



SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

Part C: Faunal Assessment

**AS PART OF THE ENVIRONMENTAL
AUTHORISATION PROCESS FOR THE
PROPOSED MIXED-USE DEVELOPMENT
ACTIVITIES OF RIVERSIDE VIEW EXT 126,
GAUTENG PROVINCE.**

Prepared for: Century Property Developments (Pty) Ltd

Author: C. Lamb (Cand. Sci. Nat.)

Reviewers: J. Potgieter (Pr. Sci. Nat.)

M. Ross (Pr. Sci. Nat.)

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Part of the SAS Environmental Group of Companies



DOCUMENT GUIDE

The table below provides a guide to the reporting of biodiversity impacts as they relate to 1) Government Notice No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Biodiversity** as published in Government Gazette 43110 dated 20 March 2020, and 2) Government Notice No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Plant and Animal Species** as published in Government Gazette 43855 dated 30 October 2020.

Theme-Specific Requirements as per Government Notice No. 1150 Animal Biodiversity Theme – Very High and High Sensitivity Rating as per Screening Tool Output		
No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	The 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.	Not Applicable
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 Part A: Appendix E
2.2	The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline¹ 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 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 recognised 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 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
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	Part C: Section 3 & 5 Part C: Appendix B

¹ Available at <https://bgis.sanbi.org/>

² the ability to survive and reproduce in the long term



	Threatened Species, South African Red List of Species, and/or other relevant databases;	
2.2.6	Determine the potential impact of the proposed development on the habitat of the Species of Conservation Concern located within the study area;	Part C: Section 5
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 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 5
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 5
2.2.10	Determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each Species of Conservation Concern	Part C: Section 3
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 & 5
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 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 C: Section 3
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 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 Part C: Appendix B
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	Part C: Section 3 Part C: Appendix B
3.1.9	The location of areas not suitable for development and to be avoided during construction where relevant;	Part C: Section 4
3.1.10	A discussion on the cumulative impacts;	Part C: Section 5
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 5
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,	Executive summary Part C: Section 6



	related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant.	
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 “medium” terrestrial animal species sensitivity and were not considered appropriate.	Part C: Section 1 & 4
3.2	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	Part A: Appendix E
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: Section 3
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 C: Section 3 Part C: Appendix B
4.3	The assessment must be undertaken within the study area.	Part C: 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 2 & 3
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 Part C: Appendix B
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 Part C: Appendix B
4.7	Conversely, 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.	Not applicable to this report



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ACRONYMS

AIP/AIPs	Alien Invasive Plant/Alien Invasive Plants
BAR	Basic Assessment Report
BGIS	Biodiversity Geographic Information Systems
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
DD	Data Deficient
DFFE	Department of Forestry, Fisheries, and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIS	Ecological Importance and Sensitivity
EN	Endangered
EWT	Endangered Wildlife Trust
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
IUCN	International Union for Conservation of Nature and Natural Resources
km	Kilometres
LC	Least Concern
m	Metres
NA	Not Applicable
NT	Near Threatened
NEMBA	National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)
NYBA	Not yet been assessed
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
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
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: Biodiversity Act, 2004 (Act No. 10 of 2004):
VU	Vulnerable



GLOSSARY OF TERMS

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”.
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. The different categories <i>are not mutually exclusive</i> and, in some cases, overlap, often because a particular area or site is important for more than one reason. They should be <i>complementary</i>, with overlaps <i>reinforcing the importance</i> 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).
Community Characterisation	Comparisons can be made among communities using attributes such as species richness, species diversity, and evenness. - Species richness is simply the number of species in a community. - 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. - 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. 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.
Critically Endangered (CR) (IUCN³ 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

³ International Union for Conservation of Nature (IUCN)



	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”. Various terminology can be used for precision of language: ➤ <u>Fair ecological condition</u>: 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. ➤ <u>Good ecological condition</u>: 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. ➤ <u>Poor ecological condition</u>: 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.
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.
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. Impact-related terminology:



	➤ <u>Cumulative impact</u>: 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. ➤ <u>Impact Significant/significance</u>: 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. ➤ <u>Residual negative impacts</u>: 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 (<i>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.</i>). ➤ <u>Significant impact</u>: 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.
Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
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.
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.
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.



1. INTRODUCTION

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 of the Riverside View Ext 126 near Kyalami within the Gauteng Province.

The proposed development comprises three areas (Area 1, Area 2, Area 3) which are hereafter collectively referred to as the “**study area**”. Area 1 is approximately 2,32 hectares (ha) in size and is located 580 metres (m) east of the R511 roadway, 170 m north of Reddam House Helderfontein, while Area 2 is approximately 7,32 ha and is located 1,5 kilometres (km) northwest of the M71 road and 1,1 km east of the R511 roadway. Area 3 is approximately 4,83 ha in size and is located 1,36 km east of the R511 roadway and 1,6 km northwest of the M71 road. The surrounding landscape consists of a peri-urban area such as residential developments. The location and extent of the study area are depicted Figure 1.

The purpose of this report is to define the faunal ecology of the study area, to identify areas of increased Ecological Importance and Sensitivity (EIS), as well as the mapping of such areas, and to describe the Present Ecological State (PES) of the study area. The primary objective of the faunal assessment is not to compile an exhaustive species list but rather to ensure that sufficient data are collected to describe all the faunal classes present in the area of interest, to optimise the detection of species of conservation concern (SCC) and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020).



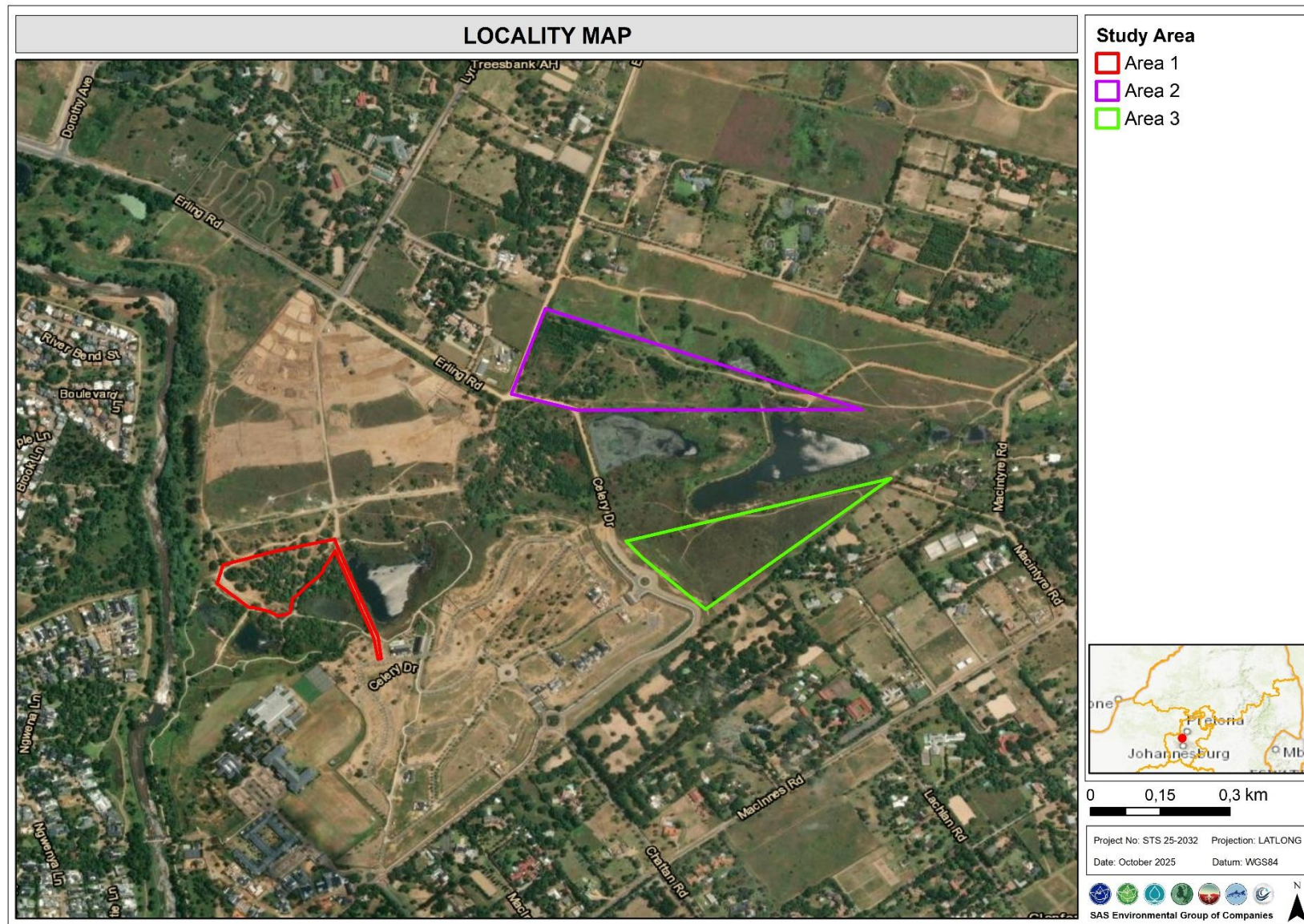


Figure 1: Digital satellite imagery depicting the locality of the study area.



1.1. Reporting Protocol

The site verification and field assessment confirmed the medium animal species theme sensitivity (as identified by the Department of Forestry, Fisheries, and the Environment's (DFFE) National Web-based Screening Tool (hereafter referred to as the "screening tool")) in certain portions of the study area. In other areas, the high sensitivity rating was disputed, and a medium sensitivity was considered to be more appropriate. Additionally, in some sections, both the medium and high sensitivity ratings were disputed and assigned a low sensitivity due to the absence of suitable habitat for faunal SCC. As such, the reporting protocol for the animal species theme follows the protocol for the medium sensitivity theme (refer to the document guide in this report).

For refined, ground-truthed / field-verified habitat sensitivities, please refer to the site ecological importance (SEI) breakdown in Section 4 of this report.

1.2. Scope of Work

The purpose of this report is to define the faunal ecology of the proposed mixed-use development as well as mapping and defining areas of increased EIS and to define the PES of the study area. 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 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 Gauteng Conservation Plan (V4.0, 2024), and the overall potential for such species to occur within the areas associated with the study area;
- To verify the DFFE's national environmental screening report for the animal theme (screening tool) for the study area;
- To provide detailed information to guide the activities associated with the proposed mixed-use development within the study area; and



- To ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements and the provision of ecological services in the local area.

1.3. 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 neighbouring 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;
- Due to the nature, habits and mobility of most faunal taxa, it is unlikely that all species would have been observed during the field assessment. Therefore, site observations were compared with literature studies, where necessary;
- The field assessment was conducted during late spring (November 2025) to determine the faunal ecological status of the study area and to “ground-truth” the results of the desktop assessment. While a more comprehensive assessment would ideally include multiple seasons, particularly early to mid-summer, late spring is considered sufficiently representative for this purpose. On-site data were supplemented with all available desktop information and specialist expertise in the area, and the findings of this assessment are considered to be an accurate reflection of the ecological characteristics of the study area;
- 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. However, this is not considered a significant limitation or fatal flaw, as such constraints are inherent to ecological fieldwork. Nevertheless, for more accurate and complete data collection, summer assessments are considered more reliable;
- For the avifaunal SCC assessment, the most recent *Regional Red Data Book of Birds of South Africa, Lesotho, and Eswatini* (Lee *et al.*, 2025) was consulted. This publication is not yet reflected in the South Africa National Biodiversity Institute (SANBI) database and the precautionary principle was applied. This resulted in the highest conservation status from either source being used in this report;



- This report addresses Freshwater Ecosystems as defined by the previous Freshwater Ecological Assessment for the nearby Helderfontein Estate (STS 200036 (2020)). No new delineation work was undertaken as part of the current 2025 assessment, as the scope of this study is restricted to a botanical and ecological evaluation of the mapped habitats. Accordingly, features were assessed solely from a faunal and ecological perspective. Aspects relating to freshwater ecosystem drivers and receptors, namely hydrology, geomorphology, water quality, and aquatic biota, as well as the formal determination of watercourse status in terms of the National Water Act, 1998 (Act No. 36 of 1998), were not reassessed and should be verified by a suitably qualified freshwater ecologist (should the proponent or competent authorities deem it necessary); and
- At the time of this report, the proponent had not provided a layout for the proposed development. Therefore, this impact assessment assumes that construction will clear all habitats within the study area and that no open green-space planning will be incorporated, nor will the Freshwater Habitat located directly within the study area be avoided.



1.4. Indemnity and Terms of use of this Report

The findings, results, observations, conclusions, and recommendations presented in this report are based on available information and the author's best scientific and professional knowledge. The report is based on survey and assessment techniques that are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and STS and its staff reserve the right to, at their sole discretion, modify aspects of the report, including the recommendations, if and when new information may become available resulting from ongoing research, or further work in this field pertaining to this investigation.

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2. ASSESSMENT APPROACH

The field assessment was undertaken on the 5th of November 2025 (late spring season), to determine the faunal ecological status of the study area. A reconnaissance 'walkabout' was used to determine the general habitat types found throughout the study area, following this, specific study sites were selected that were considered to be representative of the habitats found within the study area, with special emphasis being placed on areas that may potentially support faunal SCC. Sites were investigated on foot in order to identify the occurrence of fauna within the study area.

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



2.1 General Approach

To accurately determine the PES of the study area and capture comprehensive data with respect to faunal taxa, the following methodology was 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 undertaken to confirm the assumptions made during inspection of the digital satellite imagery;
- A literature review with respect to habitats, vegetation types and species distribution was conducted considering the larger study area. For a detailed description of the vegetation types and habitats associated with the study area, please refer to the associated Terrestrial and Plant Species Report (Part B);
- Relevant databases considered during the assessment of the study area included online verified research grade species records from iNaturalist; The Endangered Wildlife Trust (EWT) Red List of Species (2021), the SANBI South African Red List of Species, Important Bird and Biodiversity Areas (IBA, 2015), South African Bird Atlas Project 2 (SABAP2), International Union for Conservation of Nature (IUCN), the Screening Tool (2025) 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 Part A: Appendix C.

2.2 Sensitivity Mapping

All the ecological features associated with the study area were considered and sensitive areas were delineated using a Global Positioning System (GPS). Geographic Information System (GIS) software was used to project these features onto satellite imagery. The various habitat types were assigned SEI categories based on their ecological integrity, conservation value, the presence of SCC, and their ecosystem processes. Refer to Part A: Appendix C for the breakdown of the methodology used to determine SEI and sensitivity.

2.3 Faunal Species of Conservation Concern Assessment

According to the SANBI Species Environmental Assessment Guidelines, faunal SCC are defined as any species that are threatened, range-restricted, or of particular ecological, cultural, or conservation significance, and which may be especially vulnerable to habitat loss, disturbance, or other anthropogenic pressures. SCC include taxa listed as threatened in terms of the IUCN Red List categories (Critically Endangered (CR), Endangered (EN), Vulnerable



(VU), Near Threatened (NT) or Data Deficient (DD)), species protected under national or provincial legislation, species that are rare or locally endemic with limited distributions, and those identified as requiring specific conservation attention due to declining populations or specialised habitat requirements.

Certain invertebrate taxa, including scorpion and spider species, as well as reptile, amphibian and mammal species, may be listed as protected under the TOPS regulations without being regarded as SCC in terms of the SANBI Species Environmental Assessment Guidelines. This distinction arises because many of these species are relatively widespread, occur across a broad range of habitats, and are not experiencing significant population declines or severe habitat fragmentation. Their protected status is therefore precautionary and largely intended to regulate collection, trade, and handling rather than to address an immediate conservation threat. While compliance with TOPS permitting requirements may be necessary when these species are encountered during development, they are not typically considered threatened; however, they remain classified as protected species and are therefore, as a precautionary principle, included in the SCC assessment.

During field assessments, it is not always feasible to identify or observe all species within an area. This is 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 site were taken into consideration. Faunal species likely to occur within the study area are indicated and briefly discussed within each of the relevant dashboards in section 3, along with their POC.



3. FAUNAL ASSESSMENT RESULTS

3.1 Sampling Effort

The site was surveyed on foot by means of extended transects (meanders) through the study area, where species were surveyed and habitat conditions noted; meanders were positioned within the various habitat types to ensure an adequate representation of faunal species from different classes (mammals, reptiles, amphibians, avifauna and invertebrates). Figure 2 presents the specialist's recorded GPS tracks in relation to the study area as an indication of the area covered.

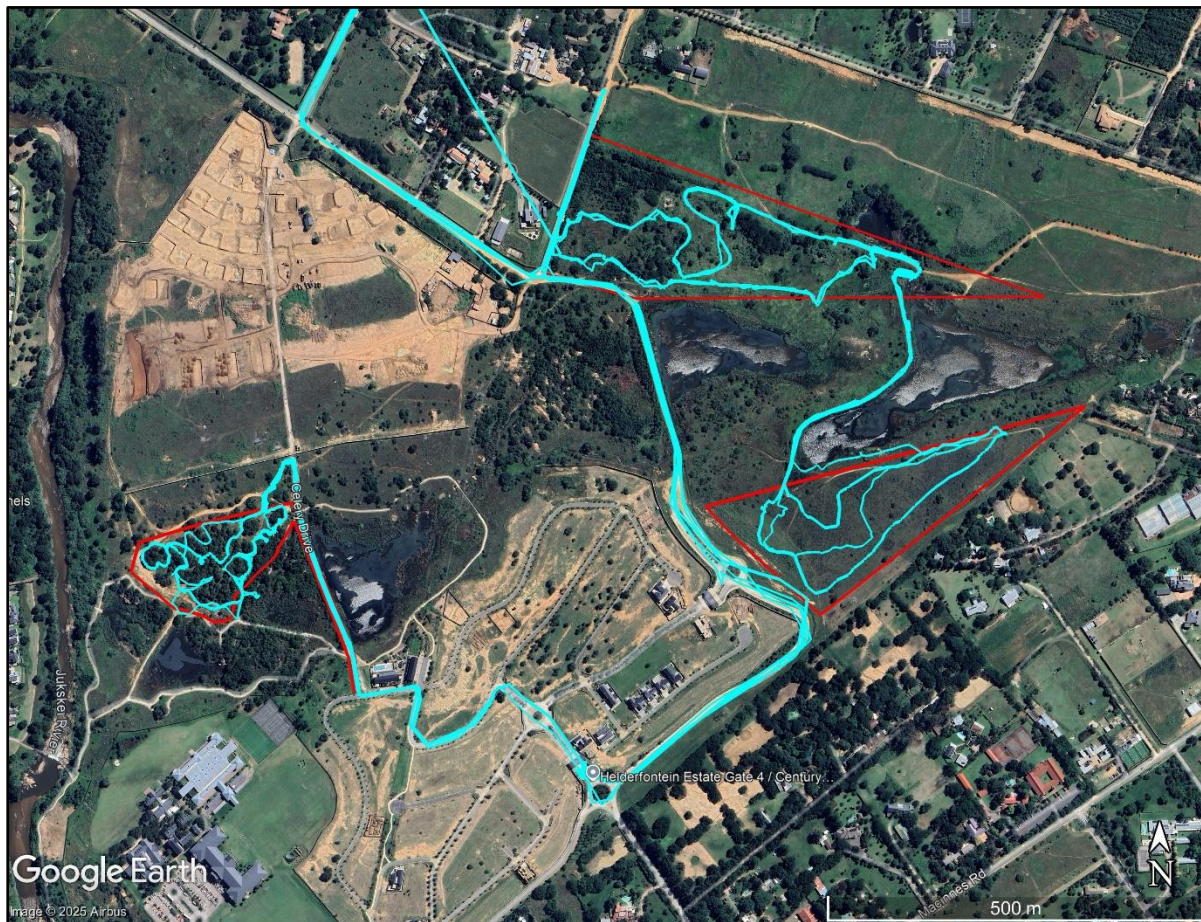


Figure 2: The study area (red outline) and the specialist's GPS tracks (blue lines) as they relate to the study area



3.2 Existing Impacts

The study area lies within a peri-urban landscape east of Kyalami, west of Dainfern Valley, and north of Glenferness. Ongoing urban expansion and surrounding developments have resulted in the relative isolation of the site. This isolation restricts faunal movement and reduces species diversity and abundance, particularly among medium and large mammal species. Faunal movement is now primarily limited to avifauna and invertebrates and, to a lesser extent, smaller mammal and reptile species capable of navigating existing barriers.

Historical disturbances, including the introduction of alien tree species, previous agricultural activities, dumping, and the construction and subsequent abandonment of a stable yard (circa 2009) and associated derelict structures, have altered habitats within the study area. These past disturbances have promoted the proliferation of Alien and Invasive Plant (AIP) species and disrupted natural fire regimes that have contributed to habitat fragmentation. Collectively, these impacts have contributed to the ongoing degradation of habitat condition, which impacts on the potential presence of fauna within the study area.

3.3 Faunal Habitat

During the field assessment, four broad habitat units were identified within the study area. The identified habitat units are as follows:

1) **Alien Dominated Woodland** (7.59 ha, Figure 3):

This habitat is characterised by a short grass layer interspersed with abundant alien tree species (some dominant species include *Tipuana tipu*, *Melia azedarach*, and *Acacia podalyriifolia*) that have proliferated following past disturbances. A small rocky area (0.05 ha) provides niche microhabitats for reptiles, invertebrates, and small mammals. The presence of trees supports a diversity of avifaunal species that utilise woody vegetation for nesting and foraging. Proximity to nearby water bodies within the Freshwater Habitat further promotes faunal diversity and abundance by supporting species that forage, roost, or nest near water sources.

Despite offering habitat for a range of faunal species, the area remains degraded, with most species present being common and well-adapted to disturbed environments. The reference Egoli Granite Grassland vegetation type has been replaced by this altered habitat, resulting in the loss of species typically associated with intact grassland ecosystems. The scattered presence of rubble and litter from past dumping further reflects the disturbed condition of this habitat unit.





Figure 3: Representative photographs of the Alien Dominated Woodland habitat unit: Left: Dense alien trees in some sections. Right – Rocky outcrops with alien trees are scattered throughout this habitat.

2) Secondary Grassland (3.78 ha, Figure 4):

This habitat is characterised by a short grass layer that has been impacted by historical agricultural and construction activities, dumping, and altered fire regimes. Dominant grass species that have a short basal structure include: *Eragrostis gummiflua* and *Eragrostis lehmanniana*. Portions of the area contain bare soil patches with limited grass cover and encroachment by AIP species. The homogenous vegetation structure restricts faunal diversity and abundance. Existing rubble piles provide refuge and basking sites for small mammal and reptile species, while seed-bearing and palatable grasses offer food resources for disturbance-adapted and commonly occurring grassland fauna.



Figure 4: Left - Rubble piles and homogenous short grass layer characteristic of the Secondary Grassland Habitat: Right – sections of this habitat have bare patches with limited grass cover.



3) **Transformed Habitat** (2.97 ha, Figure 5):

Transformed Habitat occurs throughout the study area and is largely unsuitable for most fauna due to the loss of natural vegetation and food resources from historical and ongoing anthropogenic activities (e.g. road construction). These areas no longer resemble natural grassland, offer no unique habitat features, and hold low ecological and conservation value. From an ecological perspective, the transformed habitat offers minimal functional value for fauna.



Figure 5: Transformed Habitat: Paved and sand roads throughout the study area.

4) **Freshwater Habitat** (12.34 ha, Figure 6).

This habitat unit comprises of anthropogenically derived dams (0.38 ha) and a unchanneled valley bottom wetland (11.96 ha) associated with a tributary of the Jukskei River. While edge effects, including AIP proliferation and human disturbance impact the area, it continues to provide important ecological functions. The availability of water and elevated moisture levels attract species dependent on aquatic or moist environments, including semi-aquatic mammals (e.g., water mongoose), amphibians, aquatic invertebrates and water-dependent birds. As a result, this habitat offers unique foraging opportunities for amphibians and invertebrates and provides roosting and nesting sites for avifaunal species. Only a small section (0.16 ha) of the unchanneled valley bottom wetland falls within the study area and direct development footprint. However, the broader Freshwater Habitat was still included in the assessment due to its immediate proximity to the proposed development, as potential edge effects on this habitat and its associated faunal species need to be considered.





Figure 6: Open water present on the borders of the study area offers unique habitat for water-dependent species.

For a detailed discussion of the floral communities associated with the above-mentioned habitat units, please refer to the Floral Report (Part B). Figure 7 below provides a visual representation of the above-mentioned habitat units. Sections 3.4- 3.7 provide dashboards of the findings of each faunal class.



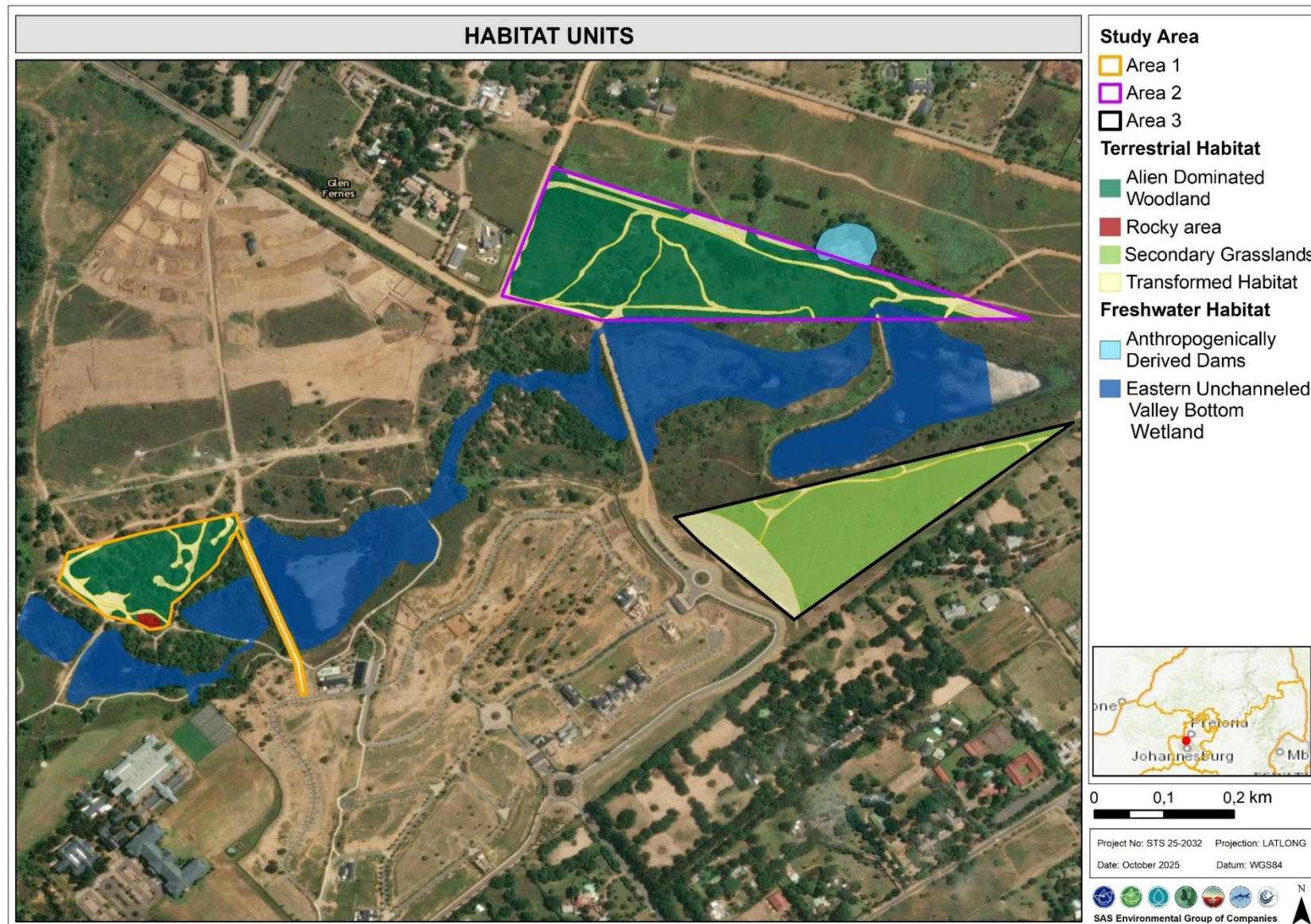


Figure 7: Overview of the habitat units associated with the study area.



3.4 Mammals

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

Photographs			
			
a.) <i>Herpestes sanguineus</i> (Slender Mongoose, LC) observed on a rocky outcrop in the Alien Dominated Woodland habitat; b.) <i>Lepus saxatilis</i> (Cape Scrub Hare, LC) droppings observed in the Alien Dominated Woodland habitat; c) Horse riders and domestic dogs observed in the Secondary Grassland habitat; d.) Small mammal burrows observed throughout the Alien Dominated Woodland and Secondary Grassland habitats.			
Mammal SCC			
Species	Habitat and Resources in the Sites	Conservation Listing	POC
<i>Aonyx capensis</i> (Cape Clawless Otter)	Cape Clawless Otters are predominantly aquatic, dwelling in the vicinity of perennial and episodic springs, rivers or dams. They exhibit a preference for shallow waters adorned with dense reed beds, providing an ideal habitat for their favoured prey which include crabs and fish. When on land, these otters seek refuge in underground burrows, beneath rocks, roots, or within thick vegetation. Although the study area lies within the species' broader range and past records exist from the region, its POC within the Freshwater Habitat is a medium because suitable habitat is limited and the remaining wetland features are isolated within the peri-urban landscape.	NT	Medium
<i>Crocidura mariquensis</i> (Swamp Musk Shrew)	This species has very specific habitat requirements, being found primarily near open water bodies with well-preserved riverine and semi-aquatic vegetation, including reedbeds, wetlands, and dense grasses along riverbanks. It inhabits both moist substrates and the drier grasslands located further from the water's edge. The species is frequently recorded in waterlogged environments such as flooded grasslands and vleis. Observations from Eswatini and Telperion Nature Reserve in Gauteng indicate that it can occupy a range of land cover types. The lack of suitable habitat within the study area results in a low POC for this species.	NT	Low



<i>Atelerix frontalis</i> (Southern African Hedgehog)	This species utilises a range of vegetation types. Its diet primarily consists of insects, but also includes reptiles, carrion, fungi, and bird eggs. This species may potentially be found in the Secondary Grassland Habitat. Due to available suitable habitat together with distribution overlap, as well as records on iNaturalist, this species has a high POC.	NT	High
<i>Crocidura maquassiensis</i> (Makwassie Musk Shrew)	This species, unique to South Africa, Swaziland, and Zimbabwe, inhabits moist grassland habitats within the savannah and grassland biomes and is typically found in association with intact wetlands. Due to marginally suitable habitat being available for this species together with distribution overlap, this species has a medium POC within the study area.	VU	Medium
<i>Hydrictis maculicollis</i> (Spotted-necked Otter)	This species primarily inhabits undisturbed and unpolluted freshwater systems, with a preference for shallow waters surrounded by dense reed beds, which provide an ideal environment for their preferred prey, such as crabs and fish. They require dense vegetation near water for breeding and shelter. On land, these otters seek refuge in underground burrows, beneath rocks, roots, or within thick vegetation. Although the study area falls within this species' broader distribution and previous records exist in the region, its POC within the Freshwater Habitat is considered low due to the limited habitat suitability and the isolated nature of the remaining wetland features within the peri-urban landscape.	VU	Low
<i>Dasymys robertsii</i> (Robert's Shaggy Rat)	This species relies on undisturbed wetlands as its habitat, predominantly within reed beds, semi-aquatic grasses, swampy regions, and along riverbanks and streams. They also flourish in grassy areas near water sources. Their omnivorous diet includes stems, fruiting heads of semi-aquatic grasses, and insects. Although the study area falls within this species range, the disturbed nature of the wetlands in the Freshwater Habitat results in a low POC.	VU	Low
<i>Mystromys albicaudatus</i> (White-tailed Rat)	The habitat requirements and ecology of White-tailed Rats warrant further investigation. These rats are typically associated with calcrete soils in grassland habitats and are never found in soft, sandy substrates, rocks, wetlands, or along riverbanks. Additionally, records from the Free State Province and Borakalalo Nature Reserve in the North-West Province indicate that they can occur in disturbed areas (such as heavily grazed sites) and in sparse grasslands. Due to the presence of suitable habitat for this species in the Secondary Grassland it is designated a medium POC.	VU	Medium
<i>Leptailurus serval</i> (Serval)	Servals are primarily found in marshes, well-watered savannahs, and areas with tall grass. They exhibit a particular affinity for reed-beds and other riparian vegetation. Key vegetation types for servals include wetlands, grasslands (preferably with long, dense grass), and indigenous vegetation that provides cover and supports dispersal. Suitable habitat is present in the Freshwater Habitat and the study area falls within this species' range. This species has also been recorded in the region on iNaturalist.	NT	High

Mammal Discussion

Reduced habitat connectivity and persistent anthropogenic impacts within and around the study area limit its capacity to support a diverse assemblage of mammal species. Residential and peri-urban development surrounding the site further restrict connectivity to the broader landscape. Disturbances such as dumping, high levels of human activity, and the frequent presence of domestic dogs further constrain mammal abundance and diversity. As a result, common small sized mammals that are highly adaptable to anthropogenic disturbance are more likely to be present. The field assessment confirmed a high abundance of small mammals, as signs such as dung or scat were observed within the study area. Observed species included *Cryptomys hottentotus* (Common Molerat), LC), *Lepus saxatilis* (Scrub Hare), *Herpestes sanguineus* (Slender Mongoose, LC), and *Procavia capensis* (Rock Hyrax, LC). Small mammal burrows were identified in the Secondary Grassland and Alien Dominated Woodland near the Freshwater Habitat, where a relatively high abundance of rodents is expected in and around the water source, as this habitat offers refuge (increased vegetation cover in the reeds) and food resources. In the Alien Dominated Woodland and Secondary Grassland habitat, rock piles form natural formations providing suitable refuge for smaller mammal species, while dumping and degraded anthropogenic infrastructure may also provide shelter for generalist and adaptable species. Small mammals provide an important ecological function, by providing a food source for predators, such as birds of prey and reptiles. The Secondary Grassland further provides an important food resource for

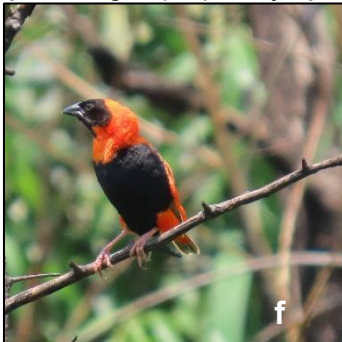
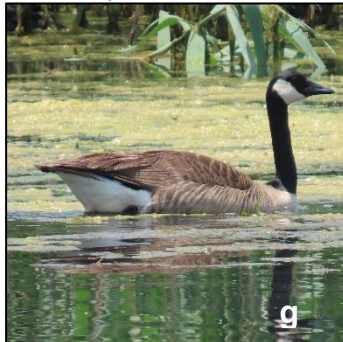
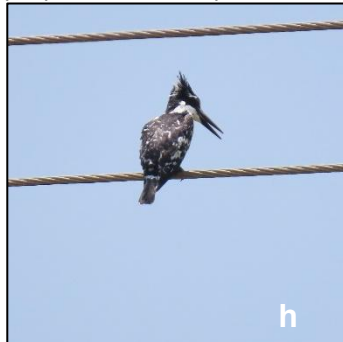


insectivores as, although homogenous, the grass layer still attracts several invertebrate species. No mammal SCC were confirmed within the study area, however, three species have a medium POC and two species a high POC (listed above) within the Freshwater, Secondary Grassland and Alien Dominated Woodland habitats.

Overall, the ecological functionality of the study area has been compromised by the decrease in habitat connectivity, which has negatively affected the long-term viability of local mammal populations. Historical land transformation from agriculture, combined with ongoing anthropogenic disturbance, has significantly reduced the site's capacity to support a diverse and abundant assemblage of mammals, particularly larger species that are more susceptible to landscape fragmentation and movement barriers.

3.5 Avifauna

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

Photographs			
			
a.) <i>Lamprotornis nitens</i> (Cape Starling, LC); b.) <i>Amblyospiza albifrons</i> (Thick-billed Weaver, LC); c.) <i>Fulica cristata</i> (Red-knobbed Coot, LC) d.) <i>Cuculus solitarius</i> (Red-			
			
e.) <i>Euplectes orix</i> (Southern Red Bishop, LC); f.) <i>Branta canadensis</i> (Canada Goose, LC); g.) <i>Ceryle rudis</i> (Pied Kingfisher, LC) and h.) <i>Scopus umbretta</i> (Hamerkop, NT).			





i.) *Vidua macroura* (Pin-tailed Whydah, LC); j.) *Saxicola torquatus* (African Stone Chat, LC); k.) *Estrilda astrild* (Common Waxbill, LC) and l.) *Agapornis roseicollis* (Rosy-faced Lovebird, LC).

Avifaunal SCC

Species	Habitat and Resources in the Sites	Status	POC	Species	Habitat and Resources in the Sites	Status	POC
<i>Scopus umbretta</i> (Hamerkop)	This species is widely distributed across sub-Saharan African where it is associated with many aquatic habitats including estuarine, rivers, ponds, lakesides and irrigation systems and even occasionally recorded along rocky shorelines. They mostly feed on amphibians, both adults and tadpoles and are also known to take small fish and invertebrates. This species was observed on site during the field assessment.	NT	Confirmed	<i>Coracias garrulus</i> (European Roller)	This species occurs within open woodlands, perching on open dead branches. It also opportunistically perches on powerlines and telephone poles to hunt from a vantage point for insects and occasionally small vertebrates. Although, it has been recorded in the study areas pentad, it is only an occasional migrant in this area and may make use of the Transformed, Secondary Grassland and Alien Dominated Woodland Habitat on site for occasional hunting.	NT	Medium
<i>Anhinga rufa</i> (African Darter)	The African darter is found throughout sub-Saharan Africa wherever large bodies of water occur. It feeds on fish, which it catches by diving. This species has been recorded in surrounding area on iNaturalist and SABAP2 pentads and suitable habitat is present in the Freshwater Habitat.	NT	High	<i>Anas undulata</i> (Yellow-billed Duck)	The yellow-billed duck is a common resident breeder found in southern and eastern Africa. While it is not migratory, it may wander during the dry season in search of suitable water sources. Outside of the breeding season, this duck is very social and often forms large flocks. It inhabits freshwater environments in relatively open areas and primarily feeds by dabbling for plant material, typically in the evening or at night. The duck nests on the ground in dense vegetation located near water. This species has a high POC as suitable habitat is present in the Freshwater Habitat and	NT	High



					they have been observed within the study area's SABAP2 pentad.		
<i>Falco biarmicus</i> (Lanner Falcon)	Lanner Falcons prefer open grassland or cleared woodland habitat where they will hunt birds, small mammals, reptiles and insects. They mainly breed on cliffs but they are also known to make nests in trees, on buildings, and on pylons. This species has a high POC as suitable habitat is present in the Secondary Grassland Habitat for hunting. Additionally, this species has been recorded within the study area's SABAP2 pentad.	VU	High	<i>Elanus caeruleus</i> (Black-winged Kite)	The black-winged kite is a species primarily of open land and semi-deserts in sub-Saharan Africa. Their prey includes grasshoppers, crickets and other large insects, lizards, and rodents. Injured birds, small snakes and frogs have also been reported. This species has been recorded on SABAP 2 pentads and on iNaturalist in the region and may make use of the Transformed, Secondary Grassland and Alien Dominated Woodland Habitat for hunting.	NT	High
<i>Ardea alba</i> (Great Egret)	The Great Egret is usually found in shallow, open waters such as rivers, lakes, marshes, flooded grasslands, floodplains, salt pans, and estuaries. The diet of the Great Egret is mostly fish and amphibians, but insects, birds, and small mammals are also consumed. This species has a high POC as suitable habitat is present in the Freshwater Habitat and they have been observed within the SABAP2 pentad associated with the study area.	NT	High	<i>Nycticorax nycticorax</i> (Black-crowned Night Heron)	It is widespread in Southern African but typically absent from dry regions such as Northern Cape. They inhabit wetlands, rivers, lakes, swamps, marshes, estuaries as well as dams and ponds where they have a wide tolerance for water conditions. A generalist feeder, known to eat a wide variety of shoreline and aquatic species such as fish, frogs, tadpoles, turtles, snakes, lizards, adult and larval insects etc. This species has been recorded in study area's SABAP 2 pentad and suitable habitat is present within the Freshwater Habitat.	NT	High
<i>Falco vespertinus</i> (Red-footed Falcon)	Within the region it prefers large, open, grassy spaces in arid woodland, where it is present from October to November, with numbers peaking in January to February as a non-breeding migrant. It is relatively uncommon and is prone to localised movements in response to rainfall and resultant insect irruptions. It is a generalist predator that typically hunts on the wing but will also take prey from the ground. Its diet consists primarily of arthropods, including insects, centipedes, solifugids and occasionally small vertebrates. This species has been recorded in the region and may occasionally hunt within the Secondary Grassland Habitat.	NT	High	<i>Alcedo semitorquata</i> (Half-Collared Kingfisher)	This kingfisher is strictly water-associated, inhabiting the dense inner marginal zones of riparian vegetation in the immediate vicinity of perennial streams and rivers that provide secluded conditions. It also frequents well-vegetated banks of lakes, dams, estuaries, and coastal lagoons. Marginally suitable habitat may be found within the Freshwater Habitat. This coupled with an older record (2017) of this species on SABAP2 results in a medium POC.	NT	Medium



<i>Spatula smithii</i> (Cape Shoveler)	The Cape Shoveler primarily inhabits shallow, plankton-rich wetlands and dams, but it is also found in tidal estuaries, salt pans, saline lagoons, and the shallow bays and upper reaches of large dams. This species has been recorded in surrounding pentads and suitable habitat is present within the dams in the Freshwater Habitat.	NT	High	<i>Netta erythrophthalma</i> (Southern Pochard)	In South Africa, their presence is widespread but unevenly distributed, with the highest concentrations found in the central part of the region. They prefer large bodies of deep, clear water, which can be either permanent or temporary. These can include sewage ponds, shallow marshes, lakes, and pools, ideally with submerged vegetation. Their primary diet consists of seeds, but they also consume the roots and vegetative parts of aquatic plants, supplementing their diet with grasses, sedges, and various aquatic invertebrates. This species has a high POC as suitable habitat is available and they have been observed in the surrounding area.	NT	High
<i>Ciconia abdimii</i> (Abdim's Stork)	Abdim's Stork is typically found in grasslands, sparsely wooded savannas, near pans, and in cultivated fields, often occurring in groups of up to 100 individuals. As this species is a non-breeding migrant suitable foraging habitat is present in the Secondary Grassland and Alien Dominated Woodland Habitat.	NT	Medium	<i>Circus ranivorus</i> (African Marsh Harrier)	The African Marsh Harrier is a bird of prey that can be found in wetlands and marshlands. They are dependent on permanent wetlands, both inland and coastal, for breeding, feeding and roosting. African Marsh Harriers primarily feed on small mammals, reptiles, and amphibians. Suitable habitat is present within the Freshwater Habitat. Although this species has been recorded within the study area's SABAP2 pentad, the surrounding anthropogenic disturbances may restrict its use of this habitat.	EN	Low
<i>Hydroprogne caspia</i> (Caspian Tern)	Caspian Terns occur on small, low islets in pans and dams where they breed and forage for fish. While breeding they are intolerant to disturbance. Although the study area falls within this species distribution range, this species prefers less disturbed dams and is unlikely to occur on site.	VU	Low	<i>Falco naumanni</i> (Lesser Kestrel)	The Lesser Kestrel is closely linked to grassland habitats and occurs in areas such as the grassy Karoo, the western edges of the grassland biome, and the southeastern Kalahari. It is known to hunt in modified landscapes, as long as these have not been entirely converted to sugarcane fields or plantation forests. In the Western Cape, it forages over small grain fields and pastures that were formerly Fynbos and Renosterveld. The Lesser Kestrel may occasionally forage within the Secondary Grassland habitat as it has been recorded in the surrounding area (SABAP2 pentad). However, it is unlikely to use this habitat extensively.	VU	Medium



<i>Tyto capensis</i> (African Grass Owl)	The African Grass Owl typically roosts and breeds in tall, rank grass or sedges associated with damp substrates such as permanent and non-perennial wetlands and streams. At night it may hunt over drier and more open habitats near its wetland roost sites but still prefers hunting in tall grassland to short grassland, wetlands or croplands. The lack of tall dense vegetation in the Secondary Grassland and Freshwater Habitat results in a medium POC for this species even though it has been recorded in the surrounding area. This species may only use the study area to occasionally hunt but will not roost or breed within it.	VU	Medium	<i>Podica senegalensis</i> (African Finfoot)	An aquatic bird which prefers permanent rivers and streams with thick riparian vegetation and overhanging trees. They feed on aquatic invertebrates and sometimes on small vertebrates which they hunt while swimming or walking on the riverbanks. Although, this species has been recorded on the study area's SABAP2 pentad, the surrounding anthropogenic disturbance reduces habitat suitability for this species in the study area.	VU	Low
<i>Podiceps cristatus</i> (Great Crested Grebe)	The Great Crested Grebe primarily inhabits large inland wetlands, lakes, and pans, typically bordered by emergent vegetation. It may occasionally be observed on saltpans and is rarely recorded at sea. The species is largely confined to deep, permanent water bodies. As it relies on clean water for survival, it is considered an indicator species for water quality. This species has been recorded in surrounding pentads and suitable Habitat is present in the Freshwater Habitat (dams). However, due to the potential change in water quality associated with its proximity to developments, it lowers this species POC to a medium.	VU	Medium	<i>Asio capensis</i> (Marsh Owl)	They are common in the grasslands of southern Africa, occurring in the northern regions of South Africa down to the province of the Eastern Cape. The marsh owl's habitat preference is open grassland, marshlands and short scrub, typically near marshy grounds, vleis or dams where they will nest on the ground. The marsh owl typically feeds on small rodents, insects and other small vertebrates. This species has been recorded in the surrounding area. The lack of suitable vegetation cover in the Freshwater and Secondary Grassland vegetation for breeding or roosting results in a medium POC for this species as this species may only occasionally hunt within the study area.	NT	Medium
<i>Grus paradisea</i> (Blue Crane)	Blue Cranes are a near endemic species to South Africa which prefer dry and open grasslands. They are also commonly found in agricultural landscapes where they forage primarily on insects, such as grasshoppers, crickets, and beetles, as well as seeds, bulbs, and roots of various plants. They usually breed within wetland habitat. Although this species has been recorded on iNaturalist and SABAP2 (recorded in 2011) and suitable habitat is present within the Secondary Grassland and Freshwater Habitat, these records are older and	VU	Medium	<i>Dendrocygna bicolor</i> (Fulvous Whistling Duck)	The Fulvous Whistling Duck typically occupies shallow freshwater or brackish wetlands dominated by tall grasses. Preferred habitats include freshwater lakes, seasonal pools, slow-flowing streams, marshes, swamps in open flat landscapes, and flooded grasslands. The species is also commonly associated with wet rice cultivation areas. During its flightless moulting period, it seeks shelter in densely vegetated wetlands, where it is less vulnerable to predation. This species has been recorded in a surrounding	NT	Medium



	the high human activity and disturbance within the study area lowers this species' POC to a medium.				pentad and may occasionally seek refuge in the wetland within the Freshwater Habitat.		
<i>Ciconia nigra</i> (Black Stork)	The Black Stork favours perennial rivers, dams, estuaries, pans that are usually located near mountains as they are cliff nesters. The Freshwater Habitat provides foraging opportunities for this species.	EN	Medium	<i>Eupodotis senegalensis</i> (White-bellied Korhaan)	The White-bellied Korhaan inhabit a wide range of habitats, including savannahs, grasslands, and woodlands and occasionally move into cultivated fields to forage. They primarily feed on insects, such as beetles, grasshoppers, and termites but may also consume small mammals, reptiles, and fruits. Suitable habitat is present for this species in the Secondary Grassland Habitat.	VU	Medium
<i>Sagittarius serpentarius</i> (Secretarybird)	This species is widespread throughout sub-Saharan Africa and has a broad distribution in South Africa. They prefer open grasslands and savannahs with scattered trees for nest sites. They are carnivorous and feed primarily on insects and reptiles, such as snakes, and lizards. Suitable habitat is present in the Secondary Grassland.	EN	Medium	<i>Oxyura maccoa</i> (Maccoa Duck)	The Maccoa Duck is found in small, shallow, nutrient-rich inland lakes in the breeding season. It is also known to utilise man-made farm dams and sewage farms. In the non-breeding season, they make use of deeper, larger bodies of water. This species has been recorded in surrounding pentads and may occasionally be found in the Freshwater Habitat, however not extensively due to the surrounding anthropogenic disturbance.	VU	Medium
<i>Sarkidiornis melanotos</i> (Knob-billed Duck)	Knob-billed Ducks utilise a range of wetlands—including rivers, freshwater swamps, lakes, rice fields, and man-made habitats like dams. Although suitable habitat is present in the Freshwater dams, this species occurs in very low numbers in high altitude area (where our study area is located) and therefore has a low POC.	NT	Low	<i>Aquila rapax</i> (Tawny Eagle)	Tawny Eagles are found in lightly wooded savannah and thornveld as well as semi-desert habitats. Scavenging and piracy are two of the most important foraging strategies for Tawny Eagles. This species has been recorded on iNaturalist in the surrounding area and is a species of concern for the Gauteng Department of Agricultural and Rural Development (GDARD). However, the lack of suitable habitat results in a low POC.	EN	Low
<i>Phoenicopterus roseus</i> (Greater Flamingo)	Greater Flamingos occur on brackish and saline water bodies such as salt pans, where they forage on aquatic invertebrates and algae. Records of Greater Flamingos are present in SABAP2 pentads and on iNaturalist. However, suitable habitat is not present resulting in a low POC.	NT	Low	<i>Phoeniconaias minor</i> (Lesser Flamingo)	This species occurs within open, shallow, alkaline and saline wetlands (e.g., salt pans). They feed on diatoms and cyanobacteria when wading through shallow water. Although, this species has been recorded in adjacent pentads suitable habitat is not present resulting in a low POC.	VU	Low
<i>Aquila verreauxii</i>	Verreaux's Eagle is a solitary nester, constructing a large stick nest on a rocky outcrop or cliff, and occasionally in a tree or on a power	VU	Low	<i>Gyps coprotheres</i> (Cape Vulture)	The Cape Vulture typically breeds and roosts on cliff faces in or near mountainous areas. It is known to forage in steep, wooded savannas, and	EN	Low



(Verreaux's Eagle)	pylon. This eagle primarily preys on Rock Hyrax (<i>Procavia capensis</i>), although, like other raptors, it is an opportunistic predator that will also hunt medium-sized mammals, large birds, and carrion. This species has been recorded in surrounding pentads however it is unlikely to forage or roost within the study area.				nest within surrounding mountainous areas. This species has been recorded (iNaturalist and SABAP2). Although this species has been recorded in the surrounding area, it is unlikely to be found within the study area due to lack of scavenging opportunities.		
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Avifauna Discussion

As part of the avifaunal assessment, data from the SABAP2 Pentad 2555_2800 were reviewed to gain a comprehensive understanding of the avifaunal assemblages potentially occurring within the study area. A total of 313 avifaunal species have been recorded within this pentad, reflecting the diversity of bird species expected within the study area. This diversity is supported by the presence of a range of habitat types, including Alien Dominated Woodland, Secondary Grassland, and Freshwater Habitat. During the field assessment, this was apparent as a diversity of avifaunal species were observed. Several species were observed actively nesting and roosting within available habitats. Despite reduced habitat connectivity resulting from anthropogenic disturbance and adjacent developments, many avifaunal species remain resilient, as their flight capability allows them to traverse barriers and access suitable habitats within and around the study area.

The Alien Dominated Woodland provides important habitat features such as woody tree cover, which attracts a range of species for roosting and foraging. Additionally, the rocky outcrops in the Alien Dominated Woodland Habitat may attract bird species that feed on the small mammals, reptiles and invertebrates present in this habitat. The Secondary Grassland, although relatively homogeneous, supports granivore and insectivorous birds through the variety of invertebrate species it provides. The Freshwater Habitat supports a particularly diverse assemblage of avifaunal species that depend on open water, reed beds for roosting, and associated food resources, including amphibians and aquatic invertebrates. However, species reliant on tall grasses and sedges adjacent to wetland margins, such as the African Grass Owl (*Tyto capensis*) and Marsh Owl (*Asio capensis*), both avifaunal SCC, are unlikely to roost or breed within the study area due to the lack of such habitat. The Secondary Grassland comprises predominantly short grasses and is dominated by *Eragrostis gummiflua* and *Eragrostis lehmanniana*, amongst others, rendering it unsuitable for these species. Species dependent on a taller grass layer are therefore expected to utilise the area only opportunistically for foraging. Although the Freshwater Habitat lies outside the proposed development footprint, avifaunal species associated with this habitat must be considered in the assessment. Construction-related disturbances are likely to cause temporary displacement of these species into adjacent habitats, potentially altering local movement and foraging patterns during the construction phase.

Observed common avifaunal species included, *Euplectes capensis* (Yellow Bishop) *Bostrychia hagedash* (Hadada Ibis), *Lanius collaris* (Common Fiscal), *Pternistis swainsonii* (Swainson's Spurfowl), *Pycnonotus barbatus* (Dark-capped Bulbul), *Vanellus armatus* (Blacksmith Lapwing), *Urocolius indicus* (Red-faced Mousebird) and *Spilopelia senegalensis* (Laughing Dove) to name a few. A full species list is provided in Appendix C. One avifaunal SCC, *Scopus umbretta* (Hamerkop, NT), was observed and is expected to utilise both the Freshwater and Alien Dominated Woodland habitats. Several other SCCs are highly likely to occur within the study area as suitable habitat is available, whilst others may use the site opportunistically for foraging or shelter (see SCC section above).

The proposed development will likely cause temporary displacement of bird species due to increased disturbance and human activity. However, if habitat integrity, particularly in the remaining open areas after development and the adjacent Freshwater Habitat, is maintained as far as possible, many species are expected to return once construction activities have ceased.



3.6 Herpetofauna (Amphibians and Reptiles)

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

Photographs			
			
a) Shallow pools provided by the Dams in the Freshwater Habitat; b) Rocky outcrops c) Dumped rubble and d) old anthropogenic infrastructure provide suitable refugia and basking sites (b – d) for reptiles throughout the study area.			
Herpetofauna SCC			
Species	Habitat and Resources in the Sites	Conservation Listing	POC
<i>Homoroselaps dorsalis</i> (Striped Harlequin Snake)	This species is cryptic but is known to inhabit grasslands, especially termite mounds found in grasslands. Therefore, suitable habitat is available as it may be found on grassy slopes, underground or at the base of tussocks or termitaria in the Secondary Grassland habitat.	NT	Medium
<i>Kinixys lobatsiana</i> (Lobatse Hinged Tortoise)	It is a species of open or closed mixed savanna inhabiting rocky hillsides, feeding on plants and invertebrates (snails, millipedes and beetles). It brumates in abandoned animal burrows or rock crevices, making these important localities for the species in the dry winter season. The rocky outcrops in the Alien Dominated Woodland provide suitable habitat for this species. Although this species has been recorded in the surrounding area, the presence of fences and walls and high levels of human activity may limit this species potential to occur on site. This results in a medium POC.	VU	Medium
<i>Pyxicephalus adspersus</i> (Giant African Bullfrog)	Breeds in shallow, temporary waters in pools or pans. It spends the dry, non-breeding season, aestivating in cocoons underground. When active, they may forage for insects at night, moving as far as 4 km from water. Shallow pools associated with the Freshwater Habitat provides suitable habitat. The adjacent Secondary Grassland may also be used to aestivate. Furthermore, this species has been recorded on iNaturalist in the surrounding area.	Protected (TOPS)	High



<i>Chamaesaura aenea</i> (Coppery Grass Lizard)	Restricted to the Grassland Biome, this species occurs on the grassy slopes and plateaus of the eastern escarpment and Highveld. It is found at elevations ranging from 1,400 to 2,100 m in KwaZulu-Natal, reaching up to 2,218 m in Mpumalanga and 2,228 m in the Free State. The species likely shelters at the bases of grass tussocks, similar to other <i>Chamaesaura</i> species. This species may potentially occur within the Secondary Grassland.	NT	Medium
Herpetofauna Discussion			
Although the habitat within the study area is disturbed by anthropogenic activities, it can support a diversity of common reptilian and amphibian species due to its varied habitats and to their adaptability to highly disturbed and anthropogenically transformed habitat. The presence of open water and elevated moisture levels within the Freshwater Habitat provides suitable breeding and foraging opportunities for amphibians. Termitaria observed in the Secondary Grassland may also offer suitable refuge for small reptiles. Although, the Secondary Grassland has a homogenous vegetation layer, inveterate species that can occur in disturbed grasslands are likely still present and the Freshwater Habitat attracts water-dependent invertebrate species. Therefore, the Freshwater and Secondary Grassland provides abundant food resources for both amphibians and reptiles, particularly during the summer months. A variety of microhabitats, including rocky outcrop, walls, termitaria, woody vegetation (supporting arboreal species such as geckos and snakes) in the Alien Dominated Woodland, and moist areas (for moisture-adapted species), further enhance the site's potential to support herpetofauna diversity. Additionally, rodents were observed to be abundant in the Grassland and Alien Dominated Woodland Habitats. Combined with potential high amphibian populations, this is likely to attract various predatory snake species. Only one reptile species, <i>Trachylepis punctatissima</i> (Speckled Rock Skink) and no amphibian species, were observed during the field assessment. However, the study area is likely to support several common reptile and amphibian species such as <i>Boaedon capensis</i> (Brown House Snake), <i>Psammophylax rhombeatus</i> (Spotted Grass Snake), <i>Pachydactylus affinis</i> (Transvaal Thick-toed Gecko), <i>Pelomedusa galeata</i> (South African Helmeted Terrapin), <i>Schismaderma carens</i> (Red Toad), <i>Sclerophrys capensis</i> (Raucous Toad), <i>Sclerophrys gutturalis</i> (Guttural Toad), <i>Kassina senegalensis</i> (Bubbling Kassina), and <i>Tomopterna cryptotis</i> (Tremolo Sand Frog). The cryptic and elusive nature of many herpetofauna, likely contributed to the limited number of recorded observations during the field assessment. One TOPS-listed amphibian, <i>Pyxicephalus adspersus</i> (Giant African Bullfrog), has a high probability of occurrence within the study area due to the presence of suitable habitat and nearby iNaturalist records. Three reptile SCC (listed above) have a medium POC due to the presence of suitable habitat.			



3.7 Invertebrates (Insects and Arachnids)

Table 4: Field assessment results pertaining to invertebrate species within the study area.

Photographs			
			
a) Termitaria mounds in the Secondary Grassland; b) <i>Miomantis caffra</i> (South African Mantis, NYBA); c) <i>Eurema brigitta</i> (Broad-bordered Grass Yellow, LC); d) <i>Belenois aurota</i> (Pioneer White, LC).			
Invertebrate SCC			
Species	Habitat and Resources in the Sites	Conservation Listing	POC
<i>Aloeides dentatis dentatis</i> (Roodepoort Copper)	This is a rare and localised species that occurs in grasslands, flatlands and mountains. Its preferred habitat in Gauteng is sandy grasslands. The disturbed nature of the habitat within the study area results in a low POC for this species.	EN	Low
<i>Clonia uvarovi</i> (Uvarov's Clonia Bush Cricket)	This predatory bush cricket is endemic to the highveld region of South Africa and inhabits tall woodland savannah. This species may occur within the Alien Dominated Woodland within the study area.	VU	Medium
<i>Ichneostoma stobbiai</i> (Stobbia's Fruit Chafer Beetle)	Adults may reproduce or larvae may feed on detritus underground near oviposition sites within grassy areas of the Secondary Grassland habitat found within the study area.	VU and P (TOPS)	Medium
<i>Metisella meninx</i> (Marsh Sylph)	This species' preferred habitats are marshes and stream banks in wetlands found in open grassland. Suitable habitat is not present within the study area due to the degraded nature of the habitats within.	NT	Low
<i>Opisthophthalmus glabrifrons</i> (Shiny Burrowing Scorpion) &	Found on ridges and rocky outcrops under rocks and logs, where it burrows. Predominantly nocturnal species that feed on ground dwelling insects. These species could utilise rocks and logs in the Alien Dominated Woodland and Secondary Grassland habitat as well as the abundant invertebrate food sources found in the study area. Furthermore, these species have been recorded on iNaturalist in the surrounding area.	P (TOPS)	High



<i>Opisthophthalmus pugnax</i> (Highveld Burrowing Scorpion)			
<i>Harpactira hamiltoni</i> (Common Baboon Spider)	Baboon spiders live in silk-lined burrows in the ground, in crevices or under rocks and logs. They feed on mainly other invertebrates but will also opportunistically prey on small rodents. Although no individual or burrows of this species were observed in the study area, it is likely that they can be found in the Secondary Grassland and Alien Dominated Woodland that provides suitable habitat for this species. Furthermore, there are records of this species on iNaturalist in the surrounding area.	P (TOPS)	High

Invertebrate Discussion

Despite some habitat disturbance and the spread of AIPs, insect populations generally demonstrate resilience as long as essential food sources remain available. The diverse habitats within the study area create microclimates that support a wide range of invertebrate species. In the Freshwater Habitat, high moisture levels and open water attract species dependent on humid environments. The Alien Dominated Woodland offers rocky outcrops and woody vegetation that provide shelter and foraging opportunities for invertebrates adapted to such substrates. In the Secondary Grassland, although the grass cover is homogenous, it supplies food resources for herbivorous insects such as those in the orders Lepidoptera (butterflies and moths), Hymenoptera (bees, wasps, sawflies, and ants), and Orthoptera (locusts and crickets). These groups are also expected to forage in the Alien Dominated Woodland on flowers produced by alien trees and within the short grassy understory. The Freshwater Habitat further supports invertebrates that utilise dense reed beds and the water surface for foraging.

Rocky outcrops and dumped rubble provide suitable refuges for arachnids and scorpions, including three protected species recorded in the broader area (listed above). Although no individuals or burrows were observed during the field assessment, their cryptic behaviour makes detection difficult, and their occurrence within the study area remains likely. The screening tool identified *Clonia uvarovi* (Uvarov's Clonia Bush Cricket) and *Metisella meninx* (Marsh Sylph) as medium-sensitivity species. *Clonia uvarovi* (Uvarov's Clonia Bush Cricket) may occur within suitable habitat within the study area, although individuals of these species were not directly observed during the field assessment. *Metisella meninx* (Marsh Sylph) is unlikely to occur within the study area due to the degraded and disturbed nature of the Secondary Grassland and the lack of *Leersia hexandra*, a host plant for the larvae of this species.

Vegetation clearing during construction is expected to cause a temporary reduction in insect abundance and diversity due to habitat disturbance. However, once construction activities cease, insects are likely to return to the open areas and adjacent Freshwater Habitat. Provided these areas remain intact, insect diversity and abundance should gradually recover to pre-disturbance levels. In contrast, the scorpion and arachnid species expected to occur within the study area, including the three TOPS protected species listed above, are slow-moving or fossorial and may be killed during vegetation clearing and construction. Should any of these species be encountered, relocation by suitably trained personnel to similar habitat outside of the development footprint must be conducted.



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

This section aims to (1) present the sensitivity of the receptors identified within the study area (e.g., SCC, the vegetation/fauna community or habitat type present on the site), and (2) clearly define and map areas where avoidance mitigation is strongly recommended if significant, negative residual impacts are to be avoided (and to prevent potential fatal flaws).

Based on the criteria provided in Appendix A, all habitats within the study area were allocated an SEI category. The SEI is a function of the biodiversity importance (BI) of the receptor and its resilience to impacts (receptor resilience [RR]). The BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor. The criteria for SEI can be found in Appendix A.

Table 5 below indicates the individual SEI scoring for each habitat unit. Figure 8 indicates the SEI categories for the study area.



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

Unit	CI	FI	BI	RR	SEI	Development Constraints
Alien Dominated Woodland Habitat	Medium Confirmed occurrence of <i>Scopus umbretta</i> (Hamerkop, NT) and highly likely occurrence of several other NT species. Medium POC for other faunal SCC and protected species within this habitat.	Medium Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Medium	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.	Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Secondary Grassland Habitat	High Highly likely occurrence of several SCC including <i>Atelerix frontalis</i> (Southern African Hedgehog, NT), and <i>Falco biarmicus</i> (Lanner Falcon, VU), amongst others. Medium POC for other faunal SCC and protected species within this habitat.	Medium Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Medium	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.	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	Low No confirmed or highly likely populations of SCC.	Low 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. Several minor and major current negative ecological impacts.	Low	Very High 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 may not be required.
Freshwater Habitat	Medium Confirmed occurrence of <i>Scopus umbretta</i> (Hamerkop, NT) and highly likely occurrence of <i>Leptailurus serval</i> (Serval, NT), and several other NT mammal and avifaunal SCC. Medium POC for other faunal SCC and protected species within this habitat.	Medium Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Medium	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.	Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.



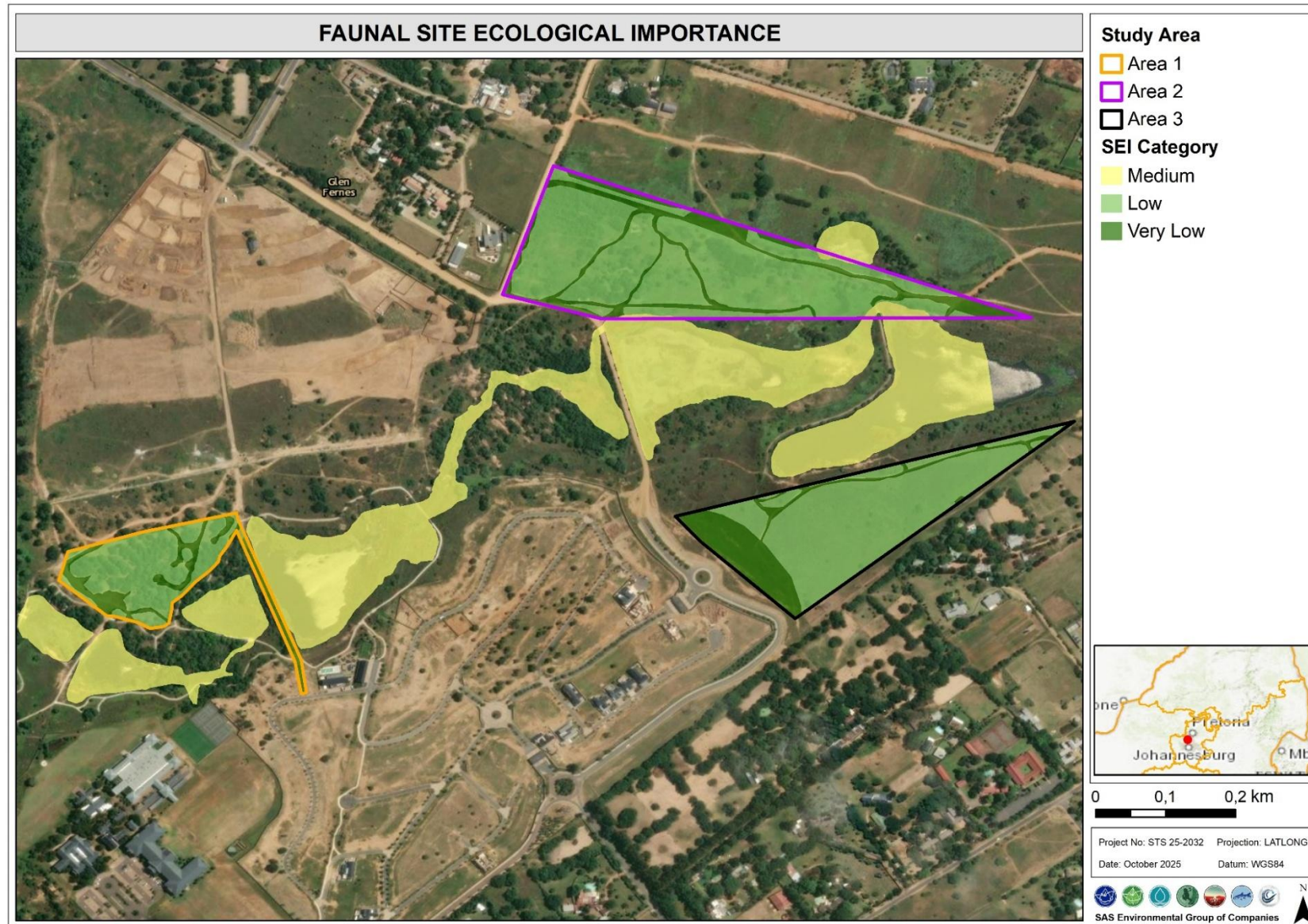


Figure 8: Faunal Site Ecological Importance pertaining to the study area.



5. IMPACT ASSESSMENT

The below sections provide 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 implemented, it is highly likely that post-mitigation impact scores will increase.

The proposed layout of the project was not provided at the time of this assessment. For this impact assessment it is assumed that the entire study area (all three assessment areas) is likely to be cleared for construction activities and that the small portion (0.26 ha) of Freshwater Habitat within the study area will not be avoided. Although construction activities will not happen directly within majority of the Freshwater Habitat, construction activities related to the current proposed activities, may cause disturbance to this habitat. This will be considered as indirect impacts (i.e., edge effects) for this study. Additional indirect impacts will still be considered and discussed for all habitats and particularly for the remaining adjacent Freshwater Habitat in the operational phase.

An impact discussion and assessment of all potential planning, construction, and 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 Phase	
-	Potential failure to implement the required mitigatory measures before and at the commencement of construction activities:
-	Impact: Long-term or permanent loss of potential faunal SCC and / or TOPS listed species.
-	Ecologically inconsiderate planning, infrastructure placement and design, leading to fragmentation of habitats of increased sensitivity, notably the Freshwater Habitat (and associated ecological processes), loss of potential sensitive faunal species and/or habitat for such species, as well as avoidable edge effect impacts on areas outside of the proposed project footprint.
-	Impact: Potentially avoidable degradation of important faunal habitat and habitat outside of the development footprint.
-	Potential failure to implement an AIP Management/Control Plan before construction activities commence which is required and will subsequently aid with improved AIP management and rehabilitation in the long term for areas that will form an open space area.
-	Impact: Loss of niche habitat, limiting the re-establishment potential of faunal species and of potential faunal SCC due to the proliferation of unfavourable AIPs.
-	Failure to demarcate the boundaries of adjacent natural areas leading to additional encroachment of development activities throughout construction and operational phases into adjacent faunal habitat.
-	Impact: The unnecessary clearing of vegetation and loss of faunal habitat, leading to further displacement of faunal species, including potentially occurring SCC.
Construction Phase	
-	Site clearing and the removal of faunal habitat in the Alien Dominated Woodland, Secondary Grassland and Freshwater Habitat due to poor planning and indiscriminate habitat destruction;
-	Impact: Loss of faunal habitat whilst reducing species occupancy in the impacted areas.
-	Proliferation of AIP species that colonise in areas of increased disturbances and that outcompete native plant species, including the further transformation of adjacent natural habitat such as open grasslands and watercourses.
-	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 outside of the final infrastructure footprint, thereby leading to further habitat disturbance, which will promote the establishment and spread of AIPs.
-	Impact: Loss or degradation of favourable faunal habitat, diversity and potential SCC.
-	Additional pressure on faunal habitat, diversity and abundance as a result of an increased human presence associated with the proposed development, contributing to:
-	- Potential hunting/trapping/removal/collection of faunal species or potential SCC; and
-	- Increased human activity will lead to the displacement and/or loss of potential faunal SCC.
-	Impact: Loss of faunal habitat and the loss of potential faunal SCC.
-	Potentially poorly managed edge effects:
-	- Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to ongoing degradation of surrounding natural areas altering faunal habitat on an increased scale; and
-	- Compaction of soils outside of the study area due to indiscriminate driving of construction vehicles through natural vegetation.
-	Impact: Loss or degradation of faunal habitat, diversity, and potential SCC within the direct footprint of the proposed development. Loss of surrounding faunal diversity and potentially occurring SCC.
-	Possible increased fire frequency during construction.
-	Impact: Loss or alteration of faunal habitat and species diversity.



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, notably in open areas where no construction is planned.
-	Impact: Loss of faunal habitat, potential SCC, as well as overall species diversity within the study area.
-	Presence of domestic animals (i.e., pets such as cats and dogs) potentially leading to the hunting and disturbance of faunal species in adjacent natural habitats.
-	Impact: Potential loss or alteration of faunal species diversity.
-	Ineffective rehabilitation of exposed and impacted areas potentially leading to vegetation succession and a possible reduction of faunal diversity and occurrence of potential faunal SCC over the long-term.
-	Impact: Permanent loss of faunal habitat, diversity and potential SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural faunal habitat. Further reduction of available habitat in the long-term, compounding the limiting factors to faunal assemblages.
-	Potential poor management and failure to monitor rehabilitation efforts, leading to:
-	- Increased storm water runoff;
-	- Compacted soils limiting the re-establishment of natural vegetation; and
-	- Increased risk of erosion in areas left disturbed.
-	Impact: Long-term (or permanent) loss of faunal habitat, diversity and potential SCC within disturbed / impacted areas.
-	Poorly implemented and monitored AIP Management programme leading to the reintroduction and proliferation of AIP species.
-	Impact: Permanent loss of surrounding faunal habitat, diversity, and potential SCC.
-	Potentially poorly managed edge effects:
-	- Ineffective control of dumping and human presence leading to ongoing degradation of surrounding natural areas altering faunal habitat on an increased scale; and
-	Impact: Loss or degradation of faunal habitat, diversity, and potential SCC within the adjacent areas of the proposed development.

5.2 Faunal Impact Assessment Results

The below tables (Table 7 - 9) indicate the perceived risks to the faunal ecology (Habitat, Diversity and SCC) associated with all phases of the proposed activities. The tables also provide 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. Key integrated mitigation measures that are applicable to the proposed project are also presented in each table and are required to suitably manage, minimise and where possible, mitigate the ecological impacts that are associated with all phases of the proposed activities.

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, post-mitigation impact scores will likely increase.



Table 7: Planning Phase impacts on faunal habitat, diversity, and SCC from the proposed development. Required mitigation measures are presented at the bottom of the table.

Habitat Units	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
Faunal Habitat and Diversity																
Alien Dominated Woodland Habitat	3	2	2	2	2	5	6	30 Low	2	2	1	1	2	4	4	16 Very Low
Secondary Grassland Habitat	3	2	2	2	2	5	6	30 Low	2	2	1	1	2	4	4	16 Very Low
Transformed Habitat	3	1	2	2	2	4	6	24 Very Low	2	1	1	1	2	3	4	12 Very Low
Freshwater Habitat	3	3	2	2	2	6	6	36 Low	2	3	1	1	2	5	4	20 Very Low
Faunal SCC																
Alien Dominated Woodland Habitat	3	2	2	2	2	5	6	30 Low	2	2	1	1	2	4	4	16 Very Low
Secondary Grassland Habitat	3	2	2	2	2	5	6	30 Low	2	2	1	1	2	4	4	16 Very Low
Transformed Habitat	3	1	2	1	2	4	5	20 Very Low	2	1	1	1	2	3	4	12 Very Low
Freshwater Habitat	3	3	2	2	2	6	6	36 Low	2	3	1	1	2	5	4	20 Very Low
Mitigation Measures																
➤ 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 remaining adjacent Freshwater Habitat; ➤ The area in which construction activities are to take place must be fenced off and clearly demarcated; ➤ Where feasible, avoid impacts on faunal SCC and more sensitive habitats through adequate planning or rerouting/redesigning of layouts. This is especially important if the entire study area will be cleared for construction, as this includes a small portion of sensitive Freshwater Habitat (Valley Bottom Wetland) that has a high potential for faunal SCC occurrence; ➤ Where possible, and feasible, all access roads should be kept to existing roads;																



Habitat Units	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
➤ Appropriate Rehabilitation plans and measures, as well as an AIP and Erosion Control Plan should be developed for implementation during the later stages of the development; and ➤ Pedestrian and vehicle movement in areas where no development is planned should be restricted to prevent further disturbance to the receiving environment; ➤ In the event that any faunal SCC listed in Appendix B are encountered in the study area and require relocation, the relevant provincial and national permits should be obtained from the DFFE and GDARD. An ecologically and legally sound action plan should be developed and be ready for implementation for the protection of potentially occurring SCC throughout the Construction, Operational and Maintenance phases; ➤ Prior to vegetation clearing activities the footprint area should be inspected for the presence of burrowing scorpions, reptiles, and baboon spiders. If located, these species should be carefully excavated and relocated to similar surrounding habitat outside of the footprint area. The relevant permitting should be acquired for the relocation of such species.																

Table 8: Construction Phase impacts on faunal habitat, diversity, and SCC from the proposed development. Required mitigation measures are presented at the bottom of the table.

Habitat Units	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
Faunal Habitat and Diversity																
Alien Dominated Woodland Habitat	5	2	3	2	3	7	8	56 Medium-Low	5	2	2	2	3	7	7	49 Low
Secondary Grassland Habitat	5	2	3	2	3	7	8	56 Medium-Low	5	2	2	2	3	7	7	49 Low
Transformed Habitat	5	1	2	2	3	6	7	42 Low	5	1	1	1	3	6	5	30 Low



Habitat Units	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
Freshwater Habitat	5	3	3	3	3	8	9	72 Medium-Low	4	3	2	2	3	7	7	49 Low

Faunal SCC																
Alien Dominated Woodland Habitat	4	2	3	2	3	6	8	48 Low	3	2	2	2	3	5	7	35 Low
Secondary Grassland Habitat	4	2	3	2	3	6	8	48 Low	3	2	2	2	3	5	7	35 Low
Transformed Habitat	3	1	2	1	3	4	6	24 Very-Low	2	1	1	1	3	3	4	12 Very-Low
Freshwater Habitat	5	3	3	3	3	8	9	72 Medium-Low	4	3	2	2	3	7	7	49 Low

Mitigation Measures																
➤ Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal; ➤ The development footprint should be demarcated, and it should be ensured that no construction-related activities take place outside of the demarcated footprint, most notably in the adjacent Freshwater Habitat; ➤ If feasible, incorporate greenspace into the planning to avoid impacts on faunal SCC and the more sensitive Freshwater Habitat. Any designated greenspace must be clearly fenced off, and domestic pets should be kept on leashes within these areas to minimise disturbance to local wildlife; ➤ Vegetation clearing should be conducted in a phased or slow paced manner to allow fauna enough time to escape areas ahead of the clearance activities as far as possible; ➤ Where bare soils are left exposed post construction activities, they should be immediately rehabilitated; ➤ In the event that reptiles are encountered during construction activities, harmless species should be carefully relocated by a suitably nominated construction personnel member. For larger and/or venomous snakes, a suitably trained professional or site personnel should be contacted to assist in the relocation of individuals, should it not move off on its own. No reptiles are to be killed or harmed; ➤ If any TOPS listed arachnids (Burrowing Scorpions and Baboon Spiders) or aestivating amphibians are encountered, the relevant authorities are to be consulted as to the best way forward regarding safe handling and relocation of the unearthed individuals; ➤ Edge effects stemming from construction activities, which may affect adjacent areas, need to be strictly managed, notably around the Freshwater Habitat;																



- 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;
- 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;
- 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; and
- Should any faunal SCC be encountered, construction should be halted, and a suitably qualified specialist consulted to help ascertain the best way forward.

Table 9: Operation and Maintenance Phase impacts on faunal habitat, diversity, and SCC from the proposed development. Required mitigation measures are presented at the bottom of the table.

Habitat Units	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
Faunal Habitat and Diversity																
Freshwater Habitat (edge effects)	3	3	3	3	5	6	11	66 Medium-Low	2	3	2	1	5	5	8	40 Low
Faunal SCC																
Freshwater Habitat (edge effects)	4	3	3	2	5	7	10	70 Medium-Low	2	3	2	1	5	5	8	40 Low
Mitigation Measures																
➤ 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, especially for the Freshwater Habitat; ➤ Rehabilitation efforts should be monitored continuously during the operational phase until natural processes restore ecological functioning and biodiversity in the surrounding and open space areas; ➤ If provision was made for greenspace, then domestic animals such as dogs must be monitored at all times and preferably be leashed in such areas to minimise disturbance to local wildlife; ➤ No dumping of litter or waste must be allowed on-site or in the adjacent or surrounding habitats (i.e., Freshwater Habitat); ➤ Local residents need to be educated and informed about local wildlife and fauna in the surrounding areas (notably the Freshwater Habitat); ➤ No hunting/trapping or persecution of fauna must be allowed in the surrounding areas; and ➤ In the event that reptiles or arachnids are encountered, harmless species should be carefully relocated by a suitably nominated community member. For larger and/or venomous snakes, a suitably trained professional should be contacted to assist in the relocation of the species. No reptiles or arachnids are to be killed or harmed.																



5.3 Impact Discussion

After the field assessment, it was determined that the Freshwater Habitat provides suitable foraging habitat for common faunal species and several potential faunal SCC, resulting in a **medium faunal SEI**. The Alien Dominated Woodland and Secondary Grassland Habitat also provide suitable habitat for common faunal species and potential SCC, however, degradation through historic and current activities results in a **low faunal SEI**. The Transformed Habitat obtained a **very low faunal SEI** as it supports a limited faunal assemblage and is unlikely to support any populations of faunal SCC. Where SEI scores are higher, the impact from the proposed activities will be more significant and greater residual, negative impacts may be experienced. The required mitigation and management measures also differ depending on the SEI scores. Currently, the proposed mixed-use development impacts the Alien Dominated Woodland, Secondary Grassland, Transformed Habitat and a small portion of the Freshwater Habitat. Majority of the Freshwater Habitat will not be directly impacted by the development, but edge effects need to be considered due to its proximity to the development. The greatest negative impacts are associated with the construction phase, as faunal habitat will be lost or impacted upon by construction disturbance. The impact significance (prior to mitigation) within these habitats on faunal habitat diversity and SCC ranges from **medium-low** to **very low**. However, after mitigation measures are implemented, impacts can be suitably reduced, notably the potential impact extents. It is recommended that, where feasible, planning and/or rerouting or redesigning of layouts be undertaken to reduce the development footprint within the small portion of Freshwater Habitat (Valley Bottom Wetland). The potential for large-scale impacts on faunal ecology is unlikely if the recommended mitigatory measures as stipulated in Section 5.2 are adhered to. The below sections provide a discussion of the impact assessment outcome in more detail.

5.3.1 Impacts on Faunal Habitat and Diversity

The study area supports a range of habitat types that can be utilised by faunal species. However, historic and current disturbance, including AIP proliferation, waste dumping, increased human activity, and past agricultural and developmental transformation, have reduced the ecological integrity of these habitats. As a result, the faunal community is primarily composed of disturbance-tolerant and generalist species.

The Secondary Grassland Habitat, though relatively homogenous, supports common species and some potential SCC by providing foraging opportunities and food resources. Its grasses and flowers attract invertebrates, which in turn attract small mammals, birds and reptiles. Similarly, the Alien Dominated Woodland Habitat is evidence of past and current disturbance



altering grassland habitat as it is characterised by alien woody species that have encroached into former grassland. Despite its degraded condition, this habitat supports a relatively diverse faunal assemblage, particularly species utilising woody vegetation for nesting and foraging. The presence of a rocky outcrop, in the Alien Dominated Woodland Habitat, provides additional microhabitats, supporting invertebrate, reptilian, and small mammalian species that are adapted to rocky substrates. The Freshwater Habitat further enhances the local faunal assemblage by providing resources for moisture-dependent species and those requiring open water. The faunal species attracted to the Freshwater Habitat are also likely to forage and or nest within the adjacent grassland and woodland areas. However, nesting and roosting for species dependent on thicker tall grasses is less likely in the Secondary Grassland due to its short and patchy grass layer with areas of exposed soil. In contrast, species that nest in rocky areas and roost in trees will make use of the Alien Dominated Woodland Habitat.

The proposed development will result in vegetation clearing that leads to the loss of faunal habitat and, consequently, a reduction in faunal species diversity. Vegetation clearing and habitat transformation (i.e., direct impacts) to faunal habitat and species diversity will be greatest during the construction and operational phase in the Alien Dominated Woodland , Secondary Grassland Habitats and the small portion of Freshwater Habitat (Valley Bottom Wetland). During the construction phase, faunal species will be displaced from the habitat in the study area and potentially killed due to vegetation-clearing activities and the movement of heavy machinery. However, within the remaining Freshwater Habitat that is not directly within the proposed footprint, any displacement of fauna is expected to be temporary, with species likely to return once the disturbance has ceased, provided that the habitat has not been degraded by edge effects.

Post-mitigation, impacts will likely result in a **low** to **very low** impact significance on faunal ecology and can be largely restricted to the footprint areas in the construction phase. As the development footprint is in close proximity to more sensitive Freshwater Habitat, possible edge effects need to be considered. **Medium-low** impacts are expected if the adjacent Freshwater Habitat is not adequately protected from development encroachment, accumulation of solid waste (litter), AIP proliferation, high human traffic, or other anthropogenic disturbances. However, with the mitigation measures outlined in this report effectively implemented, some perceived impacts can be reduced to **low** and **very low** impact significance. It is further recommended to minimise the development footprint within the small portion of Freshwater Habitat that will be directly affected, as this area supports higher faunal diversity and abundance than the surrounding degraded habitats. Although these phases will result in the destruction of faunal habitat, an increase in human activity, and ultimately a decrease in faunal diversity and abundance within the study area, the impacts are expected to primarily affect



common species as the footprint mostly occurs in habitats of low to very low SEI. Additionally, these common species are likely to persist in the surrounding region.

5.3.2 Impacts on Faunal SCC

One faunal SCC, *Scopus umbretta* (Hamerkop, NT), was observed during the field assessment within the Freshwater Habitat and is likely to utilise the adjacent Alien Dominated Woodland Habitat to forage and roost. A total of eleven SCC have a high POC within the study area, while twenty-one species have a medium POC. Additionally, four TOPS species are considered to have a high POC within the Freshwater, Secondary Grassland, and Alien Dominated Woodland habitats (refer to Sections 3.4–3.7).

The Freshwater Habitat is of particular ecological significance for SCC, as the majority of species with a high POC are associated with this habitat type. Several SCC are also highly likely to occur within the Secondary Grassland Habitat, although not to the extent of the Freshwater Habitat. Due to the degradation of the grassland habitat, SCC that are more tolerable to degraded environments and high levels of human disturbance, such as *Elanus caeruleus* (Black-winged Kite) and *Atelerix frontalis* (Southern African Hedgehog), *Falco biarmicus* (Lanner Falcon), and *Falco vespertinus* (Red-footed Falcon) are thus more likely to utilise this habitat. In contrast, other grassland-dependent SCC including *Tyto capensis* (African Grass Owl), *Asio capensis* (Marsh Owl), and *Eupodotis senegalensis* (White-bellied Korhaan) are unlikely to utilise the Secondary Grassland Habitat for nesting or roosting due to inadequate vegetation cover. These species may, however, opportunistically forage within the area but are expected to prefer more extensive, undisturbed grassland habitats in the surrounding region that provide greater habitat suitability and reduced human disturbance.

Vegetation clearance and construction activities will result in the loss of suitable habitat for potential faunal SCC within the Secondary Grassland and Alien Dominated Woodland Habitats as well as the small portion of the Freshwater Habitat (Valley Bottom Wetland). The most significant direct impacts are anticipated during the construction phase, where there will be the direct loss of SCC habitat. In areas where no direct habitat loss is anticipated, such as the majority of the Freshwater Habitat, the disturbance from construction will still displace faunal SCC into surrounding natural habitat. However, this displacement is expected to be temporary, if mitigation measures are implemented, particularly those that decrease the impacts of edge effects. Following construction, SCC can recolonise the adjacent Freshwater Habitat if ecosystem structure and function remain the same. Therefore, mitigating edge effects, such as the spread of AIPs and littering, during the operational phase, is critically important.



Without mitigation, impacts on SCC are anticipated to range from **medium–low** to **very low** across all phases of the proposed development. With the correct and strict implementation of mitigation measures, the significance of impacts on SCC is expected to be reduced to **very low** during the pre-construction phase, and **low** to **very-low** during the construction, and operational and maintenance phases. Therefore, the recommended mitigation measures, for example, phased vegetation clearing and post-construction rehabilitation and AIP control, have to be strictly implemented to minimise impacts on SCC. When combined with appropriate rescue and relocation measures (where necessary), potential impacts on SCC and TOPS-listed species can be further reduced. Furthermore, avoiding or minimising the development footprint within the directly affected Freshwater Habitat (Valley Bottom Wetland) will help further reduce impacts on SCC. However, it is acknowledged that within the Alien Dominated Woodland and Secondary Grassland Habitats, increased human activity and disturbance associated with construction may result in the displacement of SCC from the study area to adjacent undeveloped areas, which may not provide similar or ideal habitat conditions.

5.3.3 Probable Residual Impacts

Most of the habitats that will be affected by the proposed development are degraded and modified. However, even with extensive mitigation, residual impacts on the receiving faunal ecological environment will persist. The following points highlight the key residual impacts that have been identified:

- Continued loss of faunal habitat;
- Potential loss of faunal SCC including suitable habitat for such species;
- Edge effects such as further AIP proliferation;
- Altered faunal species diversity and abundance in and immediately adjacent the development footprint areas;
- Further habitat fragmentation within the landscape and reduction of movement corridors; and
- Disturbed areas not rehabilitated to an ecologically functioning state with resulting significant loss of faunal habitat, species diversity, and SCC likely to be permanent.

5.3.4 Cumulative Impacts

The proposed development will reduce available faunal habitat, decrease local fauna abundance, and impact potential SCC. Habitat loss and disturbance will displace resident fauna into nearby natural areas, which are already limited by surrounding urban and peri-urban development. In this fragmented landscape, displaced species are likely to face increased competition for territories, resources, foraging grounds, and breeding sites. This



displacement may trigger a cascading dispersal effect, further exacerbating competition for resources and ultimately reducing species abundance and diversity.

Increased human activity during both construction and operational phases poses the greatest threat to faunal ecology within the study area. Human presence is likely to increase the risk of illegal hunting (snaring) and persecution of fauna in adjacent open spaces and undeveloped habitats. It may also raise the frequency of fires, negatively affecting faunal communities and habitats beyond the development footprint. Furthermore, human activity near the Freshwater Habitat, which is a tributary of the Jukskei River, will elevate the risk of cumulative pollution in this sensitive ecosystem.

6. CONCLUSION

The impact assessment considered all aspects of faunal ecology likely to be affected by the proposed development. While the development will result in loss of faunal habitat, this loss is largely confined to areas with very low and low SEI, which are already degraded and disturbed. Construction is therefore expected to have a low to very low impact significance post-mitigation. Faunal species, including potential SCC, may be temporarily displaced into surrounding less disturbed habitats; however, if mitigation measures, particularly those addressing edge effects, AIP proliferation, littering, persecution of fauna, and layout optimisation to avoid or minimise development in the Freshwater Habitat, are implemented, displaced fauna are likely to return to suitable habitats once construction-related disturbance subsides. Impacts are expected to primarily affect common and widespread species, which are likely to persist in surrounding areas, and no significant effects on SCC populations or overall faunal ecology are anticipated. Provided that all mitigation measures outlined in this report are strictly adhered to, there is no ecological reason preventing the authorisation of the development.

It is the opinion of the ecologists that this study provides the relevant information required to implement Integrated Environmental Management (IEM) 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 was 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 in 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 were 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 TOPS listed arachnids within the study area.



Faunal Species of Conservation Concern Assessment

The Probability of Occurrence (POC) for each faunal SCC is described:

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

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

Faunal Site Ecological Importance (SEI)

SEI is 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 site⁴) 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.
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.

⁴ 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.



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
<i>Neamblysomus julianae</i>	Juliana's Golden Mole	EN	VU	Low
<i>Mystromys albicaudatus</i>	African White-tailed Rat	VU	EN	Medium
<i>Atelerix frontalis</i>	Southern African Hedgehog	LC	NT	High
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	-	Medium
<i>Hydriclis maculicollis</i>	Spotted-necked Otter	NT	VU	Medium
<i>Miniopterus natalensis</i>	Natal Long-fingered Bat	LC	NT	Low
<i>Myotis tricolor</i>	Temminck's Hairy Bat	LC	NT	Low
<i>Rhinolophus blasii</i>	Blasius's/Peak-Saddle Horseshoe Bat	LC	VU	Low
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe	LC	NT	Low
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	LC	NT	Low
<i>Rhinolophus hildebrandtii</i>	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
<i>Grus paradisea</i>	Blue Crane	VU	VU	Medium
<i>Circus ranivorus</i>	African Marsh Harrier	LC	VU	Medium
<i>Tyto capensis</i>	African Grass-Owl	LC	VU	Medium
<i>Sagittarius serpentarius</i>	Secretary bird	EN	NT	Medium
<i>Oxyura maccoa</i>	Maccoa Duck	EN	VU	Medium
<i>Mycteria ibis</i>	Yellow-billed Stork	LC	-	Low
<i>Phoenicopterus minor</i>	Lesser Flamingo	NT	-	Low
<i>Phoenicopterus roseus</i>	Greater Flamingo	LC	-	Low
<i>Eupodotis caerulea</i>	Blue Korhaan	NT	NT	Low
<i>Eupodotis senegalensis</i>	White-Bellied Korhaan	LC	VU	Medium
<i>Alcedo semitorquata</i>	Half-collared Kingfisher	LC	NT	High
<i>Mirafra cheniana</i>	Melodious Lark	LC	NT	Low

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



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

Scientific Name	Common name	IUCN Status	GDARD Status	POC
<i>Lepidochrysops praeterita</i>	Highveld Blue Butterfly	EN	VU	Low
<i>Chrysoritis aureus</i>	Heidelberg Opal	EN	VU	Low
<i>Ichneustoma stobbiai</i>	Stobbia's Fruit Chafer Beetle	NYBA	VU	Medium
<i>Aloeides dentatis</i>	Roodepoort Copper Butterfly	LC	VU	Medium

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
<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake	NT	NT	Medium

NT = Near Threatened

Table B5: RDL Other RDL Species historically recorded within the study area's QDS: 2528CC, according to GDARD and the DFFE screening tool (*)

Scientific Name	Common Name	Status	Sensitivity	POC
<i>Aloeides dentatis</i>	Roodepoort Copper Butterfly	VU	Medium	Medium
<i>Clonia uvarovi</i>	Uvarov's Clonia	VU	Medium	Medium
<i>Crociodura maquassiensis</i>	Makwassie Musk Shrew	VU	Medium	Medium
<i>Dasymys robertsii</i>	Robert's Shaggy Rat	DD	Medium	Medium
<i>Hydricotis maculicollis</i>	Spotted-Necked Otter	VU	Medium	Medium
<i>Kinixys lobatsiana</i>	Lobatse Hinged Tortoise	VU	Medium	Medium
<i>Tyto capensis</i>	African Grass Owl	VU	High	Medium
<i>Eupodotis senegalensis</i>	White-Bellied Korhaan	VU	Medium	Medium
<i>Hydroprogne caspia</i>	Caspian Tern	VU	Medium	Medium

VU = Vulnerable, NT = Near Threatened, EN = Endangered,

Table B6: Avifaunal Species for the pentad: 2555_2800 that includes the study area within the QDS 2528CC

Pentads	SABAP2 link
2555_2800	https://sabap2.birdmap.africa/coverage/pentad/2555_2800



APPENDIX C: Faunal Species List

Table C1: Mammal species recorded during the field assessment.

Scientific Name	Common Name	Status
<i>Cryptomys hottentotus</i>	Common Mole Rat	LC
<i>Herpestes sanguineus</i>	Slender Mongoose	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC
<i>Procavia capensis</i>	Rock Hyrax	LC

LC = Least Concern

Table C2: Avifaunal species recorded during the field assessment.

Scientific Name	Common name	Status
<i>Scopus umbretta</i>	Hamerkop	NT
<i>Lybius torquatus</i>	Black-collared Barbet	LC
<i>Trachyphonus vaillantii</i>	Crested Barbet	LC
<i>Merops apiaster</i>	European Bee-eater	LC
<i>Euplectes capensis</i>	Yellow Bishop	LC
<i>Euplectes afer</i>	Yellow-crowned Bishop	LC
<i>Pycnonotus tricolor</i>	Dark-capped Bulbul	LC
<i>Crithagra flaviventris</i>	Yellow Canary	LC
<i>Cisticola ayresii</i>	Wing-snapping Cisticola	LC
<i>Fulica cristata</i>	Red-knobbed Coot	LC
<i>Corvus albus</i>	Pied Crow	LC
<i>Cuculus solitarius</i>	Red-chested Cuckoo	LC
<i>Spilopelia senegalensis</i>	Laughing Dove	LC
<i>Streptopelia semitorquata</i>	Red-eyed Dove	LC
<i>Streptopelia capicola</i>	Ring-necked Dove	LC
<i>Columba livia</i>	Rock Dove	LC
<i>Branta canadensis</i>	Canada Goose	LC
<i>Thalassornis leuconotus</i>	White-backed Duck	LC
<i>Amadina fasciata</i>	Cut-throat Finch	LC
<i>Amadina erythrocephala</i>	Red-headed Finch	LC
<i>Lanius collaris</i>	Southern Fiscal	LC
<i>Terpsiphone viridis</i>	African Paradise Flycatcher	LC
<i>Stenostira scita</i>	Fairy Flycatcher	LC
<i>Melaenornis silens</i>	Fiscal Flycatcher	LC
<i>Crinifer concolor</i>	Grey Go-away-bird	LC
<i>Alopochen aegyptiaca</i>	Egyptian Goose	LC
<i>Plectropterus gambensis</i>	Spur-winged Goose	LC
<i>Tachybaptus ruficollis</i>	Little Grebe	LC
<i>Numida meleagris</i>	Helmeted Guinea fowl	LC
<i>Ardea melanocephala</i>	Black-headed Heron	LC
<i>Ardea cinerea</i>	Grey Heron	LC
<i>Upupa africana</i>	African Hoopoe	LC



Scientific Name	Common name	Status
<i>Delichon urbicum</i>	Common House Martin	LC
<i>Threskiornis aethiopicus</i>	African Sacred Ibis	LC
<i>Bostrychia hagedash</i>	Hadada Ibis	LC
<i>Ceryle rudis</i>	Pied Kingfisher	LC
<i>Vanellus senegallus</i>	African Wattled Lapwing	LC
<i>Vanellus armatus</i>	Blacksmith Lapwing	LC
<i>Vanellus coronatus</i>	Crowned Lapwing	LC
<i>Agapornis roseicollis</i>	Rosy-faced Lovebird	LC
<i>Lonchura cucullata</i>	Bronze Mannikin	LC
<i>Gallinula chloropus</i>	Common Moorhen	LC
<i>Urocolius indicus</i>	Red-faced Mousebird	LC
<i>Colius striatus</i>	Speckled Mousebird	LC
<i>Acridotheres tristis</i>	Common Myna	LC
<i>Psittacula krameri</i>	Rose-ringed Parakeet	LC
<i>Columba guinea</i>	Speckled Pigeon	LC
<i>Prinia flavicans</i>	Black-chested Prinia	LC
<i>Prinia subflava</i>	Tawny-flanked Prinia	LC
<i>Dryoscopus cubla</i>	Black-backed Puffback	LC
<i>Euplectes orix</i>	Southern Red Bishop	LC
<i>Cossypha caffra</i>	Cape Robin-Chat	LC
<i>Circaetus cinereus</i>	Brown Snake Eagle	LC
<i>Passer melanurus</i>	Cape Sparrow	LC
<i>Passer domesticus</i>	House Sparrow	LC
<i>Pternistis swainsonii</i>	Swainson's Spurfowl	LC
<i>Lamprotornis nitens</i>	Cape Starling	LC
<i>Onychognathus morio</i>	Red-winged Starling	LC
<i>Saxicola torquatus</i>	African Stonechat	LC
<i>Cinnyris talatala</i>	White-bellied Sunbird	LC
<i>Hirundo rustica</i>	Barn Swallow	LC
<i>Cecropis cucullata</i>	Greater Striped Swallow	LC
<i>Hirundo albigularis</i>	White-throated Swallow	LC
<i>Tachymarptis melba</i>	Alpine Swift	LC
<i>Turdus smithi</i>	Karoo Thrush	LC
<i>Motacilla capensis</i>	Cape Wagtail	LC
<i>Acrocephalus baeticatus</i>	African Reed Warbler	LC
<i>Estrilda astrild</i>	Common Waxbill	LC
<i>Ploceus velatus</i>	Southern Masked Weaver	LC
<i>Amblyospiza albifrons</i>	Thick-billed Weaver	LC
<i>Zosterops virens</i>	Cape White-eye	LC
<i>Vidua macroura</i>	Pin-tailed Whydah	LC
<i>Phoeniculus purpureus</i>	Green Wood Hoopoe	LC

NT = Near Threatened, LC = Least Concern



Table C3: Reptile species observed during the field assessment.

Scientific Name	Common Name	Status
<i>Trachylepis punctatissima</i>	Speckled Rock Skink	LC

LC = Least Concern

Table C4: Insect species observed during the field assessment.

Scientific Name	Common Name	Status
<i>Zonocerus elegans</i>	Elegant Grasshopper	NYBA
<i>Musca domestica</i>	House Fly	NYBA
<i>Junonia hierta</i> ssp. <i>cebre</i>	African Yellow Pansy	LC
<i>Danaus chrysippus</i>	African Monarch	LC
<i>Junonia orithya</i> ssp. <i>madagascariensis</i>	African Blue Pansy	LC
<i>Anoplolepis custodiens</i>	Pugnacious Ant	NYBA
<i>Pontia helice helice</i>	African Meadow White	LC
<i>Vanessa cardui</i>	Painted Lady	LC
<i>Schismaderma carens</i>	Green Tree Locust	NYBA
<i>Gryllus bimaculatus</i>	Common Garden Cricket	NYBA
<i>Trithemis arteriosa</i>	Red-veined Dropwing	LC
<i>Cheilomenes lunata</i>	Lunate Ladybird	NYBA
<i>Apis mellifera</i>	Honeybee	DD

LC = Least concerned, NYBA = Not yet been assessed by the IUCN

Table C5: Arachnid species recorded during the field assessment.

Scientific Name	Common Name	Status
<i>Olurunia ocellata</i>	Grass Funnel-web Spider	NYBA
Family: Lycosidae	Wolf Spider	NYBA

NYBA = Not yet been assessed by the IUCN

