SCIENTIFIC TERRESTRIAL SERVICES

# Terrestrial BIODIVERSITY ASSESSMENT

## AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED TOWNSHIP DEVELOPMENT ON PT 72 OF THE FARM BULTFONTEIN, NEAR LANSERIA, GAUTENG PROVINCE.

## PART C: FAUNAL ASSESSMENT


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**Reference:** STS 23-2057
**Date:** February 2024



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# DOCUMENT GUIDE

The table below provides a guide to the reporting of biodiversity impacts as they relate to 1) Government Notice No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Animal Species Theme** as published in Government Gazette 43855 dated 30 October 2020 (as amended in Government Notice 3717 of 2023).

| **Theme-Specific Requirements as per Government Notice No. 1150<br>Animal Biodiversity Theme – Medium Sensitivity Rating as per Screening Tool Output** | | |
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| **No.** | **SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS** | **Section in report/Notes** |
| **1.** | **General Information** | |
| 1.1 | An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "very high" or "high" sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Specialist Assessment Report. | **Part C:** Faunal Assessment |
| 1.2 | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of "medium sensitivity" for terrestrial animal species must submit either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4. | **Part C:** Section 3 |
| 1.3 | The Terrestrial Animal Species Specialist Assessment and the Terrestrial Animal Species Compliance Statement must be undertaken within the study area. | **Part C:** Faunal Assessment |
| 1.4 | Where the nature of the activity is expected to have an impact on species of conservation concern beyond boundary of the preferred site, the project areas of influence must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the study area must include the project areas of influence, as determined. | **Part C:** Faunal Assessment |
| **2** | **Animal Species Specialist Assessment** | |
| 2.1 | The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professions (SACNASP) within a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken. | **Part A – C:** Cover Page<br>**Part A:** Appendix E |
| **2.2** | **The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline[1] and must:** | |
| 2.2.1 | Identify the Species of Conservation Concern which were found, observed or are likely to occur within the study area; | **Part C**: Section 3<br>**Part C**: Appendix B & C |
| 2.2.2 | Provide evidence (photographs or sound recordings) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility, immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3); | **Part C: Section 3** |
| 2.2.3 | Identify the distribution, location, viability[2] and detailed description of population size of the Species of Conservation Concern identified within the study area; | **Part C**: Section 3<br>**Part C**: Appendix B & C |
| 2.2.4 | Identify the nature and the extent of the potential impact of the proposed development on the population of the Species of Conservation Concern located within the study area; | **Part C:** Section 5<br>**Part C:** Section 6 |
| 2.2.5 | Determine the importance of the conservation of the population of the Species of Conservation Concern identified within the study area, based on information available in national and international databases including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases; | **Part C**: Section 3<br>**Part C**: Appendix B |
| 2.2.6 | Determine the potential impact of the proposed development on the habitat of | **Part C**: Section 6 |

[1] Available at https://bgis.sanbi.org/
[2] the ability to survive and reproduce in the long term

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| | the Species of Conservation Concern located within the study area; | |
| 2.2.7 | Include a review of relevant literature on the population size of the Species of Conservation Concern, the conservation interventions as well as any national or provincial species management plans for the Species of Conservation Concern. This review must provide information on the need to conserve the Species of Conservation Concern and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation; | **Part C**: Section 3 and Section 6<br>**Part C**: Appendix B |
| 2.2.8 | Identify any dynamic ecological processes occurring within the broader landscape, that might be disrupted by the development and result in negative impact on the identified Species of Conservation Concern, for example, fires in fire-prone systems; | **Part C:** Section 3<br>**Part C:** Section 6 |
| 2.2.9 | Identify any potential impact on ecological connectivity within the broader landscape, and resulting impacts on the identified Species of Conservation Concern and its long term viability; | **Part C:** Section 3<br>**Part C:** Section 6 |
| 2.2.10 | Determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each Species of Conservation Concern | **Not Applicable to this report** |
| 2.2.11 | Discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species; or roosting and breeding or foraging areas used by migratory species where these species show significant congregations, occurring in the vicinity. | **Part C**: Section 3<br>**Part C:** Section 6<br>**Part C**: Appendix B |
| 2.2.12 | Identify any alternative development footprints within the preferred development site which would be of "low" sensitivity" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification | **Part C**: Section 4 |
| 2.3 | The findings of the assessment must be written up in a Terrestrial Animal Species Specialist Assessment Report. | **Part C:** Faunal Assessment |
| **3.** | **Animal Species Specialist Assessment Report. This report must include as a minimum the following information:** | |
| 3.1.1 | Contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae; | **Part C:** Cover page<br>**Part A**: Appendix E |
| 3.1.2 | A signed statement of independence by the specialist; | **Part A**: Appendix E |
| 3.1.3 | A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; | **Part A**: Section 1<br>**Part C**: Section 1 |
| 3.1.4 | A description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant; | **Part C**: Appendix A |
| 3.1.5 | A description of the mean density of observations/number of sample sites per unit area and the site inspection observations; | **Not applicable to this report.** |
| 3.1.6 | A description of the assumptions made and any uncertainties or gaps in knowledge or data | **Part A**: Section 1<br>**Part C**: Section 1 |
| 3.1.7 | Details of all Species of Conservation Concern found or suspected to occur on site, ensuring sensitive species are appropriately reported; | **Part C**: Section 3<br>**Part C**: Appendix C |
| 3.1.8 | The online database name, hyperlink and record accession numbers for disseminated evidence of Species of Conservation Concern found within the study area | **Not Applicable to this report** |
| 3.1.9 | The location of areas not suitable for development and to be avoided during construction where relevant; | **Part C**: Section 4<br>**Part C**: Section 6 |
| 3.1.10 | A discussion on the cumulative impacts; | **Part C:** Section 6 |
| 3.1.11 | Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr) | **Part C:** Section 6 |
| 3.1.12 | A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant. | **Part A**: Executive summary<br>**Part C:** Section 7 |
| 3.1.13 | A motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having "low" or | **Part C**: Section 4 |

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| | "medium" terrestrial animal species sensitivity and were not considered appropriate. | |
| 3.2 | A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report. | **Part C** |
| **4** | **Medium Sensitivity Species of Conservation Concern Confirmation** | |
| **4.1** | Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling. | **Part C:** Faunal Assessment |
| **4.2** | The presence or likely presence of the Species of Conservation Concern identified by the screening tool, must be confirmed through a site inspection by a specialist registered with the South African Council for Natural Scientific Professions in a field of practice relevant to the taxonomic group ("taxa") for which the assessment is being undertaken. | **Part A – C:** Cover Page<br>**Part A:** Appendix E |
| **4.3** | The assessment must be undertaken within the study area. | **Part A**: Section 1 |
| **4.4** | The site inspection to determine the presence or likely presence of Species of Conservation Concern must be undertaken in accordance with the Species Environmental Assessment Guideline. | **Part C**: Section 3<br>**Part C**: Appendix C |
| **4.5** | The site inspection is to confirm the presence, likely presence or confirmed absence of a Species of Conservation Concern within the site identified as "medium" sensitivity by the screening tool. | **Part C**: Section 3<br>**Part C**: Appendix C |
| **4.6** | Where Species of Conservation Concern are found on site or have been confirmed to be likely present, a Terrestrial Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for "very high" and "high" sensitivity in this protocol. | **Part C**: Section 3<br>**Part C**: Appendix C<br>**Terrestrial Animal Species Specialist Assessment Recommended** |
| **4.7** | Similarly, where no Species of Conservation Concern are found on site during the investigation or if the presence is confirmed to be unlikely, a Terrestrial Animal Species Compliance Statement must be submitted. | **Part C**: Appendix C |

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# ACRONYMS

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| **ADU** | The Animal Demography Unit online database: http://vmus.adu.org.za/. |
| **AIP/AIPs** | Alien Invasive Plant/Alien Invasive Plants |
| **BGIS** | Biodiversity Geographic Information Systems |
| **CI** | Conservation Importance |
| **CR** | Critically Endangered |
| **DFFE** | Department of Forestry, Fisheries, and the Environment |
| **EAP** | Environmental Assessment Practitioner |
| **EIS** | Ecological Importance and Sensitivity |
| **EN** | Endangered |
| **FI** | Functional Integrity |
| **GDARD** | Gauteng Department of Agriculture and Rural Development |
| **GIS** | Geographic Information System |
| **GN** | Government Notice |
| **GPS** | Global Positioning System |
| **Ha** | Hectares |
| **IBA** | Important Bird Area |
| **IEM** | Integrated Environmental Management |
| **IIE** | Independent Institute of Education (Pty) Ltd |
| **IUCN** | International Union for Conservation of Nature and Natural Resources |
| **LC** | Least Concern |
| **NA** | Not Applicable |
| **NT** | Near Threatened |
| **NEMBA** | National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) |
| **NYBA** | Not yet been assessed |
| **MAMSL** | Meters Above Mean Sea Level |
| **P** | Protected, according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004): Amendment of Critically Endangered, Endangered, Vulnerable and Protected Species List. December 2007 |
| **PES** | Present Ecological State |
| **POC** | Probability of Occurrence |
| **PRECIS** | Pretoria Computerised Information System |
| **QDS** | Quarter Degree Square |
| **RDL** | Red Data Listed |
| **RE** | Regionally Extinct |
| **RR** | Receptor Resilience |
| **SABAP 2** | Southern African Bird Atlas Project 2 |
| **SANBI** | South Africa National Biodiversity Institute |
| **SAS** | Scientific Aquatic Services [Pty] Ltd |
| **SEI** | Site Ecological Importance |
| **SP** | Specially Protected |
| **STS** | Scientific Terrestrial Services |
| **SCC** | Species of Conservation Concern |
| **TOPS** | Threatened Or Protected Species (list of 2007) according to the National Environmental Management: |

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| | Biodiversity Act, 2004 (Act No. 10 of 2004): |
| **VU** | Vulnerable |

# GLOSSARY OF TERMS

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| **Alien species (syn. exotic species; non-native species)** | A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers. |
| **Baseline (IEM Series)** | Conditions that currently exist. Also called "existing conditions". |
| **Baseline information (IEM Series)** | Information derived from data that:<br>• records the existing elements and trends in the environment; and<br>• records the characteristics of a given project proposal. |
| **Biological diversity or Biodiversity (as per the definition in NEMBA)** | The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and includes diversity within species, between species, and of ecosystems. |
| **Biodiversity priority areas** | Features in the landscape or seascape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. They include the following categories, most of which are identified based on systematic biodiversity planning principles and methods: Protected Areas, Critically Endangered and Endangered ecosystems, Critical Biodiversity Areas and Ecological Support Areas, Freshwater Ecosystem Priority Areas, high water yield areas, flagship free-flowing rivers, priority estuaries, Priority Areas for land-based protected area expansion, and study areas for offshore protection. Marine ecosystem priority areas and coastal ecosystem priority areas have yet to be identified but will be included in future.<br><br>The different categories *are not mutually exclusive* and, in some cases, overlap, often because a particular area or site is important for more than one reason. They should be *complementary*, with overlaps *reinforcing the importance* of an area. |
| **Biome - as per Mucina and Rutherford (2006)** | A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires). |
| **Bioregion (as per the definition in NEMBA)** | A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act. |
| **Carrying Capacity** | The maximum population size of a biological species that can be sustained by that specific environment, given the food, habitat, water, and other resources available. |
| **Community Characterisation** | Comparisons can be made among communities using attributes such as species richness, species diversity, and evenness.<br>- **Species richness** is simply the number of species in a community.<br>- **Species diversity** is more complex and includes a measure of the number of species in a community, and a measure of the abundance of each species.<br>- **Species evenness** is a description of the distribution of abundance across the species in a community. Species evenness is highest when all species in a sample have the same abundance. Evenness approaches zero as relative abundances vary.<br><br>Source: https://tinyurl.com/2p9yr3j8 |
| **Corridor** | A dispersal route or a physical connection of suitable habitats linking previously unconnected regions. |
| **Critical Biodiversity Area (CBA)** | A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges. |

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| **Critically Endangered (CR) (IUCN[3] Red List category)** | **Applied to both species/taxa and ecosystems**: A species is CR when the best available evidence indicates that it meets at least one of the five IUCN criteria for CR, indicating that the species is facing an extremely high risk of extinction. CR ecosystem types are at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state. The ecosystem type is likely to have lost much of its natural structure and functioning, and species associated with the ecosystem may have been lost. CR species are those considered to be at extremely high risk of extinction. |
| **Development footprint (as per the NEMA definition)** | "in respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity" |
| **Degradation** | The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems. |
| **Disturbance** | A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions. |
| **Driver (ecological)** | A driver is any natural or human-induced factor that directly or indirectly causes a change in ecosystem. A direct driver clearly influences ecosystem processes, where indirect driver influences ecosystem processes through altering one or more direct drivers. |
| **Ecological Condition** | "ecological condition" means the extent to which the composition, structure and function of an area or biodiversity feature has been modified from a reference condition of "natural".<br>Various terminology can be used for precision of language:<br>➢ Fair ecological condition: Areas that are moderately modified, semi-natural. An ecological condition class in which ecological function is maintained even though composition and structure have been compromised. Can apply to a site or an ecosystem.<br>➢ Good ecological condition: Areas that are natural or near-natural. An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem.<br>➢ Poor ecological condition: Areas that are severely or irreversibly modified. An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem. |
| **Ecological processes** | The functions and processes that operate to maintain and generate biodiversity. In order to include ecological processes in a biodiversity plan, their spatial components need to be identified and mapped. |
| **Ecological Support Area (ESA)** | An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation. |
| **Ecoregion** | An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region." |
| **Endangered (EN) (IUCN Red List category)** | **Applied to both species/taxa and ecosystems**: A species is EN when the best available evidence indicates that it meets at least one of the five IUCN criteria for EN, indicating that the species is facing a very high risk of extinction. EN ecosystem types are at a very high risk of collapse. EN species are those considered to be at very high risk of extinction. |
| **Endemic species** | Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range. |

[3] International Union for Conservation of Nature (IUCN)

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| **Fatal flaw (IEM Series)** | Any problem, issue or conflict (real or perceived) that could result in proposals being rejected or stopped. |
| **Faunal Class** | In biological classification, class (Latin: classis) is a taxonomic rank, as well as a taxonomic unit. Class specifically refers to major groups, namely: mammals, avifauna (birds), reptiles and invertebrates. |
| **Ground-truth** | Ground truth is a term used in various fields to refer to information provided by direct observation (i.e., empirical evidence) as opposed to information provided by inference. |
| **Habitat (As per the definition in NEMBA)** | A place where a species or ecological community naturally occurs. |
| **Habitat loss** | Conversion of natural habitat in an ecosystem to a land use or land cover class that results in irreversible change in the composition, structure and functional characteristics of the ecosystem concerned. |
| **Impact (IEM Series, draft Offset policy, and NEMA)** | The positive or negative effects on human well-being and/or on the environment.<br>Impact-related terminology:<br>➢ Cumulative impact: Past, current and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.<br>➢ Impact Significant/significance: Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e., intensity, duration, and likelihood). Impact significance is the value placed on the change by different affected parties (i.e., level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e., biophysical, social and economic). Such judgement reflects the political reality of impact assessment in which significance is translated into public acceptability of impacts.<br>➢ Residual negative impacts: Negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years (*It is acknowledged that the time it takes for full restoration differs from ecosystem type to ecosystem type, as well as the local conditions. Given that there is no readily accessible information on the recovery times of the different ecosystem types in South Africa, a general timeframe had to be used. The 30-year general timeframe in the definition of "residual impact" reflects that the difficulty in restoring South African ecosystems once they have been disturbed. It is based on the risk-averse and cautious approach.*).<br>➢ Significant impact: An impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds, or targets. |
| **Important Bird and Biodiversity Area (IBA)** | The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations. |
| **Indigenous vegetation (As per the definition in NEMA)** | Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years. |

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| **Integrity (ecological)** | The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes. |
| **Invasive species** | Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances. |
| **Listed invasive species** | All alien species that are regulated in South Africa under the NEMBA, Alien and Invasive Species Regulations, 2020. |
| **Least Threatened** | Least threatened ecosystems are still largely intact. |
| **Native species (syn. indigenous species)** | Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that have expanded their range as a result of human modification of the environment that does not directly impact dispersal (e.g., species are still native if they increase their range as a result of watered gardens but are alien if they increase their range as a result of spread along human-created corridors linking previously separate biogeographic regions). |
| **Near Threatened (according to IUCN)** | Close to being at high risk of extinction in the near future. |
| **Niche (ecological)** | The role and position a species have in its environment; how it meets its needs for food and shelter, how it survives, and how it reproduces. A species' niche includes all of its interactions with the biotic and abiotic factors of its environment. |
| **Protected** | Species of high conservation value or national importance that require protection, according to TOPS 2007 and NEMBA. |
| **Red Data Listed (RDL) species** | According to the Red List of South African plants (http://redlist.sanbi.org/) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status. |
| **Refugia (ecological)** | Refugium (plural: refugia) is a location which supports an isolated or relict population of a once more widespread species. This isolation can be caused by climatic changes, geography, or human activities such as deforestation and overhunting. |
| **Resource (ecological)** | A resource is a substance or object in the environment required by an organism for normal growth, maintenance, and reproduction. Resources can be consumed by one organism and, as a result, become unavailable to another organism. |
| **Species of Conservation Concern (SCC)** | The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as provincially and nationally protected species of relevance to the project. |
| **Termitaria** | Colonies of termites, typically within a tall mound of cemented earth. |
| **Threatened ecosystem** | An ecosystem that has been classified as CR, EN or VU, based on an analysis of ecosystem threat status. A threatened ecosystem has lost or is losing vital aspects of its structure, function, or composition. The NEMBA allows the Minister of Environmental Affairs or a provincial MEC for Environmental Affairs to publish a list of threatened ecosystems. To date, threatened ecosystems have been listed only in the terrestrial environment. In cases where no list has yet been published by the Minister, such as for all aquatic ecosystems, the ecosystem threat status assessment in the National Biodiversity Assessment (NBA) can be used as an interim list in planning and decision making. |
| **Threatened species** | A species that has been classified as CR, EN or VU, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future. |
| **Trophic (ecological)** | Refers to feeding and nutrition. |

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| **Vulnerable (VU) (Red List category)** | **Applied to both species/taxa and ecosystems**: A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction. An ecosystem type is VU when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse. |
| **Weeds** | A plant is a weed '*if, in any specified geographical area, its populations grow entirely or predominantly in situations markedly disturbed by man (without, of course, being deliberately cultivated plants*)' (Baker 1965); in cultural terms, weeds are plants (**not necessarily alien**) that grow in sites where they are not wanted and that have detectable economic or environmental impacts (Pyšek et al. 2004). |

# 1. INTRODUCTION

## 1.1. Background

Scientific Terrestrial Services (Pty) Ltd. (hereafter “STS”) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) application process for the proposed mixed-use development, located near the Lanseria airport within the Gauteng Province (hereafter referred to as the “study area”; Figure 1).

The study area, which is approximately 32 hectares (ha) in size, is located 1 kilometre (km) south of the Lanseria airport. The N14 is located approximately 2.3 km southeast of the study area and the R512 is located immediately west of the study area. The surrounding landscape consists of industrial development, agricultural practices, and some suburban housing areas.

This report, after consideration and the description of the ecological integrity of the study area, must guide the Environmental Assessment Practitioner (EAP), the regulatory authorities and the developing proponent, by means of the presentation of the faunal results and recommendations as to the ecological viability of the proposed development activities.

## 1.1. Scope of Work

The purpose of this report is to define the faunal ecology of the proposed industrial township development as well as mapping and defining areas of increased Ecological Importance and Sensitivity (EIS) and to define the Present Ecological State (PES) of the proposed industrial township development. The scope of work for this study is:

- To provide inventories of faunal species as encountered within the study area;
- To determine and describe habitat types, faunal communities and the ecological state of the sites associated with the study area and to rank each habitat type based on conservation importance and ecological sensitivity;
- To identify and consider all sensitive landscapes and/ or any other special habitat features;
- To conduct a Red Data Listed (RDL) and Species of Conservation Concern (SCC) assessment, including species as listed in the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (Government Notice R152 in Government Gazette 29657, dated 23 February 2007, as amended), and the overall potential for such species to occur within the areas associated with the study area;

- To verify the Department of Forestry, Fisheries, and the Environment's (DFFE) national environmental screening report for the animal theme (Screening Tool) for the study area;
- To provide detailed information as well as relevant mitigation measures that must be implemented to guide the proposed development activities associated with the proposed 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 faunal assessment is confined to the study area and does not include the neighboring and adjacent properties, these were however considered as part of the desktop assessment;
- 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 as such the information provided herein is considered sufficient to allow informed decision making to take place and facilitate integrated environmental management;
- The proponent has advised STS that all development layouts will remain outside of the Seep Wetland and associated buffers/setbacks (refer to the Freshwater Assessment: SAS 23-1185, 2024). As such, the impact assessment has been undertaken under the assumption that the study area (barring the Seep Wetland and associated buffers) will be transomed for development purposes. If layouts are amended and footprint creep occurs within the Wetland and/or buffers, then the impact assessment will need to be updated accordingly by the biodiversity specialist;
- Due to the nature and habits of most faunal taxa and the high level of surrounding anthropogenic activities, it is unlikely that all species would have been observed during a field assessment of limited duration (during spring). Therefore, site observations were compared with literature studies where necessary;
- 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;

- A more comprehensive 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
- As part of the assessment, a field investigation was undertaken on the 24th of October 2023 to determine the ecological status of the study area and to "ground-truth" the results of the desktop assessment (as presented in Part A). On-site data was significantly augmented with all available desktop data, historic studies ((e.g., Galago Environmental (2012), STS 190066 (2020), STS 22-2073 (2022), and STS 22-2055 (2023)) and specialist experience in the area. The findings of this assessment are considered to be an accurate reflection of the ecological characteristics associated with the locality of the study area.

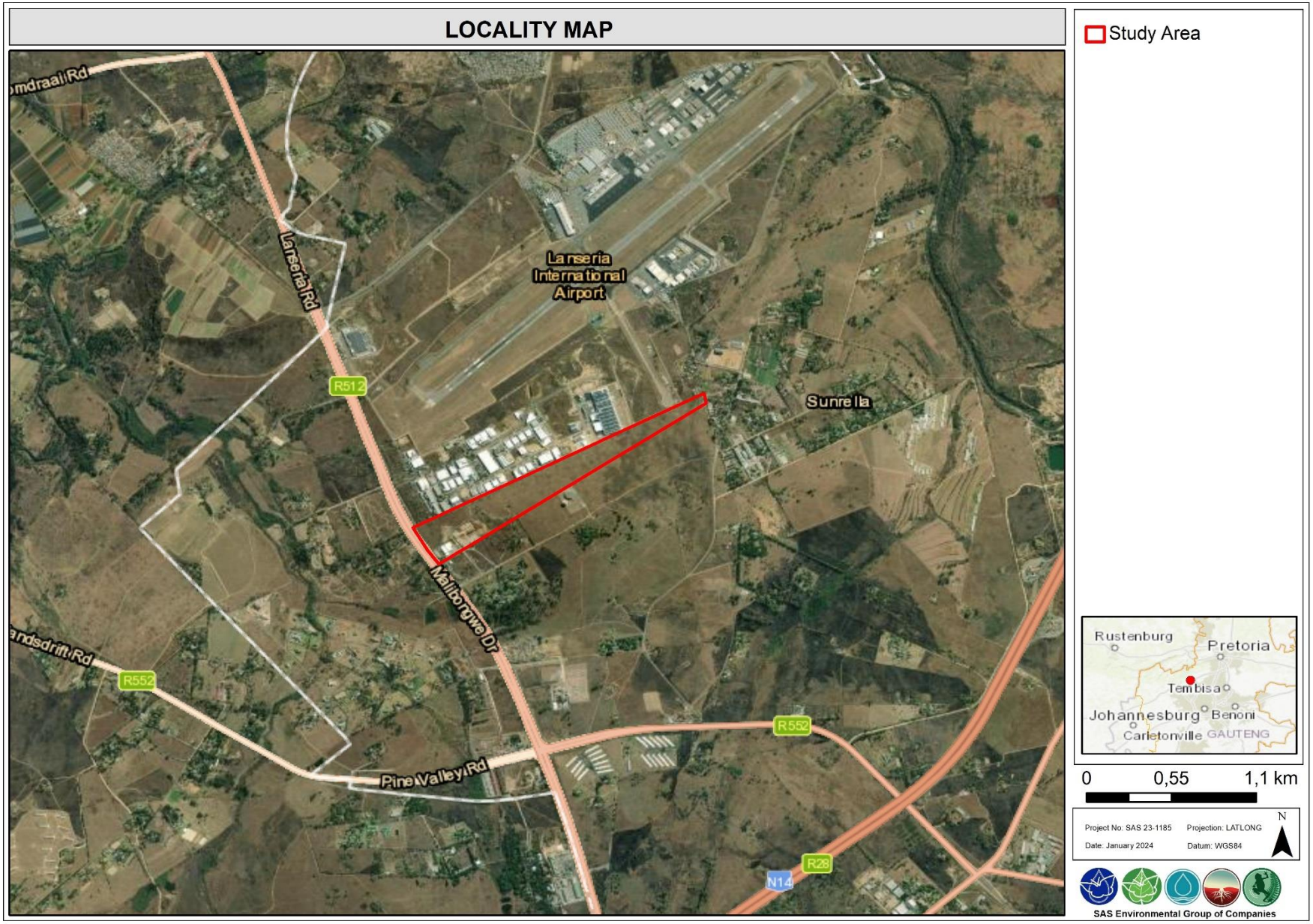



**Figure 1: Conceptual illustration of the study area in relation to the surrounding areas.**

# 2. ASSESSMENT APPROACH

The field assessment was undertaken on the 24th of October 2023 (spring season), to determine the faunal ecological status of 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 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, avifauna, herpetofauna, general invertebrates, and arachnids. For the methodologies relating to the impact assessment and development of the mitigatory measures, please refer to Appendix C of Part A of the study.

## *2.1 General approach*

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

- Maps and digital satellite images were consulted prior to the field assessment 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 online atlases on the Animal Demography Unit (ADU) Virtual Museum website; Important Bird and Biodiversity Areas (IBA, 2015), South African Bird Atlas Project 2 (SABAP2), International Union for Conservation of Nature (IUCN), the Gauteng Conservation Plan (V3.3, 2011) 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 mitigatory measures, please refer to Appendix C of Part A.

## 2.2 Sensitivity Mapping

All the ecological features of the assessment areas were considered, and sensitive areas were delineated with the use of a Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto satellite imagery. The sensitivity map should assist the Environmental Assessment Practitioner (EAP) / proponent as to the suitability of the proposed development within the assessment areas. The various habitat types were assigned Site Ecological Importance (SEI) categories based on their ecological integrity, conservation value, the presence of SCC and their ecosystem processes.

## 2.3 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. Faunal species likely to occur within the study area are indicated and briefly discussed within each of the relevant dashboards, along with their POC.

# 3. FAUNAL ASSESSMENT RESULTS

## *3.1 Sampling Effort*

The 2023 site assessment took place over one day during the spring season (24th of October 2023). The site was surveyed on foot by means of an extended transect (meander) through the study area, where species were surveyed and habitat conditions noted; meanders were positioned within the various habitat types (i.e., grassland vs wetland communities) to ensure an adequate representation of faunal species from different classes (mammals, avifauna, reptiles, amphibians and invertebrates). Figure 2 presents the specialist's GPS tracks in relation to the study area as an indication of the area covered.


**Figure 2: The study area (i.e., red outlie) and the specialist's GPS tracks (blue lines) as they relate to the surrounding areas.**

## 3.2 Existing Impacts

The study area is located within a peri-urban area that has undergone expansion within the last decade. Since 2008, the Lanseria airport and industrial warehousing have expanded considerably to the north of the study area; similarly, there has been an increase in the number of housing developments to the east of the study area. Historically, the study area was utilised for agricultural (cultivation) purposes. Although not currently used for cultivation, the study area is utilised by the surrounding communities for grazing of domestic animals, notably cattle. Buildings and excavation activities have completely modified the southwestern corner of the study area. The study area is facing secondary impacts currently, including the proliferation of Alien and Invasive Plant (AIP) species, changes in fire and herbivory regimes, increased fragmentation from surrounding areas (especially from the nearby Lanseria Airport), and the dumping of rubble. Collectively, these impacts have resulted in the subsequent degradation of the habitat(s) associated with the study area.

## 3.3 Faunal Habitat

After conducting a field investigation on October 24th, 2023, three distinct habitat units were identified in the study area (approximately 32 hectares (ha)):

1. **Degraded Grassland Habitat** – This habitat unit comprised the largest extent of the study area. A notable portion of the grassland environment experienced burning in the months leading up to the assessment. Despite this, there has been commendable regeneration of the veld, with a moderate abundance of herbaceous species observed. The recovery of the graminoid layer is still ongoing. Anthropogenic activities, including historical cultivation and current grazing practices, have influenced the overall suitability of the habitat for faunal species. However, it is worth noting that common species native to the region were still observed in this area. During the site visit, several common bird species were spotted, along with a few insect species that are known to thrive in environments which is surrounded by anthropogenic impacts. The presence of mammalian species was limited to smaller bodied common species, while no reptilian or amphibian species were observed.
2. **Moist Grassland**– this habitat unit is in the northeastern side of the study area (figure 3) and comprised the smallest extent of the study area. This habitat can be dived into two subunits: the **Seep Wetland** which is considered a watercourse but is unlikely to contain sufficient surface water (or ponds), and as such, is unlikely to serve as an important breeding habitat for amphibian species in the region. The second subunit and remainder

of this habitat will be referred to as **Perched Moist Grassland** which had similar faunal species composition and sensitivity as the Degraded Grassland Habitat. Overall, these habitat's faunal integrity and long-term viability have been compromised by landscape fragmentation, grazing pressure, and historic cultivation (sections of the Perched Moist Grassland). Some common species from different faunal classes were observed within this habitat although the overall species composition did not appear to differ significantly from that of the degraded grassland habitat adjacent to it. In times of elevated rainfall, this habitat will be characterised by higher soil moisture levels and will possibly support a marginally higher abundance of faunal species than that of the surrounding areas (provided there is no increase in grazing and subsequent trampling by cattle). Consequently, it is probable that this environment could offer augmented food resources and shelter for smaller faunal species, given the rise in grass tuft cover during the summer season. It is important to note, though, that heightened grazing activities during this period may counteract these potential benefits.

3. **Transformed Habitat** - this habitat comprised the second largest extent of the study area. This habitat was associated with anthropogenic activities including historic and current dumping, roads and infrastructure development such as buildings. Generally, vegetation communities were largely absent or represented mainly by AIP species (in which the abundance thereof was often high). The Transformed Habitat within the study area does not offer any unique habitat for fauna or areas of significant conservation value.

For a more detailed breakdown of the floral communities, habitat characteristics and conservation sensitivities associated with the above-mentioned habitat units, please refer to the Floral Report (Part B).

Figure 3 below provides a visual representation of the above-mentioned habitat units while Sections 3.3- 3.6 provide dashboards of the findings of each faunal class.

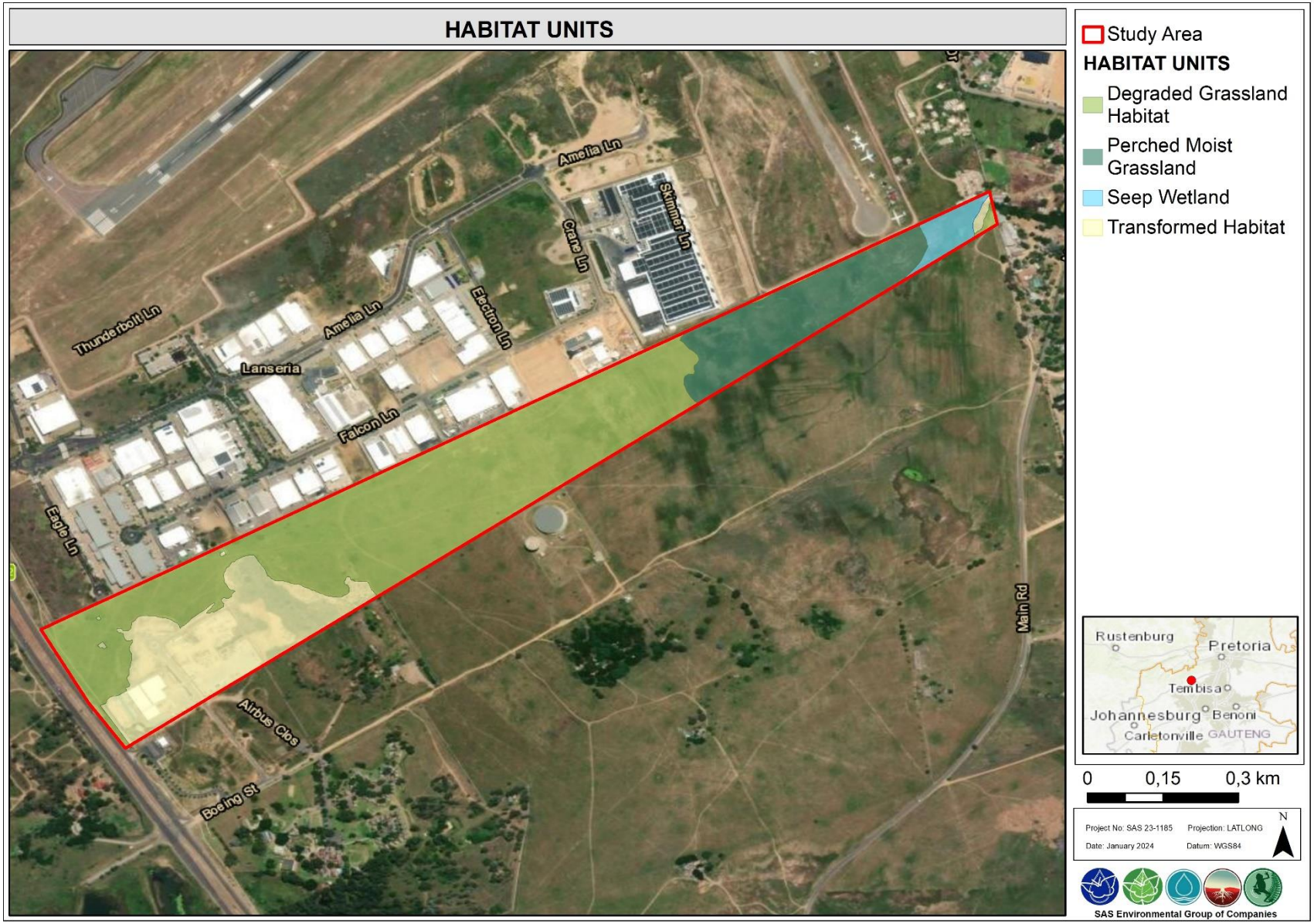



**Figure 3: Conceptual illustration of the habitat units associated with the study area.**

## 3.4 Mammals

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

**Photographs:**


**a.) *Canis mesomelas* (Black-backed Jackal) scat were found in the study area; b.) Herds of cattle were observed grazing within the Degraded Grassland Habitat.; c.) Potential old burrow from a *Hystrix africaeaustralis* (Cape Porcupine); d.) Potential droppings of *Herpestes sanguineus* (Slender Mongoose, LC).**

**Mammal SCC**

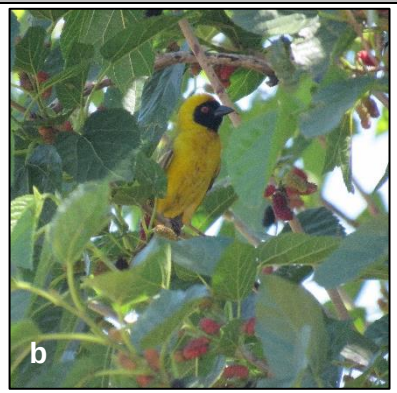
| Species | Habitat and Resources in the Sites | Conservation Listing | POC |
|---|---|---|---|
| *Crocidura maquassiensis* (Makwassie Musk Shrew) | This is a rare species endemic to South Africa, Swaziland and Zimbabwe, existing in moist grassland habitats in the savannah and grassland biomes. They are often associated with intact wetlands in these areas. Although this species distribution range encompasses the study area, the degraded condition and small size of the Seep Wetland and Perched Moist Grassland combined with current anthropogenic impacts reduces the probability for this species to occur within the study area. They may however rely on adjacent more intact wetland systems surrounding the study area. | VU | Low |
| *Atelerix frontalis* (Southern African Hedgehog) | Hedgehogs can often be found within savannah and grassland habitats where they require good vegetation cover, for shelter, nesting and insect food sources. This species may potentially be found within the Degraded and Perched Moist Grassland Habitats as well as on the periphery of the Seep Wetland, as known records of this species exist in the region. If this species were to occur here, it would likely be in low densities due to the habitats in this area being degraded. Individuals of the species will most likely rely on the more intact grassland habitat in the larger region in addition to the habitat found in the study area. | NT (GDARD) | Medium |
| *Dasymys robertsii* (Robert's Shaggy Rat) | This species depends on undisturbed wetlands for its habitat, primarily within reed beds, semi-aquatic grasses, swampy regions, and along riverbanks and streams. They also thrive in grassy areas adjacent to water sources. Their diet is omnivorous, encompassing stems, fruiting heads of semi-aquatic grasses, and insects. Although their distribution overlaps with the study area it is unlikely that this species will be found | VU | Low |

| | | | |
|---|---|---|---|
| | herein due to lack of suitable habitat. | | |
| *Hydrictis maculicollis* (Spotted-Necked Otter) | This species preferably inhabits freshwater systems that are undisturbed and unpolluted. They require dense vegetation adjacent to water for breeding and shelter. This species may potentially be found in the freshwater systems surrounding the study area but will not utilise the study area itself and thus a low POC is verified. | VU | Low |
| **Mammal Discussion** | | | |
| Based on the Mammal map in the Virtual Museum, QDS 2527DD has recorded 103 mammal species. The surrounding anthropogenic impacts and activities together with historic cultivation and current grazing activities within the study area, has however reduced the quality of the habitat within the study area for most of these potential mammal species and only a few common species are expected to occur within the study area. This was verified during the on-site inspection, where there were minimal signs or observations of mammal species within the study area. The diminished rate of observation could be attributed to the cautious behaviour of mammals adapted to environments with heightened human activity and influence. Nevertheless, it is more likely that the decline in habitat quality within the study area is the main factor contributing to the reduced diversity.<br><br>Observed species or signs thereof included common species such as, *Lepus saxatilis* (Scrub Hare), *Herpestes sanguineus* (Slender Mongoose), old burrows which most likely belonged to *Hystrix africaeaustralis* (Cape Porcupine), *Canis mesomelas* (Black-backed Jackal), domestic dogs and cattle. The study area will most likely also be utilised by common rodent species such as *Rhabdomys pumilio* (Four-striped Grass Mouse), *Mus musculus* (House Mouse) and *Rattus norvegicus* (Brown Rat) which are adapted to live in and around areas of increased anthropogenic activity. The study area has potential habitat for one mammal SCC with medium POC, *Atelerix frontalis* (Southern African Hedgehog, NT). Should this species be identified in the study area, their population is expected to be limited, primarily due to the subpar condition of the habitat acting as a constraint for the establishment of viable populations in that specific area.<br><br>The overall integrity of the habitat, reflecting its long-term ecosystem sustainability, is constrained in the study area. This limitation stems from the habitat's small size and fragmented condition, a result of both historical and current anthropogenic impacts in and around it. The presence of domestic animals, including dogs, cattle and sheep, further contributes to the degraded nature of the study area. This study area's fragmentation and location have reduced its ability to support high mammal abundance and diversity, particularly for larger-bodied species that face more difficulty moving through barriers than smaller species.<br><br>The online screening tool indicated a medium sensitivity for *Hydrictis maculicollis* (Spotted-necked Otter, VU), *Dasymys robertsii* (Robert's Shaggy Rat, VU) and *Crocidura maquassiensis* (Makwassie Musk Shrew,VU) but it is highly unlikely that these species will occur within the study area due to the lack of suitable habitat to sustain them. The Perched Moist Grassland and Seep Wetland do not contain any permanent water, riparian vegetation or resources that would benefit these species. They may potentially be found in and around the freshwater systems to the east and west of the study area and as such the proposed development is not expected to impact on these species. | | |

## 3.5 Avifauna

**Table 2: Field assessment results pertaining to avifaunal species within the study area.**

**Photographs**




**a.) *Lamprotornis nitens* (Cape Starling, LC); b.) *Ploceus velatus* (Southern Masked Weaver, LC); c.) *Macronyx capensis* (Orange-throated Longclaw, LC); d.) *Burhinus capensis* (Spotted Thick-Knee, LC);**

**Avifaunal SCC**

| Species | Habitat and Resources in the Sites | Conservation Listing | POC |
|---|---|---|---|
| *Tyto capensis* (African Grass Owl) | The African Grass Owl is known to roost and breed in tall, rank grass or sedges found in wetlands and streams. It prefers hunting in tall grassland habitats rather than short grassland, wetlands, or croplands. While it may utilise parts of the Perched Moist Grassland and Degraded Grassland habitats for foraging, it is unlikely to breed in small and degraded areas such as the study area. As a result, a medium probability of occurrence is assigned to this species in the study area. | VU | Meduim |
| *Eupodotis senegalensis* (White-bellied Korhaan) | The White-bellied Korhaan can be found in a diverse array of environments, encompassing savannahs, grasslands, and woodlands. On occasion, they venture into cultivated fields in search of food. Their diet mainly consists of insects, including beetles, grasshoppers, and termites, but they may also forage on small mammals, reptiles, and fruits. While there is a possibility that this species might occasionally traverse or forage in the study area, it is not anticipated to rely on it significantly for its survival in the region. | VU | Medium |

**Avifauna Discussion**

According to SABAP2, 355 avifaunal species have been documented within the pentad (2555_2755) associated with the study area. However, during the site visit only few common avifaunal species which are adapted to disturbed environments were observed. The overall diminished state of the habitat types, compounded by their close proximity to human activities, particularly the airport, can account for this reduced diversity. Despite these challenges, there is a moderate level of habitat and food resources present in the study area, sufficient to support a common avian fauna associated with grassland ecosystems.

Observed common avifaunal species included, *Threskiornis aethiopicus* (Sacred Ibis), *Anthus cinnamomeus* (African Pipit), *Vidua macroura* (Pin-tailed Whydah), *Spilopelia senegalensis*

(Laughing Dove), *Burhinus capensis* (Spotted Thick-KneeC), *Macronyx capensis* (Orange-throated Longclaw) *Ploceus velatus* (African Masked Weaver), *Columba guinea* (African Rock Pigeon) and *Vanellus senegallus* (Wattled Lapwing) etc. The screening tool indicated that the study area is of high sensitivity for *Tyto capensis* (African Grass Owl, VU) and of medium sensitivity for *Eupodotis senegalensis* (White-bellied Korhaan). Following the ground truthing of the study area, it is considered plausible that these species may occasionally/sporadically forage within the study area. However, it is highly improbable that they rely on the study area for ongoing survival, and the study area does not serve as suitable breeding grounds for either of these species.

## 3.6 Herpetofauna (Amphibians and Reptiles)

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

**Photographs**


**a. + b.) Termite mounds and abandoned burrows may serve as refuge for various reptile and amphibian species in the study area; c.) Rubble and old building may act as areas of refugee for reptiles; d.) Some areas had increased rocky habitat where small common reptile species may find shelter.**

**Herpetofauna SCC**

| Species | Habitat and Resources in the Sites | Conservation Listing | POC |
|---|---|---|---|
| *Pyxicephalus adspersus* (Giant African Bullfrog) | Found in arid savannas, this species can cover distances of up to 4 km away from water during non-breeding periods. During this time, it engages in nighttime foraging for insects, potentially leading it to venture into the study area, as QDS records indicate this species has been observed around the study area. The breeding habitat of this species, characterised by shallow, stagnant temporary waters in wetlands and pans, present in surrounding habitat. In the dry season, adults may be found buried beneath the soil. As no development is planned within the wetland habitat impacts on this species will be low. | P (TOPS) | Medium |

**Herpetofauna discussion**

Although searched for, no amphibians or reptiles were observed during the field assessment. The ADU database indicates that 16 species of amphibians and 52 species of reptiles have been recorded in the study area's QDS. The Perched Moist Grassland and Seep Wetland may offer seasonal zones with elevated moisture levels, though without standing water or ponding. These conditions can be beneficial to amphibians on a seasonal basis. Additionally, the rocky regions in the Degraded Grassland, as well as the rubble and old buildings in the Transformed Habitat, could serve as shelters and basking spots for common reptile species.

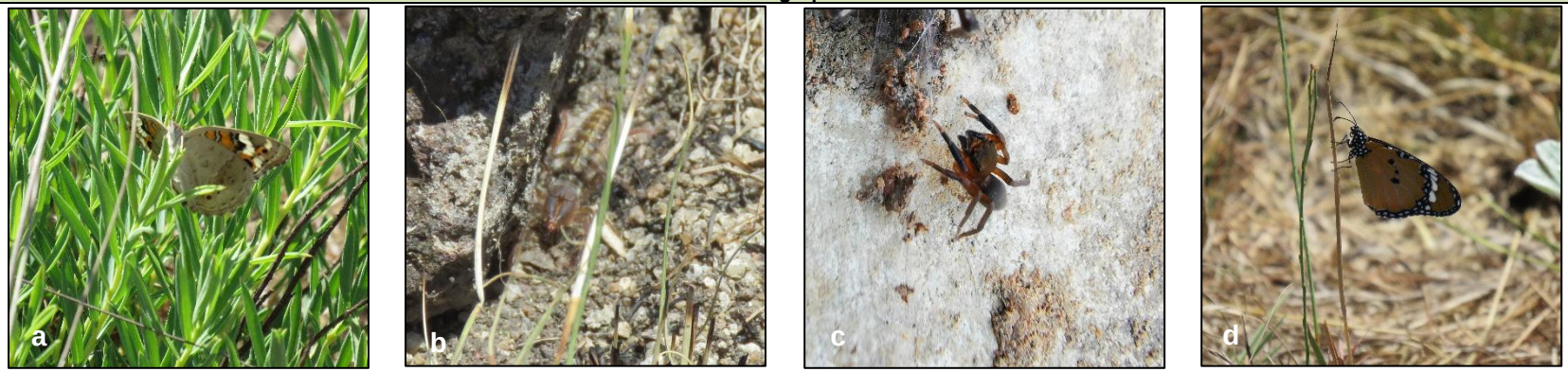
Common amphibian species expected to occur on site include species of Least Concern such as: *Sclerophrys capensis* (Raucous Toad), *Sclerophrys gutturalis* (Guttural Toad) and *Kassina senegalensis* (Bubbling Kassina). *Pyxicephalus adspersus* (Giant Bull Frog, P) has been documented in the study area's QDS. This species may use the Seep Wetland, Perched Moist Grassland and Degraded Grassland Habitat in the study area as potential feeding grounds. However, the degraded condition of the habitat in the study area reduces the favourability of these environments. It is essential to note that the site visit was of limited duration and took place outside of peak amphibian activity, thereby diminishing the likelihood of observations.

Reptiles, being inherently secretive and shy by nature, pose a challenge for detection and identification in the field, which explains the limited observations during the brief site visit. Due to their resilience and ability to adapt to modified environments and anthropogenic impacts, it is likely that the study area will support a few common reptile species. Common reptile species expected to occur within the study area include *Lygodactylus capensis* (Common Dwarf Gecko), *Afrotyphlops bibronii* (Bibron's Blind Snake), *Crotaphopeltis hotamboeia* (Herald Snake), *Trachylepis punctatissima* (Speckled Rock Skink), *Boaedon capensis* (Brown House Snake), *Psammophylax rhombeatus* (Spotted Grass Snake), *Hemachatus haemachatus* (Rinkhals), *Pachydactylus affinis* (Transvaal Gecko) and *Trachylepis capensis* (Cape Skink).

## 3.7 Invertebrates (Insects and Arachnids)

**Table 4: Field assessment results pertaining to insect and arachnid species within the study area.**

**Photographs**




**a.) *Vanessa cardui* (Painted Lady, LC); b.) A sun spider in the Order Solifugae; c.) A jumping spider in the Family Salticidae; d.); *Danaus chrysippus*. (Plain Tiger Butterfly, LC).**

**Invertebrate SCC**

| Species | Habitat and Resources in the Sites | Conservation Listing | POC |
|---|---|---|---|
| *Clonia uvarovi* (Uvarov's Clonia Bush cricket) | This predatory bush cricket is endemic to the highveld region of South Africa and inhabits tall woodland savannah. The lack of suitable habitat in the study area lowers the likelihood of encountering this species, resulting in a low POC. | VU | Low |

**Invertebrate Discussion**

Throughout the site visit, observations of invertebrates were confined to a small number of species commonly expected in the region. This restriction could be linked to the reduced floral diversity, the prevalence of AIPs across the study area, and the overall degradation of the environment.

Dominant insect orders observed were Orthoptera (grasshoppers and crickets) and Lepidoptera (butterflies and moths). While arachnid observations across the study area were limited, the ADU website documented 17 spider species and 6 scorpion species within the associated QDS. The observed spider species included: Family Lycosidae (Wolf Spiders), Family Salticidae (Jumping spiders), Family Agelenidae (Funnel Weavers) and *Palystes superciliosus* (Common Rain Spider). No scorpions were observed although common species such as *Uroplectes triangulifer* (Highveld Lesser-Thicktail Scorpion) and *Pseudolychas ochraceus* (Plain Pygmy-Thicktail Scorpion) are expected to occur within the study area. One species of Solifugue was also observed hiding under a rock in the Perched Moist Grassland.

The online screening tool highlighted one invertebrate SCC, *Clonia uvarovi* (Uvarov's Clonia bush cricket; VU) for the study area, however the lack of suitable habitat precludes this species from the study area. Other invertebrate SCC that occurs in the region, as they have been recorded in the study area's QDS include: *Harpactira hamiltoni* (Highveld Baboon Spider, TOPS P) and *Opistophthalmus pugnax* (Pugnacious Burrowing Scorpion, TOPS P). However, these species are considered to have a low POC because of the degraded and historical transformation and grazing within the study area which increase the risk to such species and their burrows being trampled.

Insect species play a crucial and significant role in the ecosystem, performing various ecological functions such as pollination, decomposition of dead animal and plant material, predation

on pests, parasitism, and dung removal from mammals. The degraded state of the study area has already caused a decline in these processes, with insect abundances and diversities being adversely impacted by historical and ongoing anthropogenic activities. While the proposed development is expected to further decrease the diversity and abundance of invertebrate species in the study area, it's worth noting that most of these species are common and will likely persist in surrounding habitats.

# 4. SITE ECOLOGICAL IMPORTANCE (SEI) AND AREAS OF CONCERN

Based on the SEI criteria provided in Appendix A of this report, all habitats within the study area were allocated an importance category, i.e., a SEI category. SEI is a function of the biodiversity importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (receptor resilience [RR]). BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor.

Table 5 below indicates the individual SEI scoring for each habitat unit respectively. Figure 4 indicates the SEI for the study area.

**Table 5. Faunal SEI importance for the different habitat units associated with the study area.**

| Unit | CI | FI | BI | RR | SEI | Development Constraints |
|---|---|---|---|---|---|---|
| Degraded Grasslands Habitat | **Low**<br>*No confirmed or highly likely populations of SCC.<br><br>*No confirmed or highly likely populations of range-restricted species<br><br>*< 50% of receptor contains natural habitat with limited potential to support SCC. | **Medium**<br><br>*Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential. | **Medium** | **Medium**<br>Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or<br>impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed. | **Low** | Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities. |
| Perched Moist Grassland | **Low**<br>*No confirmed or highly likely populations of SCC.<br><br>*No confirmed or highly likely populations of range-restricted species<br><br>*< 50% of receptor contains natural habitat with limited potential to support SCC. | **Medium**<br><br>*Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential. | **Medium** | **Medium**<br>Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or<br>impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed. | **Low** | Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities. |
| Seep Wetland | **Low**<br>*No confirmed or highly likely populations of SCC.<br><br>*No confirmed or highly likely populations of range-restricted species<br><br>*< 50% of receptor contains natural habitat with limited potential to support SCC. | **Medium**<br><br>*Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential. | **Medium** | **Medium**<br>Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or<br>impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed. | **Low** | Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities. |

| Unit | CI | FI | BI | RR | SEI | Development Constraints |
|---|---|---|---|---|---|---|
| **Transformed Habitat** | **Very Low**<br>*No confirmed and highly unlikely populations of SCC.<br><br>*No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining. | **Low**<br>*Small (> 1 ha but < 5 ha) area.<br><br>*Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential.<br><br>*Several minor and major current negative ecological impacts. | **Low** | **Very High**<br>Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed. | **Very low** | Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities<br>may not be required. |

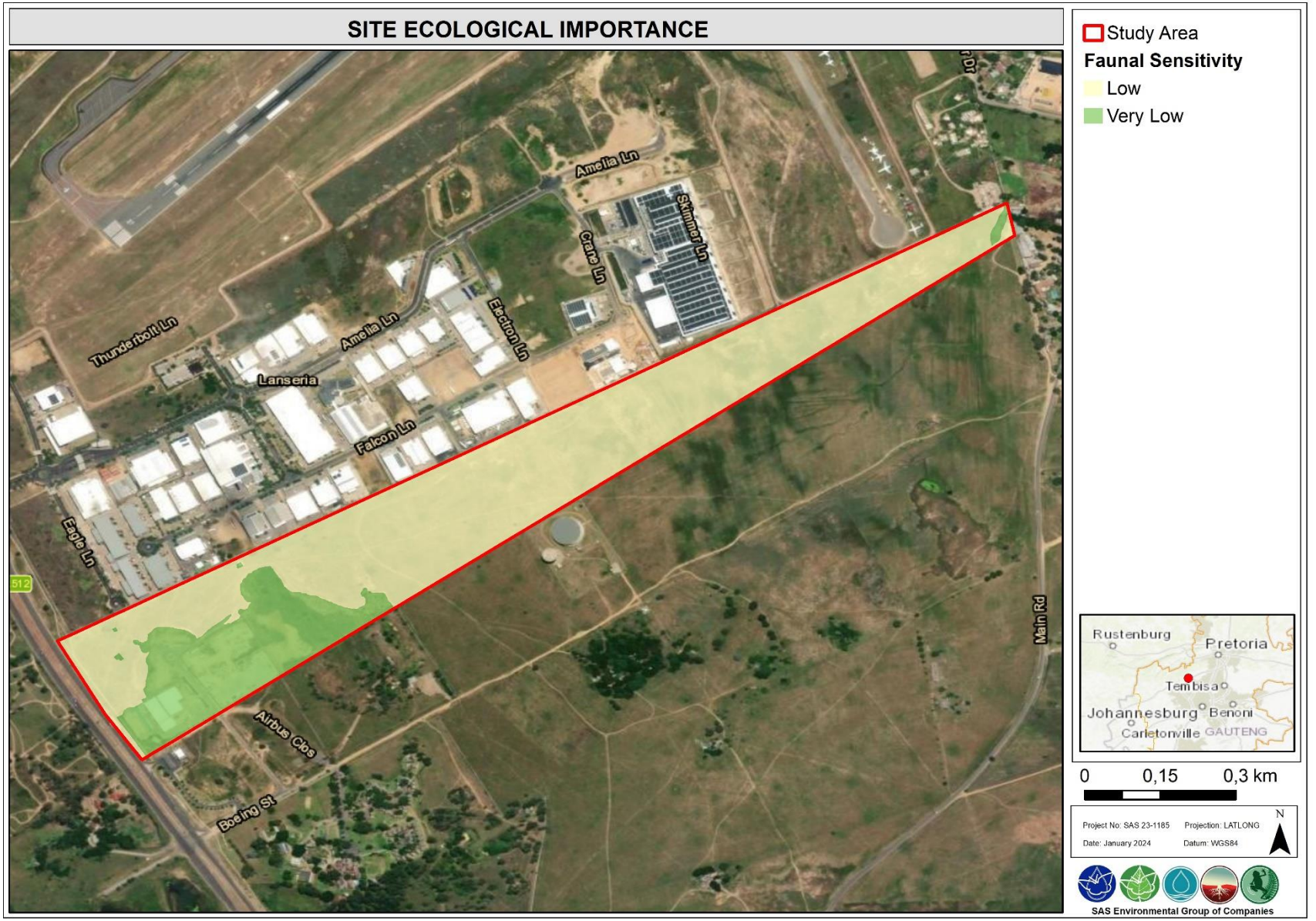



**Figure 4: Faunal habitat sensitivity map for the study area.**

# 5. IMPACT ASSESSMENT

The sections below provide the significance of perceived impacts arising from the proposed mixed-use development activities within the study area. The proponent has advised STS that all development layouts will remain outside of the Seep Wetland (and associated buffers/setbacks). As such, the impact assessment has been undertaken under the assumption that the study area (barring the Seep Wetland and associated buffers) will be transomed for development purposes.

An impact discussion and assessment of all potential (1) Pre-construction & Planning, (2) Construction, and (3) 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 5.2.

## *5.1. Activities and Aspect Register*

The table below indicates the perceived risks to faunal communities associated with the activities pertaining to the proposed development.

**Table 6: Activities and aspects likely to impact on faunal resources.**

| ACTIVITIES AND ASPECTS REGISTER |
|---|
| **Pre-Construction & Planning Phase** |
| - Potential failure to implement the required mitigatory measures before and at the commencement of construction activities:<br>- **Impact**: Potential loss of faunal SCC and their habitat. |
| - Inconsiderate planning of infrastructure placement and design, leading to the loss of faunal habitat, as well as unnecessary edge effect impacts on areas outside of the proposed development footprint (especially surrounding the Seep Wetland).<br>- **Impact:** Degradation and modification of the receiving environment. Loss of faunal habitat. |
| **Construction Phase** |
| - Site clearing and the removal of faunal habitat.<br>- **Impact:** Loss of faunal habitat, diversity and potentially occurring faunal SCC within the study area. |
| - Proliferation of AIP species that colonise in areas of increased disturbances and that outcompete native plant species, especially in adjacent habitat such as grassland, and freshwater habitat.<br>- **Impact**: Loss of favourable faunal habitat outside of the direct development footprint, including a decrease in faunal species diversity, including potential SCC. |
| - Dumping of construction material within areas where no construction is planned, thereby leading to further habitat disturbance.<br>- **Impact:** Loss or degradation of faunal habitat, diversity and potential SCC. |
| - Potentially poorly managed edge effects:<br>• Footprint creep and unnecessary vegetation clearance beyond the demarcated footprints; and<br>• Indiscriminate driving of construction vehicles through areas where no development is planned (Such as the Seep Wetland).<br>- **Impact:** Loss or degradation of faunal habitat and diversity, outside of the footprint of the proposed development. |

| ACTIVITIES AND ASPECTS REGISTER |
|---|
| - Possible increased fire frequency during construction.<br>- **Impact**: Loss or alteration of faunal habitat and species diversity. |
| - Habitat fragmentation resulting from poorly rehabilitated areas and inadequate planning for movement corridors.<br>- **Impact:** Long-term changes in faunal habitat, reduced faunal movement and potential loss of SCC. |
| **Operational and Maintenance Phase** |
| - Increased human presence in the area once operational, potentially leading to an increased risk and frequency of fire, littering and other waste impacting on faunal communities outside of the development footprint.<br>- **Impact:** Loss of faunal habitat, potential SCC, as well as overall species diversity within the study area and in surrounding areas. |
| - Ineffective rehabilitation of impacted areas.<br>- **Impact:** Loss of faunal habitat, diversity and potential SCC, and a higher likelihood of edge effect impacts on adjacent and nearby faunal habitat. |
| - Potential poor management and failure to monitor rehabilitation efforts, leading to:<br>• Landscapes being left partially fragmented, potentially altering faunal movement patterns;<br>• Increased storm water run-off;<br>• Compacted soils limiting the re-establishment of natural vegetation; and<br>• Increased risk of erosion in areas left disturbed.<br>- **Impact:** Long-term (or permanent) loss of faunal habitat, diversity and potential SCC within disturbed / impacted areas. |

## *5.2. Faunal Impact Assessment Results*

The tables below indicate the perceived risks to the faunal ecology associated with all phases of the proposed development and activities. 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.

Key, applicable integrated mitigation measures are presented in the tables below; these measures are required to suitably manage and mitigate the ecological impacts that are associated with all phases of the proposed mixed-use development.

**Table 7: Pre-construction & Planning Phase impacts on the faunal habitat, diversity, and SCC from the proposed mixed-use development.**

| Habitat Units | UNMANAGED | | | | | | | | MANAGED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Probability of Impact | Sensitivity of receiving environment | Severity | Spatial Scale | Duration of Impact | Likelihood | Consequence | Significance | Probability of Impact | Sensitivity of receiving environment | Severity | Spatial Scale | Duration of Impact | Likelihood | Consequence | Significance |
| **Impact of Faunal Habitat and Diversity** | | | | | | | | | | | | | | | | |
| Transformed Habitat | 3 | 1 | 2 | 1 | 2 | 4 | 5 | 20 Very Low | 2 | 1 | 2 | 2 | 2 | 3 | 6 | 18 Very Low |
| Degraded Grassland Perched Moist Grassland | 3 | 2 | 2 | 2 | 2 | 5 | 6 | 30 Low | 2 | 2 | 2 | 2 | 2 | 4 | 6 | 24 Very Low |
| Seep Wetland | 2 | 2 | 2 | 1 | 2 | 4 | 5 | 20 Very Low | 2 | 2 | 2 | 1 | 2 | 4 | 4 | 20 Very Low |
| **Impact on Faunal SCC** | | | | | | | | | | | | | | | | |
| Transformed Habitat | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 8 Very Low | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 8 Very Low |
| Degraded Grassland Perched Moist Grassland | 2 | 2 | 1 | 2 | 2 | 4 | 5 | 20 Very Low | 1 | 2 | 1 | 2 | 2 | 3 | 5 | 15 Very Low |
| Seep Wetland | 2 | 2 | 1 | 1 | 2 | 4 | 4 | 16 Very Low | 1 | 2 | 1 | 1 | 2 | 3 | 4 | 12 Very Low |

**Mitigation Measures for perceived impacts on habitat and species diversity**

- It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, is not placed outside of the authorised footprint, especially within the surrounding Seep Wetland and associated buffers (i.e., Seep Wetland located inside and outside of the study area);
- The area in which construction activities are to take place should be clearly demarcated; and
- Open space areas, should they be included in the layout plans, are to be designed in such a way so as to provide additional habitat for faunal species. Such can include the creation of rocky outcrops for shelter and small wooded stands (indigenous plant species to be used), which will provide shelter for several faunal species and roosting sites for avifauna.

**Mitigation Measures for perceived impacts on faunal SCC**

- In the event that any faunal SCC are encountered in the study area and require relocation (albeit considered unlikely given the current ecological condition of the study area), a suitably qualified specialist should be contact to advise on the best way forward. It is possible that permits (provincial or nations) may be required for such relocation activities (provided the species does not move off on its own; and
- Human and vehicle movement in areas where no development is planned should be restricted to prevent further disturbance to the receiving environment.

**Table 8: Construction Phase on the faunal habitat, diversity, and SCC from the proposed mixed-use development activities.**

| Habitat Units | UNMANAGED | | | | | | | | MANAGED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Probability of Impact | Sensitivity of receiving environment | Severity | Spatial Scale | Duration of Impact | Likelihood | Consequence | Significance | Probability of Impact | Sensitivity of receiving environment | Severity | Spatial Scale | Duration of Impact | Likelihood | Consequence | Significance |
| **Impact of Faunal Habitat and Diversity** | | | | | | | | | | | | | | | | |
| Transformed Habitat | 5 | 1 | 1 | 1 | 2 | 6 | 4 | 24 Very Low | 5 | 1 | 1 | 1 | 2 | 6 | 4 | 24 Very Low |
| Degraded Grassland Perched Moist Grassland | 5 | 2 | 3 | 2 | 2 | 7 | 7 | 49 Low | 5 | 2 | 2 | 2 | 2 | 7 | 6 | 42 Low |
| Seep Wetland | 3 | 2 | 3 | 1 | 2 | 5 | 6 | 30 Low | 2 | 2 | 1 | 1 | 2 | 4 | 4 | 16 Very Low |
| **Impact on Faunal SCC** | | | | | | | | | | | | | | | | |
| Transformed Habitat | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 8 Very Low | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 8 Very Low |
| Degraded Grassland Perched Moist Grassland | 2 | 2 | 2 | 2 | 2 | 4 | 6 | 24 Very Low | 2 | 2 | 2 | 2 | 2 | 4 | 6 | 24 Very Low |
| Seep Wetland | 3 | 2 | 2 | 1 | 2 | 5 | 5 | 25 Very Low | 2 | 2 | 2 | 1 | 2 | 4 | 5 | 20 Very Low |

**Mitigation Measures for perceived impacts on habitat and species diversity**

- The development footprint should be suitably demarcated, and it should be ensured that no construction related activities take place outside of the demarcated footprint;
- Vegetation clearing should be conducted in a phased manner to allow fauna enough time to escape areas ahead of the clearance activities as far as possible;
- In the event that reptiles are encountered during operational activities, harmless species should be carefully relocated by a suitably nominated construction personnel. For larger venomous snakes, a suitably trained professional or site personnel should be contacted to assist in the relocation of the species, should it not move off on its own. No reptiles are to be killed or harmed;
- Edge effects stemming from construction activities, which may affect adjacent areas, need to be strictly managed;
- No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility;
- All soils compacted, outside of the footprint areas, as a result of construction activities should be ripped, profiled, and reseeded using indigenous vegetation;
- No informal fires by construction personnel are to be allowed;
- No hunting/trapping or persecution of fauna must be allowed;
- As far as possible vegetation clearance activities should be undertaken in the winter months, as faunal species will not be breeding and there is less risk to nesting avifauna; and
- Outside lighting should be designed to minimise impacts on fauna, especially invertebrates. Use of fluorescent, LED and mercury vapour lighting should be avoided and sodium vapour (yellow) lights should be used wherever possible for outside lighting. All lights should be downward and inward facing as far as possible.

**Mitigation Measures for perceived impacts on faunal SCC**

- No hunting/trapping or persecution of faunal SCC must be allowed, should they be noted on site; and
- Should any faunal SCC be encountered (albeit considered unlikely given the current ecological condition of the study area), construction should be halted, and a suitably qualified specialist consulted to help ascertain the best way forward.

**Table 9: Operation and Maintenance Phase on the faunal habitat, diversity, and SCC from the proposed mixed-use development.**

| Habitat Units | UNMANAGED | | | | | | | | MANAGED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Probability of Impact | Sensitivity of receiving environment | Severity | Spatial Scale | Duration of Impact | Likelihood | Consequence | Significance | Probability of Impact | Sensitivity of receiving environment | Severity | Spatial Scale | Duration of Impact | Likelihood | Consequence | Significance |
| **Impact of Faunal Habitat and Diversity** | | | | | | | | | | | | | | | | |
| Transformed Habitat | 3 | 1 | 1 | 1 | 5 | 4 | 7 | 28 Low | 2 | 1 | 1 | 1 | 5 | 3 | 7 | 21 Very Low |
| Degraded Grassland Perched Moist Grassland | 3 | 2 | 3 | 2 | 5 | 5 | 10 | 50 Low | 2 | 2 | 2 | 2 | 5 | 3 | 8 | 36 Low |
| Seep Wetland | 3 | 2 | 3 | 1 | 5 | 5 | 9 | 45 Low | 2 | 2 | 2 | 1 | 5 | 4 | 8 | 32 Low |
| **Impact on Faunal SCC** | | | | | | | | | | | | | | | | |
| Transformed Habitat | 1 | 1 | 1 | 1 | 5 | 2 | 7 | 14 Very Low | 1 | 1 | 1 | 1 | 5 | 2 | 7 | 14 Very Low |
| Degraded Grassland Perched Moist Grassland | 2 | 2 | 2 | 2 | 5 | 4 | 9 | 36 Low | 1 | 2 | 1 | 2 | 5 | 3 | 8 | 24 Very Low |
| Seep Wetland | 2 | 2 | 2 | 1 | 5 | 4 | 8 | 32 Low | 2 | 2 | 1 | 1 | 5 | 4 | 7 | 28 Low |

**Mitigation Measures for perceived impacts on habitat and species diversity**

- In the event that reptiles are encountered during operational activities, harmless species should be carefully relocated by a suitably nominated operational personnel. For larger venomous snakes, a suitably trained professional should be contacted to assist in the relocation of the species, should it not move off on its own. No reptiles are to be killed or harmed;
- 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;
- No hunting/trapping or persecution of fauna must be allowed during the operational phase; and
- Where bare soils are left exposed post construction activities, they should be immediately rehabilitated. Rehabilitation efforts should continue to be monitored throughout the operational phase until natural processes allow the ecological functioning and biodiversity of the area to be re-instated.

**Mitigation Measures for perceived impacts on floral SCC**

- No collection of faunal SCCs by operational and maintenance personnel is to be allowed; and
- Should any faunal SCC be encountered (albeit considered unlikely given the current ecological condition of the study area a suitably qualified specialist consulted as to help ascertain the best way forward.

## 5.3. Impact discussion

Overall, the impact significance of the proposed mixed-use development (prior to mitigation) on faunal habitat and diversity ranges from **low** to **very low** within the study area. After mitigation measures are implemented, the impact scores will reduce, resulting in predominantly **very low** impacts and a few **low** impact scores. The potential for large scale impacts is unlikely if recommended mitigatory measures as stipulated in Section 5.2 are adhered to.

The effects on faunal SCC are not expected to be significant, given the restricted POC of SCC within the study area. Impacts, without mitigation, to SCC range from **low** to **very low** through all phases of the development. Mitigation, if implemented correctly, will reduce the impact significance to SCC in most phases to very low.

### 5.3.1. Impact on Faunal Habitat and Diversity

During the Pre-construction and Planning phase **very low** impacts on faunal habitat and diversity can be expected, post mitigation, as no clearing activities is expected during this phase. The Construction phase will result in impact significances ranging from **low** to **very low** depending on the habitat affected. While the clearing of vegetation in this phase will lead to the loss of faunal habitat and a decrease in faunal diversity within the study area, the anticipated impacts are expected to predominantly affect common faunal species. These species, however, are likely to persist in surrounding areas outside the study area. The Operation and Maintenance Phase will result in **low** to **very low** impacts within the study area post mitigation.

The historical, continuous, and adjacent anthropogenic influences, such as cultivation, grazing, and development, have compromised the long-term capacity to sustain a diverse faunal community within the study area. This is primarily due to its current diminished, degraded, and fragmented state. Currently, the habitats in the study area can only sustain a moderate to low diversity of faunal classes, primarily favouring common, small-sized animals, with large mammals or predators being largely excluded.

### 5.3.2. Impact on Faunal SCC

The online screening tool considered the study area to have both a high sensitivity and a medium sensitivity. The sensitivities were triggered by the potential occurrence of the

following species; *Crocidura maquassiensis* (Makwassie Musk Shrew, VU), *Dasymys robertsii* (Robert's Shaggy Rat, VU), *Hydrictis maculicollis* (Spotted-necked Otter, VU), *Tyto capensis* (African Grass Owl, VU), *Eupodotis senegalensis* (White-bellied Korhaan, VU) and *Clonia uvarovi* (Uvarov's Clonia Bush cricket, VU).

After field verification it was determined that the following species, *Tyto capensis* (African Grass Owl, VU) and *Eupodotis senegalensis* (White-bellied Korhaan, VU), have a medium POC with the potential to forage within the study area but will not be likely to breed or be found on a permanent basis within. *Atelerix frontalis* (Southern African Hedgehog, NT) and *Pyxicephalus adspersus* (Giant African Bullfrog, P) also have a medium POC within the study area as potential habitat exists and their distributions overlap. Should any of these SCC be found within the study area it would be on a temporary basis and their abundances are expected to be low.

The impact on SCC within the study area is not anticipated to be significant, given the limited POC of such SCC. If in the unlikely event that faunal SCC as listed in Appendix B of this report are encountered during the construction of the proposed development, a biodiversity specialist must be consulted to ascertain the best way forward.

## 5.4. Probable Residual Impacts

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

- Continued loss of faunal habitat;
- Loss of and altered faunal species diversity;
- Reduction of faunal abundance, notably invertebrate, reptile and avifaunal abundance;
- Habitat fragmentation within the landscape and reduction of movement corridors; and
- Disturbed areas are highly unlikely to be rehabilitated to baseline levels of ecological functioning and significant loss of faunal habitat, species diversity and potential faunal SCC will most likely be permanent.

## 5.5. Cumulative Impacts

Based on the general landscape and habitat within the study area the site may host a moderate to low diversity of faunal classes, favouring smaller-bodied common species over

larger types due to anthropogenic development and activities within the study area and areas surrounding the study area.

The anticipated activities are likely to reduce faunal habitat and lower local abundances. This could result in the migration of existing faunal residents toward the adjacent vegetated areas, which are already limited due to urban and peri-urban environments. Consequently, this may escalate competition for territories and breeding sites. Moreover, there is a potential for a cascading dispersal effect, leading to increased competition for resources and a potential rise in mortality rates. The overall outcome may be a decline in species abundance and a potential loss of species diversity.

The most prominent threat to the faunal ecology within the study area is increased human presence in the area, during construction and once the development is operational, which could potentially lead to illegal hunting (snares) and persecution of fauna in undeveloped areas and the adjacent habitat. There is also an increased risk of fire frequency, which could negatively impact faunal communities and habitat outside the development footprint.

# 5. CONCLUSION

The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information.

The impacts associated with the faunal habitat, diversity, and SCC are anticipated to range from **low** to **very low** prior to the implementation of mitigation measures. Should recommended mitigatory measures be implemented impacts can be reduced to predominantly **very low** levels with a few **low** impacts still remaining. In terms of faunal habitat and diversity, the construction phase is expected to have the most immediate impacts, while the operational and maintenance phase is likely to exert ongoing, long-term effects on habitat and diversity, particularly if edge effects are not effectively managed. These impacts are expected to primarily affect common faunal species that can endure in habitats neighbouring the study area and in the broader region. The proposed mixed-use development is not foreseen to exert significant influences on faunal ecology or populations of SCC. Consequently, there is no apparent reason why this development should not be approved.

It is the opinion of the ecologists that this study provides the relevant information required to implement Integrated Environmental Management (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 associated with the study area may 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 by actively searching/listening for individuals or the presence of spoor, calls and dung. Specific attention was given to mammal SCC listed on a regional and national level, as well as those identified by the Screening Tool. Desktop analysis of the study area was used to determine areas of higher value to mammal species and focus were placed within these areas during the field survey. Transects were walked throughout the study area to cover maximum ground within the given timeframe.

### *Avifauna*

The Southern African Bird Atlas Project 2 database (http://sabap2.adu.org.za/) was compared with the recent field survey of avifaunal species identified in the study area. Field surveys were undertaken utilising direct observation and bird call identification techniques to accurately identify avifaunal species. Specific attention was given to avifaunal SCC listed on a regional and national level, as well as those identified by the Screening Tool.

### *Reptiles*

Reptiles were identified during the field survey. Suitable applicable habitat areas (rocky outcrops and fallen dead trees) were inspected, and all reptiles encountered were 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 Screening Tool.

### *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 Screening Tool.

### *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 Screening Tool.

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 within the study area.

# *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.

## 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 proposed mixed-use development. 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[4]:

- **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$^2$ 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.

## NEMBA TOPS SPECIES AND NATIONALLY AND PROVINCIALLY LISTED SCC

The Threatened or Protected Species (TOPS) Regulations (GN 255 of 2015) under Section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), were

[4] 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: https://screening.environment.gov.za/screeningtool/#/pages/welcome

taken into consideration as well as all species listed by the IUCN, the National Biodiversity Assessment 2019 and the relevant provincial conservation databases.

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.

| Low POC | Medium POC | High POC | Confirmed |
|---|---|---|---|

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 Site Ecological Importance (SEI)*

SEI is considered to be a function of the biodiversity importance (BI) of the receptor (e.g., species of conservation concern, the vegetation/fauna community or habitat type present on the site[5]) and its resilience to impacts (receptor resilience [RR]) as follows:

**SEI = BI + RR**

SEI can be derived from a simple matrix of BI and RR as follows:

**Table A1: Matrix of CI and FI to determine BI.**

| Site Ecological Importance (SEI) | | Biodiversity Importance | | | | |
|---|---|---|---|---|---|---|
| | | Very high | High | Medium | Low | Very low |
| Receptor Resilience | Very low | Very high | Very high | High | Medium | Low |
| | Low | Very high | Very high | High | Medium | Very low |
| | Medium | Very high | High | Medium | Low | Very low |
| | High | High | Medium | Low | Very low | Very low |
| | Very high | Medium | Low | Very low | Very low | Very low |

Interpretation of the SEI in the context of the proposed development is provided below.

**Table A2: Guidelines for interpreting SEI in the context of the proposed development activities.**

| Site ecological importance | Interpretation in relation to proposed development activities |
|---|---|
| Very high | Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains. |
| High | Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities. |
| Medium | Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities. |

[5] Note that the habitat type may be independent of the vegetation community and that it may even be artificial, e.g., excavated rock quarries that provide crucial breeding habitat for cliff-nesting species such as Bald Ibis.

| | |
|---|---|
| Low | Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities. |
| Very low | Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required. |

BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor as follows:

**BI = CI + FI**

BI can be derived from a simple matrix of CI and FI as follows:

**Table A3: Matrix of CI and FI to determine BI.**

| Biodiversity importance | | Conservation importance | | | | |
|---|---|---|---|---|---|---|
| | | Very high | High | Medium | Low | Very low |
| Functional Integrity | Very high | Very high | Very high | High | Medium | Low |
| | High | Very high | High | Medium | Medium | Low |
| | Medium | High | Medium | Medium | Low | Very low |
| | Low | Medium | Medium | Low | Low | Very low |
| | Very low | Medium | Low | Very low | Very low | Very low |

**Conservation importance (CI)** is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN [2016]).

Conservation importance is defined here as:

*'The importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.'*

These criteria are defined as follows:

- IUCN threatened and Near Threatened species (CR, EN, VU and NT) are defined as either the global or national assessments of the risk of extinction as evaluated by a dedicated panel of species specialists according to the criteria of the International Union for The Conservation of Nature (www.iucnredlist.org). Where the global and national assessments differ for the same taxon, the national evaluation of status[6] should be used in calculating SEI unless the global assessment is both more recent and of a more threatened category. It is important to note that the specialist is required to have a firm understanding of the IUCN Red List Categories and Criteria (IUCN 2012) in order to appropriately apply these for the evaluation of SEI. This criterion can be assessed using confirmed occurrences of species or the suitability of the habitat to support these species. Rare species are those included on South Africa's National Red List as Rare or Critically Rare or Extremely Rare. These are highly restricted species that are currently not declining. However, should any development impact on a population of these species they will immediately qualify under one of the IUCN categories of threat. y Range-restricted species – the presence of terrestrial flora, vertebrate, and invertebrate fauna with a global population extent of occurrence (EOO) of 10 000 km$^2$ or less.
- Globally significant populations of congregatory species – a roughly estimated proportion (%) of the global population of a fauna species that congregate for breeding/feeding/hibernation/other reasons. y Significant areas of threatened vegetation types – this is a function of both the area (size) being considered in relation to the total extent of that vegetation type (i.e., proportion) and how threatened (CR, EN, VU) the vegetation types are.

[6] http://speciesstatus.sanbi.org/. For mammals: https://www.ewt.org.za/wp-content/uploads/2020/04/2020-updated-2016-Red-List-of-Mammals-of-South- Africa-Lesotho-Swaziland-Summary-Listings.xlsx; for plants: http://redlist.sanbi.org.

- Natural processes – natural unmanaged areas with low levels of ecological disturbance have largely intact natural processes such as pollination, seed dispersal and migration, and thus have greater intrinsic conservation importance than those that are modified through ecological disturbance.

While most of the features that will be included in the CI will be provided by the screening tool, it is important to note that CI is evaluated at a much finer spatial scale and based on fieldwork data collection and comprehensive desktop analyses performed by the specialist during the EA process. As a minimum requirement, CI needs to be determined for each identified habitat within the project footprint, but best practice recommendation is that it should be determined for all habitats within the entire PAOI[7].

Fulfilling criteria to evaluate CI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation, providing a more robust evaluation of CI (Table A4). Furthermore, while CI is most likely to be assessed based on data collected during the fieldwork survey, it can also be an assessment of the suitability of the receptor to support populations conforming to the fulfilling criteria. As can be seen from the worked example below, each of these evaluations of the fulfilling criteria demand necessary justification.

**Table A4: Conservation importance (CI) criteria.**

| Conservation importance | Fulfilling criteria |
|---|---|
| **Very high** | - Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare[8] or Critically Rare[9] species that have a global EOO of < 10 km$^2$.<br>- Any area of natural habitat[10] of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent[11]) of natural habitat of EN ecosystem type.<br>- Globally significant populations of congregatory species (> 10% of global population). |
| **High** | - Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km$^2$. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining.<br>- Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type.<br>- Presence of Rare species.<br>- Globally significant populations of congregatory species (> 1% but < 10% of global population). |
| **Medium** | - Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.<br>- Any area of natural habitat of threatened ecosystem type with status of VU.<br>- Presence of range-restricted species.<br>- > 50% of receptor contains natural habitat with potential to support SCC. |

[7] Because CI needs to be assigned to a receptor (e.g., the vegetation/fauna community or habitat type), it is customary to use the flora community delineation developed for a PAOI by a botanical specialist. However, such delineation is often too fine scaled to define fauna-specific habitats, which are generally more structural than phytosociological in nature. Where this is the case, the fauna specialist should merge two or more relevant floral communities to correlate with the specific fauna habitat type that is characteristic of a particular taxon assemblage. In certain cases, the faunal specialist will have to demarcate habitats that have not been classified by the botanical specialist; a pertinent example is the presence of cliffs, which are frequently important breeding habitat for some bird SCC.

[8] For butterflies, as per Armstrong *et al*. (2013).

[9] For plants, as per Raimondo *et al*. (2009).

[10] This excludes areas of transformed habitat within a defined ecosystem even if these are partially restored, e.g., Highveld grasslands that have been converted to maize fields and then abandoned so that some form of functional grassland is restored; this is not natural habitat as it does not and will not in the future have species composition representative of the original natural habitat.

[11] This can be calculated from the threatened ecosystem of South Africa shapefile available from the SANBI (current available version 2011: http://bgis.sanbi. org/Projects/Detail/49).

| Conservation importance | Fulfilling criteria |
|---|---|
| **Low** | - No confirmed or highly likely populations of SCC.<br>- No confirmed or highly likely populations of range-restricted species.<br>- < 50% of receptor contains natural habitat with limited potential to support SCC. |
| **Very low** | - No confirmed and highly unlikely populations of SCC.<br>- No confirmed and highly unlikely populations of range-restricted species.<br>- No natural habitat remaining. |

**Functional integrity (FI)** of the receptor (e.g., the vegetation/fauna community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Simply stated, FI is:

*'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.'*

These criteria can be defined as:

- Connectivity to other natural areas – connectivity, which can also be measured conversely as the degree of habitat fragmentation, refers to how connected habitat patches are to each other, which has a significant influence on numerous ecological processes, such as migration and dispersal opportunities of biota and therefore genetic exchange between populations. Connectivity to other similar habitats becomes more important as the remaining intact and functional area of a habitat decreases, mainly because population sizes decrease and are therefore at greater risk from ecological perturbations and inbreeding effects. The degree of connectivity between habitat patches varies greatly with the dispersal ability of the taxon or taxon group (e.g., fossorial reptiles) in question.
- Degree of current persistent negative ecological impacts – persistent negative impacts such as uncontrolled spread of alien and invasive flora effectively decreases both the remaining intact area and ecosystem functioning of a particular habitat. Persistent ecological disruptors must not include components that landowners are legally obliged to address or that should be addressed as norm for best practice. Wilful neglect of these legal obligations or the presence of invasive alien species that can practically be controlled through management actions should not negatively influence the FI score to a major extent.
- Remaining intact and functional area – the proportion of the receptor that supports natural habitat with intact ecological processes – small areas are less likely to withstand ecological degradation compared to large areas, and the latter are therefore better able to maintain structure and function allowing for intact ecological processes.

Ecological processes can be considered to be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area. As for CI, the fulfilling criteria to evaluate FI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation (Table A5) and will require justification by the specialist.

**Table A5: Functional integrity (FI) criteria.**

| Functional integrity | Fulfilling criteria |
|---|---|
| **Very high** | - Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types.<br>- High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches.<br>- No or minimal current negative ecological impacts with no signs of major past disturbance (e.g., ploughing). |
| **High** | - Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types.<br>- Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches.<br>- Only minor current negative ecological impacts (e.g., few livestock utilising area) with no signs of major past disturbance (e.g., ploughing) and good rehabilitation |

| Functional integrity | Fulfilling criteria |
|---|---|
| | potential. |
| **Medium** | - Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types.<br>- Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches.<br>- Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential. |
| **Low** | - Small (> 1 ha but < 5 ha) area.<br>- Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential.<br>- Several minor and major current negative ecological impacts. |
| **Very low** | - Very small (< 1 ha) area.<br>- No habitat connectivity except for flying species or flora with wind-dispersed seeds.<br>- Several major current negative ecological impacts. |

Ecological processes can be considered to be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area. As for CI, the fulfilling criteria to evaluate FI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation (Table 8.2) and will require justification by the specialist (see worked example below).

**Receptor resilience (RR)** is defined here as:

*'The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.'*

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor (Table A4) and will require justification by the specialist. The specialist needs to bear in mind that resilience will often be linked to a particular disturbance or impact, or even time of year, and needs to be described in relation to these factors. For example, large birds of prey have different levels of resilience to noise disturbance depending on whether they are breeding or not; these species would have low resilience to noise disturbance such as construction of a road adjacent to a nest site during the breeding season but a higher resilience to lodge construction in an area with limited breeding habitat outside of the breeding season.

Receptor resilience needs to be evaluated by the specialist and justification for each evaluation must be provided in the report (see worked example below). Finally, after the successful evaluation of both BI and RR as described above, it is possible to evaluate SEI from the final matrix as follows:

SEI should be described in the above manner for each impact receptor within the area of influence and clearly mapped in relation to the proposed development activities and infrastructure. Interpretation of SEI in the context of the proposed development activities (Table A1) must be provided by the specialist.

**It is very important to note that SEI is specific to the proposed development activities and cannot be meaningfully compared between different proposed projects with different associated activities on the same spatial location. However, SEI for the same proposed development with multiple alternative layouts and/or locations may be compared within the same study.**

**Table A6: Resilience criteria.**

| Resilience | Fulfilling criteria |
|---|---|
| Very high | Habitat that can recover rapidly (~ less than 5 years) to restore > 75%[28] of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed. |
| High | Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed. |
| Medium | Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed. |
| Low | Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed. |
| Very low | Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed. |

# APPENDIX B: Faunal SCC

The tables below list the faunal Species of Conservation Concern for Gauteng:

**Table B1: RDL Mammal Species for the Gauteng Province (GDARD 2014a).**

| Scientific Name | Common name | IUCN Status | GDARD Status | POC |
|---|---|---|---|---|
| *Aonyx capensis* | Cape Clawless Otter | NT | - | Low |
| *Atelerix frontalis* | Southern African Hedgehog | LC | NT | Medium |
| *Lutra maculicollis* | Spotted-necked Otter | NT | NT | Low |
| *Miniopterus schreibersii* | Scheiber's Long-Fingered Bat | NT | NT | Low |
| *Myotis tricolor* | Temminck's Hairy Bat | LC | NT | Low |
| *Mystromys albicaudatus* | White-tailed Mouse | EN | EN | Low |
| *Neamblysomus julianae* | Juliana's Golden Mole | EN | VU | Low |
| *Rhinolophus blasii* | Blasius's/Peak-Saddle Horseshoe Bat | LC | VU | Low |
| *Rhinolophus clivosus* | Horseshoe Bat | LC | NT | Low |
| *Rhinolophus darlingi* | Darling's Horseshoe Bat | LC | NT | Low |
| *Rhinolophus hildebrandtii* | Hildebrandt's Horseshoe Bat | LC | NT | Low |

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

**Table B2: RDL Avifaunal Species for the Gauteng Province (GDARD 2014a).**

| Scientific Name | Common name | IUCN Status | GDARD Status | POC |
|---|---|---|---|---|
| *Alcedo semitorquata* | Half-collared Kingfisher | LC | NT | Low |
| *Anthropoides paradiseus* | Blue Crane | VU | VU | Low |
| *Circus ranivorus* | African Marsh Harrier | LC | VU | Low |
| *Eupodotis caerulescens* | Blue Korhaan | NT | NT | Low |
| *Eupodotis senegalensis* | White-Bellied Korhaan | LC | VU | Medium |
| *Mirafra cheniana* | Melodious Lark | LC | NT | Low |
| *Mycteria ibis* | Yellow-billed Stork | LC | - | Low |
| *Oxyura maccoa* | Maccoa Duck | VU | VU | Low |
| *Phoenicopterus minor* | Lesser Flamingo | NT | - | Low |
| *Phoenicopterus roseus* | Greater Flamingo | LC | - | Low |
| *Sagittarius serpentarius* | Secretary bird | VU | NT | Low |
| *Tyto capensis* | African Grass-Owl | LC | VU | Medium |

VU = Vulnerable, NT = Near Threatened, LC = Least Concern, EN = Endangered, Ad mon = Additional Monitoring, End and N-end = Endemic and Near endemic

**Table B3: RDL Invertebrates Species for the Gauteng Province (GDARD 2014a).**

| Scientific Name | Common name | IUCN Status | GDARD Status | POC |
|---|---|---|---|---|
| *Lepidochrysops praeterita* | Highveld Blue Butterfly | EN | VU | Low |
| *Chrysoritis aureus* | Golden Opel/Highveld Copper | NYBA | VU | Low |
| *Ichnestoma stobbiai* | Stobbia's Fruit Chafer Beetle | NYBA | VU | Low |
| *Aloeides dentatis* | Roodepoort Copper Butterfly | VU | VU | Low |

EN = Endangered, VU = Vulnerable, NYBA = Not yet been assessed

**Table B4: RDL Reptile Species for the Gauteng Province (GDARD 2014a)**

| Scientific Name | Common Name | IUCN Status | GDARD Status | POC |
|---|---|---|---|---|
| *Homoroselaps dorsalis* | Striped Harlequin Snake | NT | NT | Low |

NT = Neat Threatened

**Table B5: Species triggered by the online screening tool.**

| Scientific Name | Common Name | Status | Sensitivity | POC |
|---|---|---|---|---|
| *Tyto capensis* | African Grass Owl | VU | High | Medium |
| *Eupodotis senegalensis* | White-bellied Korhaan | VU | Medium | Medium |
| *Crocidura maquassiensis* | Makwassie Musk Shrew | VU | Medium | Low |
| *Dasymys robertsii* | Robert's Shaggy Rat | VU | Medium | Low |
| *Hydrictis maculicollis* | Spotted-Necked Otter | VU | Medium | Low |
| *Clonia uvarovi* | Uvarov's Clonia Bush cricket | VU | Medium | Low |

**Avifaunal Species for the pentad 2555_2755 within the QDS 2527DD. 2555_2755**

| Pentads | SABAP2 link |
|---|---|
| 2555_2755 | http://sabap2.birdmap.africa/coverage/pentad/2555_2755 |

# APPENDIX C: Faunal Species List

**Table C1: Mammal species observed, or signs thereof recorded during the field assessment. Species marked with a (*) are not observed but are expected to be found on site.**

| Scientific Name | Common Name | IUCN Status |
|---|---|---|
| *Lepus saxatilis* | Scrub Hare | LC |
| *Canis mesomelas* | Black-backed Jackal | LC |
| *Hystrix africaeaustralis* | Cape Porcupine | LC |
| *Herpestes sanguineus* | Slender Mongoose | LC |
| **Rhabdomys pumilio* | Four-striped Grass Mouse | LC |
| **Rattus norvegicus* | Brown Rat | LC |
| **Mus musculus* | Common House Mouse | LC |

**LC = Least Concern**

**Table C2: Avifaunal species recorded during the field assessment.**

| Scientific name | Common Name | IUCN Status |
|---|---|---|
| *Anthus cinnamomeus* | African Pipit | LC |
| *Mirafra africana* | Rufous-naped Lark | LC |
| *Lamprotornis nitens* | Cape Starling | LC |
| *Burhinus capensi* | Spotted Thick-Knee | LC |
| *Macronyx capensis* | Orange-throated Longclaw | LC |
| *Saxicola torquatus* | African Stonechat | LC |
| *Vanellus senegallus* | Wattled Lapwing | LC |
| *Anthus vaalensis* | Buffy Pipit | LC |
| *Numida meleagris* | Helmeted Guineafowl | LC |
| *Bostrychia hagedash* | Hadada Ibis | LC |
| *Prinia subflava* | Tawny-flanked Prinia | LC |
| *Threskiornis aethiopicus* | Sacred Ibis | LC |
| *Ploceus velatus* | Southern Masked Weaver | LC |

**LC = Least Concern**

**Table C3: Reptile species not observed during field assessment but have been recorded in QDS:2527DD. Source: FitzPatrick Institute of African Ornithology (2021c).**

| Scientific Name | Common Name | IUCN Status |
|---|---|---|
| *Agama atra* | Southern Rock Agama | LC |
| *Chamaeleo dilepis* | Common Flap-neck Chameleon | LC |
| *Crotaphopeltis hotamboeia* | Red-lipped Snake | LC* |
| *Dasypeltis scabra* | Rhombic Egg-eater | LC |
| *Dispholidus typus viridis* | Northern Boomslang | LC |
| *Philothamnus hoplogaster* | South Eastern Green Snake | LC |
| *Philothamnus occidentalis* | Western Natal Green Snake | LC |
| *Philothamnus semivariegatus* | Spotted Bush Snake | LC |
| *Telescopus semiannulatus semiannulatus* | Eastern Tiger Snake | LC |
| *Cordylus vittifer* | Common Girdled Lizard | LC |
| *Elapsoidea sundevallii media* | Highveld Garter Snake | LC |
| *Hemachatus haemachatus* | Rinkhals | LC |
| *Naja annulifera* | Snouted Cobra | LC |
| *Naja mossambica* | Mozambique Spitting Cobra | LC |

| | | |
|---|---|---|
| *Hemidactylus mabouia* | Common Tropical House Gecko | LC |
| *Lygodactylus capensis* | Common Dwarf Gecko | LC |
| *Pachydactylus affinis* | Transvaal Gecko | LC |
| *Pachydactylus capensis* | Cape Gecko | LC |
| *Gerrhosaurus flavigularis* | Yellow-throated Plated Lizard | LC |
| *Nucras ornata* | Ornate Sandveld Lizard | LC |
| *Aparallactus capensis* | Black-headed Centipede-eater | LC |
| *Atractaspis bibronii* | Bibron's Stiletto Snake | LC |
| *Boaedon capensis* | Brown House Snake | LC |
| *Duberria lutrix lutrix* | South African Slug-eater | LC |
| *Lycophidion capense capense* | Cape Wolf Snake | LC |
| *Prosymna sundevallii* | Sundevall's Shovel-snout | LC |
| *Psammophis brevirostris* | Short-snouted Grass Snake | LC |
| *Psammophis crucifer* | Cross-marked Grass Snake | LC |
| *Psammophylax rhombeatus* | Spotted Grass Snake | LC |
| *Psammophylax tritaeniatus* | Striped Grass Snake | LC |
| *Pseudaspis cana* | Mole Snake | LC |
| *Leptotyphlops sp.* | Thread Snake | LC |
| *Leptotyphlops distanti* | Distant's Thread Snake | LC |
| *Leptotyphlops scutifrons scutifrons* | Peters' Thread Snake | LC |
| *Pelomedusa galeata* | South African Marsh Terrapin | LC |
| *Python natalensis* | Southern African Python | LC |
| *Mochlus sundevallii* | Sundevall's Writhing Skink | LC |
| *Panaspis wahlbergii* | Wahlberg's Snake-eyed Skink | LC |
| *Trachylepis capensis* | Cape Skink | LC |
| *Trachylepis laevigata* | Striped Variable Skink | LC |
| *Trachylepis punctatissima* | Speckled Rock Skink | LC |
| *Trachylepis varia sensu lato* | Common Variable Skink Complex | LC |
| *Kinixys lobatsiana* | Lobatse Hinged Tortoise | LC |
| *Stigmochelys pardalis* | Leopard Tortoise | LC |
| *Afrotyphlops bibronii* | Bibron's Blind Snake | LC |
| *Rhinotyphlops lalandei* | Delalande's Beaked Blind Snake | LC |
| *Varanus albigularis albigularis* | Rock Monitor | LC |
| *Varanus niloticus* | Water Monitor | LC |
| *Bitis arietans arietans* | Puff Adder | LC |
| *Causus rhombeatus* | Rhombic Night Adder | LC |

**LC = Least Concern, NT = Near Threatened,**

**Table C4: Amphibian species not observed during field assessment but have been recorded in QDS:2527DD. Source: FitzPatrick Institute of African Ornithology (2021c).**

| Scientific name | Common Name | IUCN Status |
|---|---|---|
| *Schismaderma carens* | Red Toad | LC |
| *Sclerophrys capensis* | Raucous Toad | LC |
| *Sclerophrys garmani* | Olive Toad | LC |
| *Sclerophrys gutturalis* | Guttural Toad | LC |
| *Kassina senegalensis* | Bubbling Kassina | LC |
| *Phrynomantis bifasciatus* | Banded Rubber Frog | LC |
| *Xenopus laevis* | Common Platanna | LC |
| *Amietia delalandii* | Delalande's River Frog | LC |
| *Amietia fuscigula* | Cape River Frog | LC |
| *Cacosternum boettgeri* | Common Caco | LC |

| | | |
|---|---|---|
| *Tomopterna cryptotis* | Tremelo Sand Frog | LC |
| *Tomopterna natalensis* | Natal Sand Frog | LC |
| *Pyxicephalus adspersus* | Giant Bull Frog | P |

**LC = Least Concern, P = TOPS - Protected,**

**Table C5: General invertebrate recorded during the field assessment.**

| Scientific Name | Common Name | IUCN Status |
|---|---|---|
| *Eurema brigitta* | Broad-bordered Grass Yellow | NYBA |
| *Belenois aurota* | Brown-veined White | NYBA |
| *Junonia hierta* | Yellow Pansy | LC |
| *Musca domestica* | House Fly | NYBA |
| *Catantops humeralis* | N/A | NYBA |
| *Orthoctha dasycnemis* | N/A | NYBA |
| *Danaus chrysippus* | African Monarch | LC |
| *Odaleus* sp. | N/A | NYBA |
| *Rhachitopis* sp. | N/A | NYBA |
| *Anterhynchium natalense* | N/A | NYBA |
| *Anoplolepis custodiens* | Pugnacious Ant | NYBA |
| *Acrotylus* sp | Burrowing Grasshoppers | NYBA |
| *Putala transvaalensis* | N/A | NYBA |
| *Oedaleus* sp | Yellow wings | NYBA |
| *Exoprosopa* sp | Bee Flies | LC |
| *Orthetrum julia* | Julia Skimmer | LC |
| *Pontia helice helice* | Meadow White | LC |
| *Paracinema tricolor* | Vlei Grasshopper | LC |
| *Lycus* sp | Net-winged Beetle | LC |
| *Hodotermes mossambicus* | Northern Harvester Termite | LC |
| *Acrida acuminata* | Common Stick Grasshopper | LC |
| *Africallagma glaucum* | Swamp Bluet | LC |
| *Crocothemis sanguinolenta* | Small Scarlet | LC |
| Family Anthophoridae | N/A | NYBA |
| *Rhinocoris* sp | Assassin Bugs | NYBA |
| *Cheilomenes lunata* | Lunate Ladybird | NYBA |
| *Ceratochrysa antica* | Yellow Lacewing | NYBA |
| *Catantops* sp | N/A | NYBA |
| *Orthoctha* sp | N/A | NYBA |
| *Exoprosopa* sp | N/A | NYBA |
| *Lycus melanurus* | Hook-winged Net-winged Beetle | NYBA |
| *Gryllus bimaculatus* | Common Garden Cricket | NYBA |
| *Cheilomenes lunata* | Lunate Ladybird | NYBA |
| *Apis mellifera* | Honeybee | DD |
| *Trinervitermes* sp | Snouted Harvester Termites | NYBA |
| *Spilostethus pandurus* | Milkweed Bug | NYBA |

**LC = Least Concern, NYBA = Not yet been assessed by the IUCN; DD = Data Deficient**

**Table C5. Arachnids recorded during the field assessment.**

| Scientific Name | Common Name | IUCN Status |
|---|---|---|
| *Olorunia* sp | Grass Funnel-Web Spider | NYBA |
| *Nephila senegalensis* | Banded-legged Nephila | NYBA |
| *Tibellus* sp | Small Wandering Crab Spider | NYBA |
| Family Salticidae | Jumping Spiders | NYBA |
| Family Ctenidae | Wandering Spiders | NYBA |
| Family Agelenidae | Funnel Weavers | NYBA |
| *Uroplectes triangulifer* | Highveld Lesser-Thicktail Scorpion | NYBA |

**NYBA = Not yet been assessed by the IUCN**