- Property where land-use and access agreements have not been reached between the developer and land-owner;
- Areas already approved for expansion of the Halfgewonnen Mine;
- Current Halfgewonnen coal processing plant - incompatible with solar PV development due to dust and land availability; and
- Previously mined areas deemed not suitable to develop the PV array.

The final layout prepared was thus put forward as the only alternative, noting that some ecological impacts cannot be avoided any further. This layout thus forms the basis of the impact assessment of this study.



## 5.1 Activities and Aspect Register

The table below indicates the perceived risks to faunal species associated with the activities pertaining to the proposed infrastructure developments listed in section 1.1

**Table 6. Aspects and activities register considering faunal resources during the pre-construction and planning phases.**

ACTIVITIES AND ASPECTS REGISTER	
Planning Phase	
-	Inconsiderate planning of infrastructure placement and design, leading to the loss of potential sensitive faunal species and/or habitat for such species, as well as unnecessary edge effect impacts on areas outside of the proposed development footprint.
-	<b>Impact:</b> Degradation and modification of the receiving environment, loss of currently intact faunal habitat.
-	Potential failure to implement the required mitigation measures before and at the commencement of construction activities: <ul style="list-style-type: none"> <li>• Potential failure to obtain the necessary permits for the removal of protected faunal species should they be needed resulting in delays to the construction activities.</li> </ul>
-	<b>Impact:</b> Long-term or permanent degradation and modification of the receiving environment and displacement or loss of faunal SCC.
-	Potential failure to design and implement an Alien and Invasive Plant (AIP) Management/Control plan before the commencement of construction activities, resulting in the spread of AIPs from the development footprint to surrounding natural habitat.
-	<b>Impact:</b> Spreads of AIPs, leading to potential loss and/or degradation of the faunal habitat in the study area.
-	Potential inadequate design of lighting within the PV facility leading to invertebrates being attracted to lights and the resulting attracting of insect predators, increasing the potential for fauna, particularly bats, to be collide with, be electrocuted by or start fires.
-	<b>Impact:</b> Long-term collision and electrocution risks or destruction of habitat could lead to a reduction in diversity.
Construction Phase	
-	Extensive site clearing and the removal of indigenous vegetation.
-	<b>Impact:</b> Loss of important faunal habitat and the potential loss of faunal SCC.
-	Site clearing and the removal of vegetation.
-	<b>Impact:</b> Loss of faunal habitat, diversity, and the possible loss of SCC.
-	Potentially uncontrolled and unplanned site clearing and the removal of vegetation and destruction of faunal habitat and forage.
-	<b>Impact:</b> Loss of sensitive faunal habitat and faunal species reliant on this specific habitat for survival.
-	Proliferation of AIP species that colonise areas of increased disturbances and may outcompete indigenous plant species, including further transformation of adjacent, undeveloped habitat.
-	<b>Impact:</b> Degradation of favourable faunal habitat outside of the direct construction footprint, leading to a decrease in faunal diversity at a local scale and loss of land to meet biodiversity targets.
-	Potential dumping of excavated and construction material outside of designated areas, promoting the establishment of AIPs.
-	<b>Impact:</b> Loss of faunal habitat, diversity and SCC.
-	Potential failure to implement a rehabilitation and an alien floral control plan after the construction phase.
-	<b>Impact:</b> Potentially leading to permanent transformation of faunal habitat and long-term degradation of important faunal habitat within the region.
-	Increased risk of faunal collisions with construction vehicles.
-	<b>Impact:</b> Local loss of faunal SCC abundance and diversity.
-	Additional pressure on faunal habitat as a result of an increased human presence associated with the proposed development, contributing to: <ul style="list-style-type: none"> <li>• Potential hunting/trapping/removal/collection of faunal species or potential SCC; and</li> <li>• Increased human activity will lead to the displacement and/or loss of potential faunal SCC.</li> </ul>
-	<b>Impact:</b> Loss of sensitive faunal habitat and the potential loss of faunal SCC.
-	Excavation and compaction of soils leading to increased runoff and sedimentation of downslope habitat during times of high rainfall.



### ACTIVITIES AND ASPECTS REGISTER

<ul style="list-style-type: none"> <li>- <b>Impact:</b> Loss of favourable faunal habitat and decline in faunal species diversity due to sedimentation and potential pollution of the watercourses.</li> </ul>
<ul style="list-style-type: none"> <li>- Potential failure to implement a rehabilitation and an alien floral control plan after the construction phase.</li> <li>- <b>Impact:</b> Potentially leading to permanent transformation of faunal habitat and long-term degradation of important faunal habitat within the region, i.e. faunal SCC associated with Eastern Highveld Grassland.</li> </ul>
<ul style="list-style-type: none"> <li>- Impaired water quality and altered flow of water within watercourses due to the proposed activities.</li> <li>- <b>Impact:</b> Loss of ecologically important faunal habitat and consequently a further loss of diversity and species reliant on the Wetland habitat. Potential loss of the habitat for faunal SCC such as <i>Pyxicephalus adspersus</i> (Giant Bullfrog) and <i>Metisella meninx</i> (Marsh Sylph). Desiccation and/or pollution of the freshwater habitat will have a detrimental impact to the faunal assemblages utilising this habitat.</li> </ul>
<ul style="list-style-type: none"> <li>- Potential failure to concurrently rehabilitate bare or disturbed sites as soon as the construction activities have occurred will potentially result in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs.</li> <li>- <b>Impact:</b> Long-term loss of favourable habitat for historically recorded faunal species. Loss of faunal diversity and potential SCC which will disperse into the surrounding area in search of favourable habitat.</li> </ul>
<ul style="list-style-type: none"> <li>- Additional pressure on faunal habitat as a result of an increased human presence associated with the proposed development, contributing to:               <ul style="list-style-type: none"> <li>- Potential hunting/trapping/removal/collection of faunal species or potential SCC; and</li> <li>- Increased human activity will lead to the displacement and/or loss of potential faunal SCC.</li> </ul> </li> <li>- <b>Impact:</b> Loss of sensitive faunal habitat and the potential loss of faunal SCC.</li> </ul>
<b>Operational and Maintenance Phase</b>
<ul style="list-style-type: none"> <li>- Ineffective rehabilitation of exposed and impacted areas potentially leading to vegetation succession and a possible reduction of faunal diversity and occurrence of potential faunal SCC over the long-term.</li> <li>- <b>Impact:</b> Permanent loss of faunal habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural faunal habitat of increased sensitivity. Further reduction of available habitat in the long-term, compounding the limiting factors to faunal assemblages.</li> </ul>
<ul style="list-style-type: none"> <li>- Potential poor management and failure to monitor rehabilitation efforts, leading to:               <ul style="list-style-type: none"> <li>• Landscapes being left fragmented, resulting in reduced migration capabilities of faunal species, isolation of faunal populations and a decrease in faunal diversity;</li> <li>• Compacted soils limiting the re-establishment of natural vegetation; and</li> <li>• Increased risk of erosion in areas left disturbed.</li> </ul> </li> <li>- <b>Impact:</b> Long-term (or permanent) loss of faunal habitat, diversity and SCC.</li> </ul>
<ul style="list-style-type: none"> <li>- Potentially poorly implemented and monitored AIP Management programme leading to the reintroduction and proliferation of AIP species.</li> <li>- <b>Impact:</b> Permanent loss of surrounding faunal niche habitat, diversity and SCC.</li> </ul>
<ul style="list-style-type: none"> <li>- Potential overexploitation through the removal and/or collection of important or sensitive faunal SCC on the property.</li> <li>- <b>Impact:</b> Local loss of faunal SCC abundance and diversity.</li> </ul>
<ul style="list-style-type: none"> <li>- Potentially poorly managed edge effects:               <ul style="list-style-type: none"> <li>- Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to a continual proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the faunal habitat; and</li> <li>- Potential erosion stemming from soil left bare leading to sedimentation of downslope faunal habitat.</li> </ul> </li> <li>- <b>Impact:</b> Loss of faunal habitat, diversity and SCC within the direct expansion development footprint. Loss of surrounding faunal diversity and faunal SCC through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas.</li> </ul>

## 5.2 Faunal Impact Assessment Results

The below table indicates the perceived risks to the faunal ecology associated with all phases of the proposed development. The table also provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. The mitigated results of



the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

The impact assessment focusses on the following activities:

- PV 1 Panels (anticipated 34 Ha) with associated Main Pipeline;
- PV 2 Panels (anticipated 88 Ha) with associated Main Pipeline;
- Additional Surface Infrastructure (the Main Substation, additional Buildings, and the Battery Storage area); and
- High Voltage Powerline.



**Table 7: Summary of the Impact Assessment of the Planning, Construction, Operational and Maintenance Phases of the proposed project footprint for fauna.**

Impacting Activities	UNMANAGED							MANAGED								
	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
<b>PLANNING PHASE</b>																
<b>Habitat and Diversity</b>																
Photovoltaic (PV) 1 Panels	3	1	2	2	3	4	7	28 Low	2	1	1	2	3	3	6	18 Low
Photovoltaic (PV) 2 Panels	3	4	2	2	3	7	7	49 Low	2	4	1	2	3	6	6	36 Low
Additional surface infrastructure	3	2	2	2	3	5	7	35 Low	2	2	1	2	3	4	6	24 Very low
High-Voltage Line	3	3	2	2	3	6	7	42 Low	2	3	1	2	3	5	6	30 Low
<b>Species of Conservation Concern</b>																
Photovoltaic (PV) 1 Panels	3	1	2	2	3	4	7	28 Low	2	1	1	2	3	3	6	18 Very low
Photovoltaic (PV) 2 Panels	3	3	2	2	3	6	7	42 Low	2	3	1	2	3	5	6	30 Low
Additional surface infrastructure	3	2	2	2	3	5	7	35 Low	2	2	1	2	3	4	6	24 Very low
High-Voltage Line	3	3	2	2	3	6	7	42 Low	2	3	1	2	3	5	6	30 Low
<b>CONSTRUCTION PHASE</b>																
<b>Habitat and Diversity</b>																
Photovoltaic (PV) 1 Panels	4	1	3	2	3	5	8	40 Low	4	1	2	2	3	5	7	35 Low
Photovoltaic (PV) 2 Panels	5	4	4	4	3	9	11	99 Medium high	4	4	3	3	3	8	9	72 Medium low
Additional surface infrastructure	2	2	3	2	3	4	8	32 Low	1	2	2	1	3	3	6	18 Very low
High-Voltage Line	3	3	3	2	3	6	8	48 Low	2	3	2	2	3	5	7	35 Low
<b>Species of Conservation Concern</b>																
Photovoltaic (PV) 1 Panels	3	1	2	2	3	4	8	32 Low	2	1	2	2	3	3	7	21 Very low
Photovoltaic (PV) 2 Panels	4	3	3	4	3	7	11	77 Medium high	4	3	3	3	3	7	9	63 Medium low
Additional surface infrastructure	2	2	2	2	3	4	7	28 Very low	1	2	1	1	3	3	5	15 Very low
High-Voltage Line	3	3	2	2	3	6	7	42 Low	2	3	1	2	3	5	6	30 Very low





OPERATIONAL AND MAINTENANCE PHASES																
Habitat and Diversity																
Photovoltaic (PV) 1 Panels	4	1	2	2	5	5	9	45 Low	3	1	1	2	4	4	7	28 Low
Photovoltaic (PV) 2 Panels	4	4	4	4	5	8	13	104 High	3	4	3	3	4	7	10	70 Medium low
Additional surface infrastructure	3	2	2	2	5	5	9	45 Low	2	2	1	1	4	4	6	24 Very low
High-Voltage Line	3	3	2	2	5	6	9	54 Medium low	2	3	1	2	4	5	7	35 Low
Species of Conservation Concern																
Photovoltaic (PV) 1 Panels	2	1	2	2	5	3	9	27 Low	1	1	1	2	4	3	7	21 Very low
Photovoltaic (PV) 2 Panels	3	3	3	4	5	6	12	70 Medium low	2	3	3	3	4	5	10	50 Low
Additional surface infrastructure	2	2	2	2	5	4	9	36 Low	1	2	1	1	4	3	6	18 Very low
High-Voltage Line	2	3	2	2	5	5	9	45 Low	1	3	1	2	4	4	7	28 Low



### **5.3 Impact Discussion**

The perceived impact significance of the proposed infrastructure development (prior to mitigation) on faunal habitat, diversity and SCC ranges from very low to high. These impact scores were influenced by the varying degrees of impact that possible activities within each stage of development of certain infrastructure would have on the faunal assemblage identified. Should the relevant mitigation proposed within this report be undertaken impacts can be reduced to medium-low, low and very low levels. The development of PV 2 Panels will result in the highest impact score as a result of the impacts that will occur within the presently intact sensitive Eastern Highveld Grassland Habitat.

The study area is partially surrounded by agricultural and mining activities which reduce the suitability for supporting a diverse and abundant faunal assemblage and especially for larger faunal species. Yet habitat connectivity is still maintained for the most part and as such movement routes for faunal species should be maintained by preventing impacts on Wetland Habitat. As part of the rehabilitation actions, disturbed areas not within the development footprint must be rehabilitated appropriately and AIP establishment controlled within such areas.

#### **5.3.1 Impact on Faunal Habitat and Diversity**

The proposed development will result in a loss of faunal habitat from the area which is anticipated to result in high to low level impacts should mitigation measures not be implemented. With mitigation, impacts can be reduced to medium low and very low levels in most cases. Despite the fragmented nature of the habitat within a broader mosaic of agriculture, mining and natural areas, the study area still provides habitat for SCC and for more common and widespread faunal species.

Development within the Eastern highveld Grassland will lead to a permanent loss of primary grassland which provides valuable niche habitat for a wide variety of fauna. The impacts from PV 2 panels are anticipated to be high to medium high and will lead to a reduction in habitat and species diversity. These impacts will result in a decrease in available forage within the study area. As much of the remaining proposed infrastructure is in areas which have been exposed to historic or current disturbances or are of small size, impacts scores are anticipated to be low in most cases.

Mitigation efforts should be aimed at limiting edge effects from construction activities to the surrounding area and implementing an AIP management plan. Efforts to minimize vegetation loss (faunal habitat) beneath the PV panels should be maximised to ensure that habitat for



fauna may still be utilised beneath these structures. These efforts and the implementation of an AIP control plan, in the long run, will help to ensure that the habitat potential of the remaining portions of the study area increases.

### 5.3.2 Impacts on Faunal SCC

No faunal SCC were observed during the site visit. Habitat for five SCC was observed within the study area. In most cases the SCC have a high probability of occurring within the study area due to the intact nature of the Wetland and Eastern Highveld Grassland habitat and the valuable habitat therein. *Metisella meninx* (Marsh Sylph), *Leptailurus serval* (Serval) and *Pyxicephalus adspersus* (Giant Bullfrog) are SCC with a High probability of occupying the study area permanently. Habitat for *Pyxicephalus adspersus* (Giant Bullfrog, VU) was also observed within the Wetland habitat. *Leptailurus serval* (Serval) would find suitable habitat within the Wetland and Eastern Highveld Grassland due to the intact nature of the habitat. No specimens were observed and the locality is at the edge of this species distribution range, and confidence in this species occurring within the study area is lower. Thus, impacts within this unit will result in the destruction of its habitat and may result in the loss of these SCC from the study area.

Other SCC are likely to forage intermittently within the study area and due to their more wide ranging habit may still utilise the study area following the proposed activities. These species include:

- *Ourebia ourebi* (Oribi, VU); and
- *Poecilogale albinucha* (Striped Weasel, NE).

High to low impact significances are expected should mitigatory measures not be implemented. The highest impacts to SCC will result from the construction and permanent alteration of Eastern highveld Grassland from the proposed PV 2 panels. The remaining activities are of lower significance to SCC and unlikely to result in reduction in SCC diversity. It is recommended therefore, that the best construction and operation practices must be employed alongside the recommended mitigation measures in Table 8 to ensure further habitat degradation is minimised and mitigated as far as possible.

### 5.3.3 Probable Residual Impacts

Even with extensive mitigation, residual impacts on the receiving faunal ecological environment are likely. The following points highlight the key residual impacts that have been identified:

- Potential loss of natural habitat adjacent to the proposed sites as a result of edge effects;



- Potential continued loss or altered faunal species diversity and abundance in the local area;
- Continued loss of faunal habitat through disturbances;
- Potential loss of faunal SCC; and
- Further alien floral invasion.

#### **5.3.4 Cumulative Impacts**

The local area has already been subjected to historic agriculture in the central portions and current agriculture within the eastern portions of the study area greatly reducing faunal abundances and diversity within these areas. The study area remains natural in the west where Eastern Highveld Grassland and Wetland Habitat remain in a good conditions and likely aid in supporting five SCC. *Metisella meninx* (Marsh Sylph), *Pyxicephalus adspersus* (Giant Bullfrog, VU) and *Leptailurus serval* (Serval) are anticipated to forage or breed within the Wetland and Eastern highveld Grassland habitat of the study area and as such disturbances in these units will likely result in the disappearance of these species from the study area. The remaining SCC (*Ourebia ourebi* (Oribi) and *Poecilogale albinucha* (Striped Weasel) will likely utilize the study area to forage within.

The proposed establishment of the PV facility will lead to the displacement of faunal species currently inhabiting the proposed footprint areas, pushing them out into the surrounding vegetated areas leading to increased competition for territories and breeding sites. Moreover, there is likely to be a knock-on dispersal affect, leading to increased resource competition and possible increased mortality rates, resulting in a decreased species abundance and diversity and SCC habitat. AIP proliferation and insufficient rehabilitation will ultimately lead to loss of viable habitat in the surrounding areas, displacing faunal species further as indigenous floral species (faunal habitat and food resources) are displaced and lost.

#### **5.4. Integrated Impact Mitigation**

The table below highlights the additional general mitigation measures that are applicable to the project, to suitably manage and mitigate the ecological impacts that are associated with the proposed PV facility infrastructure development.



**Table 8. A summary of the mitigatory requirements for faunal resources**

<b>Project phase</b>	<i>Planning Phase</i>
<b>Impact Summary</b>	<i>Loss of faunal habitat and species diversity</i>
<b>Management Measures</b>	<b>Proposed mitigation and management measures:</b>
	<p><b>Faunal Habitat and Diversity</b></p> <ul style="list-style-type: none"> <li>- Minimise loss of indigenous vegetation where possible through refining the final development footprint, optimising the design within habitat of lowered ecological importance and sensitivity;</li> <li>- All construction equipment to be utilised must be a good working condition, and all possible precautions taken to prevent potential spills and /or leaks; and</li> <li>- An Alien and Invasive Control Plan must be compiled by a suitably qualified specialist and it must be ensured that sufficient funding is made available for the long term management and monitoring of AIPs.</li> </ul>
<b>Project phase</b>	<i>Construction Phase</i>
<b>Impact Summary</b>	<i>Loss of faunal habitat and species diversity</i>
<b>Management Measures</b>	<b>Proposed mitigation and management measures:</b>
	<p><b>Development footprint</b></p> <ul style="list-style-type: none"> <li>- Alien vegetation must be removed and controlled along the proposed powerline route, in line with the National Environmental Management: Biodiversity Act: 2004 (NEMBA) Alien and Invasive Species Regulations (2020);</li> <li>- The development footprint should be demarcated, and it should be ensured that no development related activities take place outside of the demarcated footprint;</li> <li>- The construction footprint must be kept as small as possible in order to minimise the impact on the surrounding environment. Efforts to reduce vegetation clearance or the removal of topsoil should be undertaken where possible beneath the proposed PV facility within the Eastern Highveld Grassland (this may reduce the impacts on valuable foraging and breeding habitat should fauna recolonize the footprint);</li> <li>- Faunal habitat beyond the demarcated area should not be altered or disturbed;</li> <li>- Construction equipment should be restricted to travelling only on designated roadways to limit the ecological footprint of the development activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;</li> <li>- No dumping of litter, rubble or cleared vegetation on site should be allowed. As such it is advised vegetation cuttings (especially AIP) to be carefully collected and disposed of at a separate waste facility;</li> <li>- Pipeline servitudes / connection routes must be kept as narrow as possible to prevent excessive disturbance to the vegetation. All trenched pipes (if any) must be backfilled as soon as possible and trenches should not be left exposed for extensive periods as faunal species could fall in and get injured/trapped;</li> <li>- Where spills or soil contamination occurs as a result of equipment maintenance activities, the contaminated soil needs to be excavated and removed to an approved waste disposal site. New soil is then to be used to replace the removed soil and the area appropriately revegetated;</li> <li>- No fires are allowed by construction personnel as this will increase the risk of the surrounding veld catching fire and burning down not only the immediate faunal habitat but also that of the larger local areas;</li> <li>- Following heavy rains, access roads and areas adjacent to the development footprints are to be inspected for signs of erosion, which if found must be immediately rectified through appropriate erosion control measures;</li> <li>- During the site-pegging phase of surface infrastructure, should any faunal SCC be observed, all activities should be halted and a suitably qualified specialist is to be contacted to advise on the best way forward;</li> <li>- Should any other faunal species protected under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA) or the Mpumalanga State of the Environment Report (2003) be encountered, a suitably qualified specialist should be consulted. Should it be deemed necessary to move the taxa authorisation to relocate such species must be obtained from MTPA or the Department of Forestry, Fisheries and the Environment (DFFE);</li> <li>- Edge effect control needs to be implemented to ensure no further degradation and potential loss of faunal habitat outside of the proposed project footprint areas occurs;</li> <li>- Smaller species such as scorpions and reptiles are likely to be less mobile during the colder periods of the year, as such should any be observed in the footprint sites during</li> </ul>



	<p>clearing and operational activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these species and the need for their conservation. Smaller scorpion species and harmless reptiles should be carefully relocated by a suitably nominated construction person or staff member. For larger venomous snakes, a suitably trained official or specialist should be contacted to affect the relocation of the species, should it not move off on its own;</p> <ul style="list-style-type: none"> <li>- All rescue and relocation plans for SCC should be overseen by a suitably qualified specialist;</li> <li>- Disturbed and cleared areas need to be revegetated with indigenous grass species to help stabilise the soil surface. Where bare soils are left exposed because of construction activities, they should be immediately rehabilitated; and</li> <li>- It is recommended that construction activities take place in a phased manner, so as to ensure that as far as possible faunal species can naturally disperse out of the area ahead of sequential construction activities;</li> </ul> <p><b>Alien Vegetation</b></p> <ul style="list-style-type: none"> <li>- Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed, according to regulations specified in the floral report.</li> <li>- Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the construction and operational phase of the development should be regularly checked for AIP proliferation and to prevent spread into surrounding natural areas. This is especially important for linear developments as they serve as corridors along which alien species can spread more rapidly; and</li> <li>- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it.</li> <li>- All cleared plant material to be disposed of at a licensed waste facility which complies with legal standards.</li> </ul> <p><b>Faunal SCC</b></p> <ul style="list-style-type: none"> <li>- Where feasible, effective relocation of individuals to suitable similar habitat in the vicinity of the proposed footprint areas;</li> <li>- All rescue and relocation plans should be overseen by a suitably qualified specialist;</li> <li>- It is recommended that construction activities take place in a phased manner, so as to ensure that as far as possible faunal species can naturally disperse out of the area ahead of sequential construction activities;</li> </ul>
<b>Project phase</b>	<i>Operational and Maintenance Phase</i>
<b>Impact Summary</b>	<i>Loss of faunal habitat and species diversity</i>
<b>Management Measures</b>	<p><b>Development footprint</b></p> <ul style="list-style-type: none"> <li>- All vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the development activities;</li> <li>- No litter or cleared plant material should be dumped or allowed to remain on-site. As such it is advised that alien vegetation cuttings be carefully collected and disposed of at a separate waste facility;</li> <li>- No hunting/trapping or collecting of any faunal species is allowed;</li> <li>- No fires are allowed by operational personnel as this will increase the risk of the surrounding veld catching fire and burning down not only the immediate faunal habitat but also that of the larger local areas;</li> </ul> <p><b>Alien Vegetation</b></p> <ul style="list-style-type: none"> <li>- Alien vegetation must be removed from the study area during both the construction and operational phases, in line with the NEMBA Alien and Invasive Species Regulations (2016).</li> </ul> <p><b>Faunal SCC</b></p> <ul style="list-style-type: none"> <li>- No collection or persecution of faunal SCC within the study area is allowed;</li> <li>- Any faunal SCC that are observed should be logged (with a GPS position) and uploaded to the iNaturalist site. Such data can also be used as part of the proposed facilities long term monitoring.</li> </ul>





## 6. CONCLUSION

STS was appointed to conduct a Biodiversity Assessment as part of the EIA process for the proposed Halfgewonnen Solar PV Project, near Hendrina, Mpumalanga Province, i.e., the **study area**. The project is associated with both linear developments (Main Pipelines and a High-Voltage Line), as well as surface infrastructure including the Solar PV Panels, Buildings, the Main Substation and Battery Storage of the energy generated.

During the field assessment, four broad faunal habitats within the study area were identified, namely the Degraded and Transformed Habitat, Secondary Grassland Habitat, Wetland Habitat and Eastern Highveld Grassland habitat. The impacts from the proposed infrastructure are largely medium low and low and are not anticipated to impact on local fauna. The more sensitive nature of the Eastern Highveld Grassland in which the activity falls is where higher impacts are anticipated.

During the field assessment no faunal SCC were observed. Two faunal SCC, *Metisella meninx* (Marsh Sylph) were noted to have breeding habitat within the Wetland Habitat. The larval food plant for *Metisella meninx* (Marsh Sylph) was observed in high abundances within the Wetland habitat and as such any disturbances within this unit will likely result in the exodus of this species from the study area. Marginal breeding habitat for *Pyxicephalus adspersus* (Giant Bullfrog, VU) was observed within the Wetland while suitable foraging habitat was noted within the adjacent grassland habitat, thus impacts to these habitats will reduce the suitability of the study area for this species. *Leptailurus serval* (Serval) may also utilise the Eastern Highveld grassland and Wetland habitat for breeding due to the suitable habitat observed. Faunal SCC that range in Mpumalanga with a medium probability of occurring on site due suitable habitat or food resources being present, include: *Ourebia ourebi* (Oribi) and *Poecilogale albinucha* (Striped Weasel).

The objective of this study was to provide sufficient information on the faunal ecology of the area, together with other studies on the physical and socio-cultural environment, in order for the EAP and the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development. It is the opinion of the ecologist that the proposed activities may result in medium high to high impacts, yet, with mitigation impact levels can be reduced to medium low and lower levels. It is thus important to mitigate ecological impacts on the receiving environment as well as national and provincial biodiversity targets. Consultation with the relevant provincial conservation authorities should be undertaken to determine the appropriate approach to biodiversity management associated with the project. This study provides the relevant information required in order to implement



IEM and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development.



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## APPENDIX A: Faunal Method of Assessment

It is important to note that due to the nature and habits of fauna, varied stages of life cycles, seasonal and temporal fluctuations along with other external factors, it is unlikely that all faunal species will have been recorded during the site assessment. The presence of anthropogenic activities adjacent to the sites will have an impact on faunal behaviour and in turn the rate of observations.

### ***Mammals***

Mammal species were recorded during the field assessment with the use of visual identification, spoor, calls, dung and other notable field signs. Due to access restrictions, security risks and the limited time available during the assessment, camera and Sherman traps were not employed. Specific attention was paid to mammal SCC as listed by the International Union for the Conservation of Nature (IUCN), the Mpumalanga province and NEMBA.

### ***Reptiles***

Reptiles were identified during the field survey. Suitable applicable habitat areas (rocky outcrops and fallen dead trees) were inspected, and all reptiles encountered are identified. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which reptile species are likely to occur on the study area. Specific attention was given to reptile SCC listed on a regional and national level, as well as those identified by the IUCN.

### ***Amphibians***

Identifying amphibian species is done by the use of direct visual identification along with call identification technique. Amphibian species flourish in and around wetland, riparian and moist grassland areas. It is unlikely that all amphibian species will have been recorded during the site assessment, due to their cryptic nature and habits, varied stages of life cycles and seasonal and temporal fluctuations within the environment. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which amphibian species are likely to occur within the study area as well as the surrounding area. Specific attention was given to amphibian SCC listed on a regional and national level, as well as those identified by the IUCN.

### ***Invertebrates***

Whilst conducting transects through the study area, all insect species visually observed were identified, and where possible photographs taken. It must be noted, however that due to the cryptic nature and habits of insects, varied stages of life cycles and seasonal and temporal fluctuations within the environment, it is unlikely that all insect species will have been recorded during the site assessment period. Nevertheless, the data gathered during the assessment along with the habitat analysis provided an accurate indication of which species are likely to occur in the study area at the time of the survey. Specific attention was given to insect SCC listed on a regional and national level, as well as those identified by the IUCN.

### ***Arachnids***

Suitable applicable habitat areas (rocky outcrops, sandy areas and fallen dead trees) where spiders and scorpions are likely to reside were searched. Rocks were overturned and inspected for signs of these species. Specific attention was paid to searching for Mygalomorphae arachnids (Trapdoor and Baboon spiders) as well as potential SCC scorpions.

## ***Faunal Species of Conservation Concern Assessment***

Prior to the site visit, a record of faunal SCC and their habitat requirements was developed for the study area, which includes consulting the National Web-based Environmental Screening Tool. Because not all SCC have been included in the Screening Tool layers (e.g., NT and DD taxa), it remains important for the specialist to be on the lookout for additional SCC. For this study, known distribution ranges and



literature regarding SCC was used in conjunction with primary sources described below. Species that have a Very High – Medium POC are considered as possibly occurring within a study area.

## The National Web-Based Environmental Screening Tool

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the study area. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, “*low*”, “*medium*”, “*high*” and “*very high*” sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g., for **confirmed** areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Animal [and Plant] Protocols are described below<sup>3</sup>:

- **Very High:** Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km<sup>2</sup> are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) D criteria of the IUCN or species listed as Critically/Extremely Rare under South Africa’s National Red List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale.
- **High:** Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2000) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat.
- **Medium:** Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
- **Low:** Areas where no SCC are known or expected to occur.

<sup>3</sup> More details on the use of the Screening Tool for Species of Conservation Concern can be found in the below resources:

- South African National Biodiversity Institute (SANBI). 2020. Draft Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.0.
- The National Web based Environmental Screening Tool website:  
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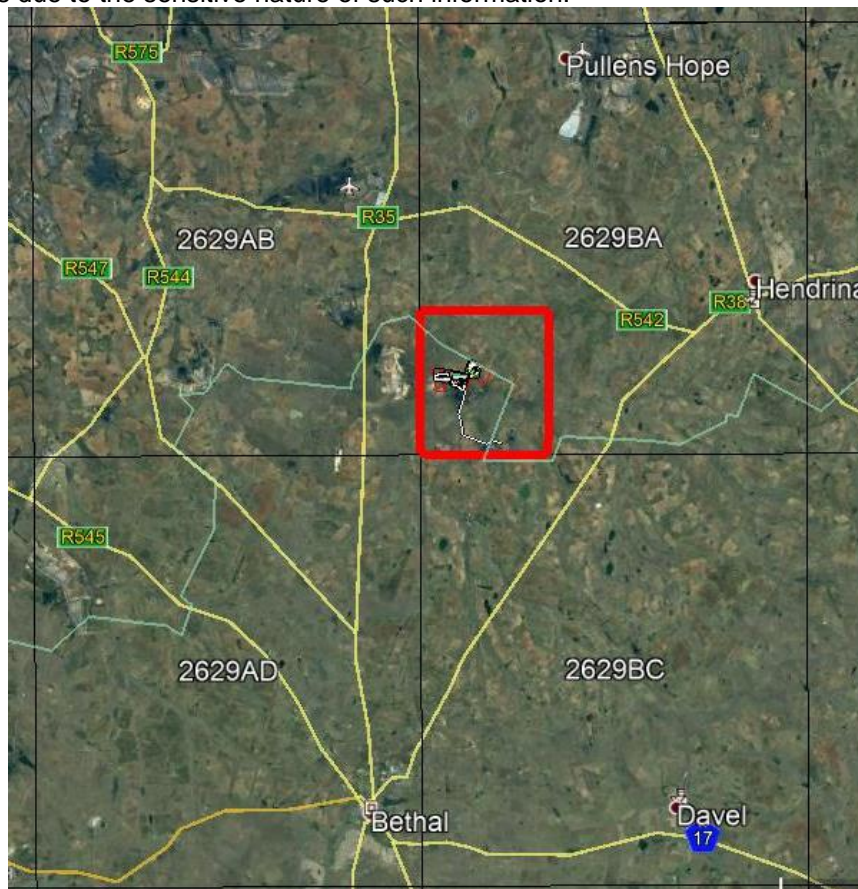


## NEMBA TOPS SPECIES

The National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (Government Gazette [GN] 29657, as amended in GN R1187 in Government Gazette 30568 of 2007 and again in GN 627 in Government Gazette 43386 of 2020) were taken into consideration.

## MTPA Species Status Report

A list of threatened species for the QDS 2629BA, 2629AB, 2629BC and 2629AD was obtained from the Mpumalanga Tourism and Parks Agency (MTPA) due to the study area being very centrally located in these four QDS's (see below image). This list includes true recordings of species but does not provide exact localities due to the sensitive nature of such information.



## Specially Protected and Protected Species

The Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA) provides a list of Protected Species (Schedule 11) (Section 69(1)(a) of the MNCA) and Specially Protected Species (Schedule 12) (Section 69(1)(b) of the MNCA) for the Mpumalanga Province. These species formed part of the SCC assessment.



Throughout the fauna assessment, special attention was paid to the identification of any of these SCC as well as the identification of suitable habitat that could potentially support these species. The **Probability of Occurrence (POC)** for each faunal SCC is described as:

- **“Confirmed”**: if observed during the survey.
- **“High”**: if within the species’ known distribution range and suitable habitat is available.
- **“Medium”**: if either within the known distribution range of the species or if suitable habitat is present; or
- **“Low”**: if the habitat is not suitable and falls outside the distribution range of the species.

The accuracy of the POC is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.

## Faunal Habitat Sensitivity

The sensitivity of the study area for each faunal class (i.e., mammals, birds, reptiles, amphibians and invertebrates) was determined by calculating the mean of five different parameters which influence each faunal class and provide an indication of the overall faunal ecological integrity, importance and sensitivity of the study area for each class. Each of the following parameters are subjectively rated on a scale of 1 to 5 (1 = lowest and 5 = highest):

- **Faunal SCC**: The confirmed presence or potential for faunal SCC or any other significant species, such as endemics, to occur within the habitat unit;
- **Habitat Availability**: The presence of suitable habitat for each class;
- **Food Availability**: The availability of food within the study area for each faunal class;
- **Faunal Diversity**: The recorded faunal diversity compared to a suitable reference condition such as surrounding natural areas or available faunal databases; and
- **Habitat Integrity**: The degree to which the habitat is transformed based on observed disturbances which may affect habitat integrity.

Each of these values contribute equally to the mean score, which determines the suitability and sensitivity of the study area for each faunal class. A conservation and land-use objective is also assigned to each sensitivity class which aims to guide the responsible and sustainable utilization of the study area in relation to each faunal class. The different classes and land-use objectives are presented in the table below:

**Table A1: Faunal habitat sensitivity rankings and associated land-use objectives.**

Score	Rating significance	Conservation objective
1.0 < 1.5	Low	Optimise development potential.
≥1.5 <2.5	Moderately low	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.
≥2.5 <3.5	Intermediate	Preserve and enhance biodiversity of the habitat unit surrounds while optimising development potential.
≥3.5 <4.5	Moderately high	Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance.
≥4.5 ≤ 5.0	High	Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered.



## APPENDIX B: Faunal SCC

**Table B1: List of mammal species and IUCN Red List Category (Cohen & Camacho, 2002a) as listed in the Mpumalanga State of the Environment Report (2003).**

English Name	Species	MP 2003 Status	POC
Cape Mole Rat	<i>Georychus capensis</i>	EN	Medium
Sclater's Golden Mole	<i>Chlorotalpa sclateri montana</i>	CR	Low
Highveld Golden Mole	<i>Amblysomus septentrionalis</i>	VU	Low
Rough-Haired Golden Mole	<i>Chrysospalax villosus rufopallidus</i>	CR	Low
Rough-Haired Golden Mole	<i>Chrysospalax villosus rufus</i>	EN	Low
Juliana's Golden Mole	<i>Neamblysomus julianae</i>	EN	Low
Robust Golden Mole	<i>Amblysomus robustus</i>	VU	Low
Meester's Golden Mole	<i>Amblysomus hottentotus meesteri</i>	VU	Low
Laminate Vlei Rat	<i>Otomys laminatus</i>	VU	Low
Peak-Saddle Horseshoe Bat	<i>Rhinolophus blasii empusa</i>	EN	Low
Lesser Long-Fingered Bat	<i>Miniopterus fraterculus</i>	VU	Low
Welwitsch's Hairy Bat	<i>Myotis welwitschii</i>	EN	Low
Short-Eared Trident Bat	<i>Cloeotis percivali australis</i>	EN	Low
Antbear	<i>Orycteropus afer</i>	NE	Low
Oribi	<i>Ourebia ourebi</i>	VU	Medium
African Striped Weasel	<i>Poecilogale albinucha</i>	NE	Medium
Wild Dog	<i>Lycaon pictus</i>	EN	Low
Pangolin	<i>Manis temminckii</i>	VU	Low
Aardwolf	<i>Proteles cristatus</i>	LC	Low
African Leopard	<i>Panthera pardus</i>	VU	Low
Natal Red Rock Rabbit	<i>Pronolagus crassicaudatus ruddi</i>	NE	Low
Serval	<i>Leptailurus serval</i>	NT	Medium

EN= Endangered; CR= Critically Endangered; LC=Least Concern; NE=Not Evaluated; VU= Vulnerable

**Table B2: List of reptile species and their IUCN Red List Category (Williamson & Theron, 2002) as listed in the Mpumalanga State of the Environment Report (2003).**

English Name	Species	MP 2003 Status	POC
Haacke's Flat Gecko	<i>Afroedura haackei</i>	EN	Low
Abel Erasmus Pass Flat Gecko	<i>Afroedura rupestris</i>	EN	Low
Mariepskop Flat Gecko	<i>Afroedura indet</i>	EN	Low
Rondavels Flat Gecko	<i>Afroedura rondavelica</i>	EN	Low
Forest/Natal Purpleglossed Snake	<i>Amblydipsas concolor</i>	VU	Low
Lowveld Shieldnosed Snake	<i>Aspidelaps scutatus intermedius</i>	VU	Low
Dwarf Chameleon	<i>Bradypodion transvaalense complex</i>	VU	Low
Sungazer/ Giant Girdled Lizard	<i>Cordylus giganteus</i>	VU	Low
Barberton Girdled Lizard	<i>Cordylus warreni barbertonensis</i>	NT	Low
Lebombo Girdled Lizard	<i>Cordylus warreni</i>	VU	Low
Swazi Rock Snake	<i>Lamprophis swazicus</i>	VU	Low
Transvaal Flat Lizard	<i>Platysaurus orientalis</i>	NT	Low
Wilhelm's Flat Lizard	<i>Platysaurus wilhelmi</i>	VU	Low
Montane Burrowing Skink	<i>Scelotes mirus</i>	NT	Low
Breyer's Longtailed Seps	<i>Tetradactylus breyeri</i>	VU	Low

EN= Endangered; VU= Vulnerable; NT= Near Threatened; LC= Least Concern

**Table B3: List of amphibian species and their IUCN Red List Category (Williamson & Theron, 2002) as listed in the Mpumalanga State of the Environment Report (2003).**

English Name	Species	MP 2003 Status	POC
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Karoo Toad	<i>Bufo gariensis nubicolus</i>	VU	Low
Natal Ghost Frog	<i>Heleophryne natalensis</i>	VU	Low
Spotted Shovel-Nosed Frog	<i>Hemisis guttatus</i>	VU	Low
Yellow Striped Reed Frog	<i>Hyperolius semidiscus</i>	VU	Low
Plain Stream Frog	<i>Strongylopus wageri</i>	VU	Low
Giant Bullfrog	<i>Pyxicephalus adspersus</i>	VU	Medium/High
Greater Leaf-Folding Frog	<i>Afraxalus fornasinii</i>	VU	Low
Whistling Rain Frog	<i>Breviceps sopranus</i>	VU	Low

VU= Vulnerable

**Table B4: List of invertebrate species and their IUCN Red List Category (De Wet, 2002) as listed in the Mpumalanga State of the Environment Report (2003).**

English Name	Species	MP 2003 Status	POC
<i>Aloeides rossouwi</i>	Rossouw's Copper	EN	Low
<i>Aloeides barbarae</i>	Barbara's Copper	EN	Low
<i>Lepidochrysops swanepoeli</i>	Swanepoel's Blue	EN	Low
<i>Lepidochrysops jefferyi</i>	Jeffery's Blue	EN	Low
<i>Dingana fraterna</i>	Stoffberg Widow	EN	Low
<i>Metisella meninx</i>	Marsh Sylph	VU	High
<i>Aloeides nubilis</i>	Cloud Copper	VU	Low
<i>Pseudagrion coeleste</i>	Catshead Sprite	CR	Low
<i>Pseudagrion inopinatum</i>	Balinsky's Sprite	VU	Low
<i>Pseudagrion newtoni</i>	Newton's Sprite	VU	Unknown
<i>Pseudagrion sjoestedti pseudojoestedti</i>	Sjoestedt's Sprite	CR	Low
<i>Aeshna ellioti usambarica</i>	Elliot's Hawker	VU	Low
<i>Phyllomacromia monoceros</i>	Unicorn Cruiser	CR	Low

EN= Endangered; CR= Critically Endangered; VU= Vulnerable

**Table B5: Protected Species for the Mpumalanga Province (2015) as listed in Government Notice 256 Threatened or Protected Species (TOPS) as published in the Government Gazette 38600 of 2015 as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)**

English Name	Species	Status
Natal Ghost Frog	<i>Heleophryne natalensis</i>	VU
Giant Bullfrog	<i>Pyxicephalus adspersus</i>	VU/P*
African Bullfrog	<i>Pyxicephalus edulis</i>	P*
Spotted Shovel-Nosed Frog	<i>Hemisis guttatus</i>	VU
Yellow Striped Reed Frog	<i>Hyperolius semidiscus</i>	VU
Plain Stream Frog	<i>Strongylopus wageri</i>	VU
Greater Leaf-Folding Frog	<i>Afraxalus fornasinii</i>	VU
Whistling Rain Frog	<i>Breviceps sopranus</i>	VU

EN= Endangered; CR= Critically Endangered; VU= Vulnerable; P\* = Protected (TOPS 2007)

**Table B6: MTPA protected fauna list that have been historically recorded in the study area<sup>4</sup> QDS 2629BA, and 2629AB.**

Scientific Name	Common Name	Conservation Status (RSA)	Conservation Status (MTPA)	Endemic
<b>On the same property</b>				
<b>REPTILES</b>				
<i>Agama aculeata distanti</i>	<i>Agama aculeata distanti</i>	LC	LC	RSA
<i>Aparallactus capensis</i>	<i>Aparallactus capensis</i>	LC	LC	-
<i>Crotaphopeltis hotamboeia</i>	<i>Crotaphopeltis hotamboeia</i>	LC	LC	-
<i>Pachydactylus affinis</i>	<i>Pachydactylus affinis</i>	LC	LC	RSA

<sup>4</sup> Information provided by the Mpumalanga Tourism and Parks Agency in January 2021.



Scientific Name	Common Name	Conservation Status (RSA)	Conservation Status (MTPA)	Endemic
<i>Pachydactylus capensis</i>	<i>Pachydactylus capensis</i>	LC	LC	-
<i>Psammophis crucifer</i>	<i>Psammophis crucifer</i>	LC	LC	RSA
<b>Within 2 km</b>				
<b>REPTILES</b>				
<i>Lycodonomorphus rufulus</i>	<i>Lycodonomorphus rufulus</i>	LC	No details provided	-
<b>AMPHIBIANS</b>				
<i>Amietia delalandii</i> (=Rana angolensis)	<i>Amietia delalandii</i> (was Rana angolensis)	LC	No details provided	-
<i>Cacosternum boettgeri</i>	<i>Cacosternum boettgeri</i>	LC	No details provided	-
<i>Kassina senegalensis</i>	<i>Kassina senegalensis</i>	LC	No details provided	-
<i>Schismaderma carens</i>	<i>Schismaderma carens</i>	LC	No details provided	-
<i>Sclerophrys gutturalis</i> (was Bufo)	<i>Sclerophrys gutturalis</i> (was Bufo)	LC	No details provided	-
<i>Semnodactylus wealii</i>	<i>Semnodactylus wealii</i>	LC	No details provided	RSA
<i>Strongylopus fasciatus</i>	<i>Strongylopus fasciatus</i>	LC	No details provided	Near RSA
<i>Xenopus laevis</i>	<i>Xenopus laevis</i>	LC	No details provided	-
<b>Within 5 km</b>				
<b>REPTILES</b>				
<i>Lycodonomorphus rufulus</i>	<i>Lycodonomorphus rufulus</i>	LC	No details provided	-
<b>Within 10 km</b>				
<b>BIRDS</b>				
<i>Alopochen aegyptiaca</i>	Egyptian Goose	No details provided	No details provided	-
<i>Ardea melanocephala</i>	Black-headed Heron	No details provided	No details provided	-
<i>Fulica cristata</i>	Red-knobbed Coot	No details provided	No details provided	-
<i>Gallinago nigripennis</i>	African Snipe	No details provided	No details provided	-
<i>Himantopus</i>	Black-winged Stilt	No details provided	No details provided	-
<i>Phalacrocorax africanus</i>	Reed Cormorant	No details provided	No details provided	-
<i>Tringa nebularia</i>	Common Greenshank	No details provided	No details provided	-
<i>Tyto capensis</i>	African Grass-Owl	VU	VU	-
<i>Vanellus armatus</i>	Blacksmith Lapwing	No details provided	No details provided	-
<b>LARGE MAMMALS</b>				
<i>Cynictis penicillata</i>	Yellow mongoose	LC	LC	-
<b>Within 15 km</b>				
<b>BIRDS</b>				
<i>Alopochen aegyptiaca</i>	Egyptian Goose	No details provided	No details provided	-
<i>Ardea cinerea</i>	Grey Heron	No details provided	No details provided	-
<i>Ciconia</i>	White Stork	No details provided	No details provided	-
<i>Eupodotis caerulescens</i>	Blue Korhaan	LC	NT	RSA
<i>Fulica cristata</i>	Red-knobbed Coot	No details provided	No details provided	-
<i>Phoenicopterus minor</i>	Lesser Flamingo	NT	NT	-
<i>Phoenicopterus ruber</i>	Greater Flamingo	NT	NT	-
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU	-
<i>Tyto capensis</i>	African Grass-Owl	VU	VU	-





Scientific Name	Common Name	Conservation Status (RSA)	Conservation Status (MTPA)	Endemic
<b>REPTILES</b>				
<i>Duberria lutrix</i>	<i>Duberria lutrix</i>	LC	RSA	-
<b>LARGE MAMMALS</b>				
<i>Canis mesomelas</i>	Black-backed jackal	LC	LC	-
<i>Damaliscus pygargus phillipsi</i>	Blesbok	LC	LC	RSA
<i>Equus quagga buchellii</i>	Burchell's zebra	LC	LC	-
<i>Felis silvestris</i>	African wild cat	LC	NT	-
<i>Ictonyx striatus</i>	Striped polecat	LC	LC	-
<i>Leptailurus serval</i>	Serval	NT	NT	-
<b>Within 20 km</b>				
<b>BIRDS</b>				
<i>Alopochen aegyptiaca</i>	Egyptian Goose	No details provided	No details provided	-
<i>Anas erythrorhyncha</i>	Red-billed Teal	No details provided	No details provided	-
<i>Eupodotis caerulescens</i>	Blue Korhaan	LC	NT	RSA
<i>Fulica cristata</i>	Red-knobbed Coot	No details provided	No details provided	-
<i>Geronticus calvus</i>	Southern Bald Ibis	VU	VU	RSA
<i>Glareola nordmanni</i>	Black-winged Pratincole	NT	NT	-
<i>Phoenicopterus minor</i>	Lesser Flamingo	NT	NT	-
<i>Phoenicopterus ruber</i>	Greater Flamingo	NT	NT	-
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU	-
<i>Threskiornis aethiopicus</i>	African Sacred Ibis	No details provided	No details provided	-
<i>Tyto capensis</i>	African Grass-Owl	VU	VU	-
<b>INVERTEBRATES</b>				
<i>Aloeides dentatis maseruna</i>	<i>Aloeides dentatis maseruna</i>	LC	Rare	-
<i>Metisella meninx</i>	<i>Metisella meninx</i>	VU	NT	-
<b>REPTILES</b>				
<i>Aparallactus capensis</i>	<i>Aparallactus capensis</i>	LC	LC	-
<i>Crotaphopeltis hotamboeia</i>	<i>Crotaphopeltis hotamboeia</i>	LC	LC	-
<i>Dasypeltis scabra</i>	<i>Dasypeltis scabra</i>	LC	LC	-
<i>Hemachatus haemachatus</i>	<i>Hemachatus haemachatus</i>	LC	LC	RSA
<i>Lamprophis capensis</i>	<i>Lamprophis capensis</i>	LC	LC	-
<i>Leptotyphlops scutifrons conjunctus</i>	<i>Leptotyphlops scutifrons conjunctus</i>	LC	LC	RSA
<i>Pachydactylus affinis</i>	<i>Pachydactylus affinis</i>	LC	LC	RSA
<i>Pachydactylus capensis</i>	<i>Pachydactylus capensis</i>	LC	LC	-
<i>Pseudaspis cana</i>	<i>Pseudaspis cana</i>	LC	LC	-
<i>Mabuya striata punctatissima</i>	<i>Mabuya striata punctatissima</i>	No details provided	No details provided	-
		No details provided	No details provided	-
<b>AMPHIBIANS</b>				
<i>Amietia delalandii</i> (=Rana angolensis)	<i>Amietia delalandii</i> (was Rana angolensis)	LC	No details provided	-



Scientific Name	Common Name	Conservation Status (RSA)	Conservation Status (MTPA)	Endemic
<i>Amietia pyntoni</i> (= <i>Rana fuscigula</i> )	<i>Amietia fuscigula</i> ( was <i>Rana</i> )	LC	No details provided	Near RSA, Namibia
<i>Cacosternum boettgeri</i>	<i>Cacosternum boettgeri</i>	LC	No details provided	-
<i>Kassina senegalensis</i>	<i>Kassina senegalensis</i>	LC	No details provided	-
<i>Ptychadena porosissima</i>	<i>Ptychadena porosissima</i>	LC	No details provided	-
<i>Sclerophrys gutturalis</i> ( was <i>Bufo</i> )	<i>Sclerophrys gutturalis</i> ( was <i>Bufo</i> )	LC	No details provided	-
<i>Semnodactylus wealii</i>	<i>Semnodactylus wealii</i>	LC	No details provided	RSA
<i>Strongylopus fasciatus</i>	<i>Strongylopus fasciatus</i>	LC	No details provided	Near RSA
<i>Tomopterna natalensis</i>	<i>Tomopterna natalensis</i>	LC	No details provided	Near RSA
<i>Tomopterna tandyi</i>	<i>Tomopterna tandyi</i>	LC	No details provided	RSA
<i>Xenopus laevis</i>	<i>Xenopus laevis</i>	LC	No details provided	-
<b>LARGE MAMMALS</b>				
<i>Cynictis penicillata</i>	Yellow mongoose	LC	LC	-
<i>Damaliscus pygargus phillipsi</i>	Blesbok	LC	LC	RSA
<i>Hyaena brunnea</i>	Brown hyaena	NT	NT	-
<i>Ictonyx striatus</i>	Striped polecat	LC	LC	-
<i>Leptailurus serval</i>	Serval	NT	NT	-
<i>Lepus saxatilis</i>	Scrub Hare	LC	LC	-
<i>Sylvicapra grimmia</i>	Common duiker	LC	LC	-
<b>SMALL MAMMALS</b>				
<i>Atelerix frontalis</i>	Southern African hedgehog	NT	NT	-
<b>Within 30 km</b>				
<b>BIRDS</b>				
<i>Afrotis afraoides</i>	Northern Black Korhaan	No details provided	No details provided	-
<i>Alopochen aegyptiaca</i>	Egyptian Goose	No details provided	No details provided	-
<i>Anas smithii</i>	Cape Shoveler	No details provided	No details provided	-
<i>Anas undulata</i>	Yellow-billed Duck	No details provided	No details provided	-
<i>Ardea cinerea</i>	Grey Heron	No details provided	No details provided	-
<i>Asio capensis</i>	Marsh Owl	No details provided	No details provided	-
<i>Bubo africanus</i>	Spotted Eagle-Owl	No details provided	No details provided	-
<i>Bubulcus ibis</i>	Cattle Egret	No details provided	No details provided	-
<i>Ciconia ciconia</i>	White Stork	No details provided	No details provided	-
<i>Circus macrourus</i>	Pallid Harrier	NT	NT	-
<i>Circus pygargus</i>	Montagu's Harrier	No details provided	No details provided	-
<i>Egretta alba</i>	Great Egret	No details provided	No details provided	-
<i>Elanus caeruleus</i>	Black-shouldered Kite	No details provided	No details provided	-
<i>Eupodotis caerulescens</i>	Blue Korhaan	LC	NT	RSA
<i>Falco amurensis</i>	Amur Falcon	No details provided	No details provided	-
<i>Falco biarmicus</i>	Lanner Falcon	VU	VU	-
<i>Falco vespertinus</i>	Red-footed Falcon	NT	NT	-
<i>Fulica cristata</i>	Red-knobbed Coot	No details provided	No details provided	-
<i>Geronticus calvus</i>	Southern Bald Ibis	VU	VU	RSA



Scientific Name	Common Name	Conservation Status (RSA)	Conservation Status (MTPA)	Endemic
<i>Himantopus</i>	Black-winged Stilt	No details provided	No details provided	-
<i>Oxyura maccoa</i>	Maccoa Duck	NT	NT	-
<i>Phoenicopterus minor</i>	Lesser Flamingo	NT	NT	-
<i>Phoenicopterus ruber</i>	Greater Flamingo	NT	NT	-
<i>Plectropterus gambensis</i>	Spur-winged Goose	No details provided	No details provided	-
<i>Plegadis falcinellus</i>	Glossy Ibis	No details provided	No details provided	-
<i>Ploceus rubiginosus</i>	Chestnut Weaver	No details provided	No details provided	-
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU	-
<i>Scleroptila levaillantii</i>	Red-winged Francolin	No details provided	No details provided	-
<i>Smithornis capensis</i>	African Broadbill	No details provided	No details provided	-
<i>Tyto alba</i>	Barn Owl	No details provided	No details provided	-
<i>Tyto capensis</i>	African Grass-Owl	VU	VU	-
<b>INVERTEBRATES</b>				
<i>Metisella meninx</i>	<i>Metisella meninx</i>	VU	NT	-
<b>REPTILES</b>				
<i>Acontias breviceps</i>	<i>Acontias breviceps</i>	LC	VU	MP
<i>Afrotyphlops bibroni</i>	<i>Afrotyphlops bibroni</i>	LC	No details provided	RSA
<i>Agama aculeata distanti</i>	<i>Agama aculeata distanti</i>	LC	No details provided	RSA
<i>Aparallactus capensis</i>	<i>Aparallactus capensis</i>	LC	No details provided	-
<i>Crotaphopeltis hotamboeia</i>	<i>Crotaphopeltis hotamboeia</i>	LC	No details provided	-
<i>Gerrhosaurus flavigularis</i>	<i>Gerrhosaurus flavigularis</i>	LC	No details provided	-
<i>Leptotyphlops scutifrons conjunctus</i>	<i>Leptotyphlops scutifrons conjunctus</i>	LC	No details provided	RSA
<i>Lycodonomorphus rufulus</i>	<i>Lycodonomorphus rufulus</i>	LC	No details provided	-
<i>Pachydactylus affinis</i>	<i>Pachydactylus affinis</i>	LC	No details provided	RSA
<i>Pachydactylus capensis</i>	<i>Pachydactylus capensis</i>	LC	No details provided	-
<i>Psammophis crucifer</i>	<i>Psammophis crucifer</i>	LC	No details provided	RSA
<i>Psammophylax rhombeatus</i>	<i>Psammophylax rhombeatus</i>	LC	No details provided	RSA
<i>Psammophylax rhombeatus</i>	<i>Psammophylax rhombeatus</i>	LC	No details provided	RSA
<i>Pseudaspis cana</i>	<i>Pseudaspis cana</i>	LC	No details provided	-
<b>AMPHIBIANS</b>				
<i>Amietia delalandii</i> (=Rana angolensis)	<i>Amietia delalandii</i> (was Rana angolensis)	LC	No details provided	-
<i>Amietia pyntoni</i> (=Rana fuscigula)	<i>Amietia fuscigula</i> ( was Rana)	LC	No details provided	Near RSA, Namibia
<i>Cacosternum boettgeri</i>	<i>Cacosternum boettgeri</i>	LC	No details provided	-
<i>Kassina senegalensis</i>	<i>Kassina senegalensis</i>	LC	No details provided	-
<i>Schismaderma carens</i>	<i>Schismaderma carens</i>	LC	No details provided	-
<i>Sclerophrys capensis</i> (was Bufo rangeri)	<i>Sclerophrys capensis</i> (was Bufo rangeri)	LC	No details provided	RSA
<i>Sclerophrys gutturalis</i> (was Bufo)	<i>Sclerophrys gutturalis</i> (was Bufo)	LC	No details provided	-
<i>Semnodactylus wealii</i>	<i>Semnodactylus wealii</i>	LC	No details provided	RSA
<i>Strongylopus fasciatus</i>	<i>Strongylopus fasciatus</i>	LC	No details provided	Near RSA



Scientific Name	Common Name	Conservation Status (RSA)	Conservation Status (MTPA)	Endemic
<i>Tomopterna cryptotis</i>	<i>Tomopterna cryptotis</i>	LC	No details provided	-
<i>Tomopterna natalensis</i>	<i>Tomopterna natalensis</i>	LC	No details provided	Near RSA
<i>Tomopterna tandyi</i>	<i>Tomopterna tandyi</i>	LC	No details provided	RSA
<i>Xenopus laevis</i>	<i>Xenopus laevis</i>	LC	No details provided	--
<b>LARGE MAMMALS</b>				
<i>Antidorcas marsupialis</i>	Springbok	LC	LC	-
<i>Aonyx capensis</i>	Cape clawless otter	LC	LC	-
<i>Atilax paludinosus</i>	Water mongoose	LC	LC	-
<i>Damaliscus pygargus phillipsi</i>	Blesbok	LC	LC	RSA
<i>Hyaena brunnea</i>	Brown hyaena	NT	NT	-
<i>Ictonyx striatus</i>	Striped polecat	LC	LC	-
<i>Leptailurus serval</i>	Serval	NT	NT	-
<i>Lepus saxatilis</i>	Scrub Hare	LC	LC	-
<i>Ourebia ourebi</i>	Oribi	EN	EN	-
<i>Raphicerus campestris</i>	Steenbok	LC	LC	-
<i>Suricata suricatta</i>	Suricate	LC	LC	-
<i>Vulpes chama</i>	Cape fox	LC	LC	-
<b>SMALL MAMMALS</b>				
<i>Amblysomus septentrionalis</i>	Highveld golden mole	NT	NT	-
<i>Atelerix frontalis</i>	Southern African hedgehog	NT	NT	-
<i>Crocidura mariquensis</i>	Swamp musk shrew	NT	NT	-
<i>Xerus inauris</i>	Cape ground squirrel	LC	LC	-
<b>Beyond 30 km</b>				
<b>BIRDS</b>				
<i>Falco amurensis</i>	Amur Falcon	No details provided	No details provided	-
<b>REPTILES</b>				
<i>Chamaesaura aenea</i>	<i>Chamaesaura aenea</i>	NT	NT	RSA
<b>LARGE MAMMALS</b>				
<i>Connochaetes gnou</i>	Black wildebeest	LC	LC	-
<i>Damaliscus pygargus phillipsi</i>	Blesbok	LC	LC	RSA
<i>Equus quagga buchellii</i>	Burchell's zebra	LC	LC	-

EN= Endangered; CR= Critically Endangered; VU= Vulnerable; P = Protected; NYBA = Not Yet Been Assessed

### Species listed as protected under the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA)

Table B8: 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





**Table B9: Schedule 2 - PROTECTED GAME (SECTION 4 (1) (b))**

Common name	Scientific name
<b>AMPHIBIANS, REPTILES AND MAMMALS</b>	
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</i>
Hartmann's Zebra	<i>Equus zebra hartmannae</i>
Hippopotamus	<i>Hippopotamus amphibius</i>
Giraffe	<i>Giraffa 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 lunatus</i>
Lichtenstein's Hartebeest	<i>Alcelaphus lichtensteinii</i>
Klipspringer	<i>Oreotragus</i>
Oribi	<i>Ourebia ourebi</i>
Steenbok	<i>Raphicerus campestris</i>
Sharpe's Grysbok	<i>Raphicerus sharper</i>
Suni	<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>
<b>BIRDS</b>	
Any bird which is a wild animal, excluding a bird referred to in Schedule 3, and the -	
White Breasted Cormorant	<i>Phalacrocorax lucidus</i>
Reed Cormorant	<i>Phalacrocorax africanus</i>
Red-Eyed Turtle Dove	<i>Streptopelia semitorquata</i>
Cape Turtle Dove	<i>Streptopelia capicola</i>
Laughing Dove	<i>Streptopelia senegalensis</i>
all species of mousebirds	all species of the Family Colidae
Pied Crow	<i>Corvus albus</i>
Black Crow	<i>Corvus capensis</i>
Red-Eyed Bulbul	<i>Pycnonotus nigricans</i>
Black-Eyed Bulbul	<i>Pycnonotus barbatus</i>
Red-Winged Starling	<i>Onychognathus morio</i>
Cape Sparrow	<i>Passer melanurus</i>
Spotted-Backed Weaver	<i>Ploceus cucullatus</i>
Cape Weaver	<i>Ploceus capensis</i>
Masked Weaver	<i>Ploceus velatus</i>



Common name	Scientific name
Red-Billed Quelea	<i>Quelea</i>
Red Bishop	<i>Euplectes orix</i>

**Table B10: Schedule 4 - PROTECTED WILD ANIMALS (SECTION 4 (1) (d)).**

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

**Table B11: Schedule 5 - WILD ANIMALS TO WHICH THE PROVISIONS OF SECTION 33 APPLY**

Common name	Scientific name
Water Monitor Lizard	<i>Varanus niloticus</i>
White throated rock monitor lizard	<i>Varanus exanthematicus</i>
All species of snakes	all species of the Sub Order Serpentes
Any bird which is a wild animal, but which is not game, excluding the ostrich	<i>Struthio camelus</i>
Chacma Baboon	<i>Papio ursinus</i>
Vervet Monkey	<i>Cercopithecus mitis</i>
All Dassies	Family: Procaviidae
All Mongooses	Family: Viverridae
Tree Squirrel	<i>Paraxerus cepapi</i>
Warthog	<i>Phacochoerus aethiopicus</i>
Serval	<i>Felis serval</i>
Civet	<i>Civettictis civetta</i>
Cape Fox	<i>Vulpes chama</i>
Side Striped Jackal	<i>Canis adustus</i>
All Genets	<i>Genetia</i> spp.
Springhare	<i>Pedetes capensis</i>
African Wild Cat	<i>Felis lybica</i>

**Table B12: Schedule 7 - INVERTEBRATES (SECTION 35 (1)).**

Common name	Scientific name
All species of baboon spiders belonging to the genera as referred	<i>Ceratogyrus</i> spp., <i>Harpactira</i> spp. and <i>Pterinochilus</i> spp.



## APPENDIX C: Faunal Species List

**Table C1: Mammal species and or signs thereof recorded during the field assessment.**

Scientific Name	Common Name	Conservation Status (IUCN)
<i>Sylvicapra grimmia</i>	Common Duiker	LC
<i>Atilax paludinosus</i>	Marsh (Water) Mongoose	LC
<i>Dendromus mesomelas</i>	Brant's Climbing Mouse	LC
<i>Lepus saxitilis</i>	Scrub Hare	LC
<i>Raphicerus campestris</i>	Steenbok	LC
<i>Canis mesomelas</i>	Black -backed Jackal	LC
<i>Hystrix africaeaustralis</i>	Cape Porcupine	LC

LC = Least Concern, NT (MP 2003) = Near Threatened according to the Mpumalanga State of the Environment Report (2003).

**Table C2: Amphibian species recorded during the field assessment**

Scientific Name	Common Name	Conservation Status (IUCN)
<i>Amietia angolensis</i>	Common River Frog,	LC

LC = Least Concern.

**Table C3: Insect species recorded during the field assessment.**

Scientific Name	Common Name	IUCN STATUS
<i>Acrida</i> sp	Common Stick Grasshopper	NYBA
<i>Acrotylus</i> sp	Burrowing Grasshoppers	NA
<i>Africallagma glaucum</i>	Common African Blue	LC
<i>Anax imperator</i>	Blue Emperor	LC
<i>Anoplolepis custodiens</i>	Pugnacious Ant	NYBA
<i>Anthia thoracica</i>	Two-spotted Ground Beetle	NYBA
<i>Apis mellifera</i>	Honey Bee	NYBA
<i>Astylus atromaculatus</i>	Spotted Maize Beetle	NYBA
<i>Belenois aurota</i>	Brown-veined White	NYBA
<i>Catopsilla florella</i>	African Migrant	NYBA
<i>Creoleon</i> sp	Large Grassland Antlion	N/A
<i>Crocothemis erythraea</i>	Broad Scarlet	LC
<i>Danaus chrysippus</i>	African Monarch	LC
<i>Ectrichodia crux</i>	Millipede Assassin	NYBA
<i>Eurema brigitta</i>	Broad-bordered Grass Yellow	NYBA
<i>Forficula</i> sp	Common Earwig	N/A
<i>Gryllotalpa</i> sp.	Mole cricket	N/A
<i>Harmonia axyridis</i>	Asian Ladybeetle	NYBA
<i>Heteracris</i> sp	N/A	NYBA
<i>Heteronychus arator</i>	Black Maize Beetle	NYBA
<i>Hostilia</i> sp	Cockroach	N/A
<i>Ischnura senegalensis</i>	Tropical (March) Bluetail	LC
<i>Jumonia hierta</i>	Yellow Pansy	LC
<i>Lagria vulnerata</i>	Hairy Darkling Beetle	NYBA
<i>Lycus melanurus</i>	Hook-winged Net-winged Beetle	NYBA



Scientific Name	Common Name	IUCN STATUS
<i>Musca domestica</i>	N/A	NYBA
<i>Myrmeleon</i> sp	Pit-building Antlions	N/A
<i>Noctuidae</i> sp	Owlet Moth sp	NYBA
<i>Pachnoda</i> sp	Fruit Chafer (unidentified)	NYBA
<i>Pantala flavescens</i>	Wandering Glider	LC
<i>Pedderus</i> sp.	Rove Beetle	N/A
<i>Plaesiorrhinella plana</i>	Yellow-belted Fruit Chafer	NYBA
<i>Pontia helice</i>	Meadow White	NYBA
<i>Popillia bipunctata</i>	Bumspot Chafer	NYBA
<i>Synagris emarginatum</i>	N/A	
<i>Trinervitermes</i> sp	Snouted Harvester Termite	NYBA
<i>Truxis</i> sp	N/A	NA

LC = Least Concern, NYBA = Not Yet Been Assessed

**Table C4: Arachnid species signs recorded during the field assessment**

Scientific Name	Common Name	Conservation Status (IUCN)
Family Agelenidae	Funnel-web spiders	NA
<i>Uroplectes triangulifer</i>	Highveld Lesser-Thicktail Scorpion	NYBA

NYBA = Not Yet Been Assessed

