



SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Assessment

FOR THE PROPOSED MINING EXPANSION ACTIVITIES
AT THE THARISA MINE, NORTH WEST PROVINCE

Part C: Faunal Assessment

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DOCUMENT GUIDE

The table below provides a guide to the reporting of biodiversity impacts as they relate to 1) Government Notice No. 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. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	Section in report/Notes
2	Terrestrial Biodiversity Specialist Assessment	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	Part A – C: Cover Page Part A: Appendix E
2.2	The assessment must be undertaken on the preferred site and within the proposed mining activities footprint.	Part A: Section 1
2.3	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed mining activities will impact these;	Part B: Section 3 (flora) Part C: Section 3 (fauna)
2.3.2	Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	Part B: Section 3 (flora) Part C: Section 3 (fauna)
2.3.3	The ecological corridors that the proposed mining activities would impede including migration and movement of flora and fauna;	Part A: Section 3 (desktop analysis) Part B: Section 3 (flora) Part C: Section 3 (fauna)
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Area (FEPA) sub catchments;	Part A: Section 3 (desktop analysis) Part B: Section 3.2 – 3.4 (flora) Part C: Section 3.2 – 3.7 (fauna)
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: <ul style="list-style-type: none"> a) main vegetation types; b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified; c) ecological connectivity, habitat fragmentation, ecological processes and fine scale habitats; and d) species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified; 	Part A: Section 3 (desktop analysis) Part B: Section 3 (flora) Part C: Section 3 (fauna)
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a “low” sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	Not Applicable.
2.3.7	The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: <ul style="list-style-type: none"> a) <i>the reasons why an area has been identified as a CBA;</i> b) <i>an indication of whether or not the proposed mining activities is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;</i> c) <i>the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);</i> d) <i>the impact on ecosystem threat status;</i> e) <i>the impact on explicit subtypes in the vegetation;</i> 	Part A: Section 3 (desktop analysis) Part B: Section 3.1, 3.3, 5.3.3 Part C: Section 3



	<p>f) <i>the impact on overall species and ecosystem diversity of the site; and</i></p> <p>g) <i>the impact on any changes to threat status of populations of species of conservation concern in the CBA;</i></p>	
2.3.7.2	<p>Terrestrial Ecological Support Areas (ESAs), including:</p> <p>a) <i>the impact on the ecological processes that operate within or across the site;</i></p> <p>b) <i>the extent the proposed mining activities will impact on the functionality of the ESA; and</i></p> <p>c) <i>loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;</i></p>	
2.3.7.3	<p>Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including-</p> <p>a) <i>an opinion on whether the proposed mining activities aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;</i></p>	Part A: Section 3 (desktop analysis)
2.3.7.4	<p>Priority areas for protected area expansion, including-</p> <p>a) <i>the way in which the proposed mining activities will compromise or contribute to the expansion of the protected area network;</i></p>	Part A: Section 3 (desktop analysis)
2.3.7.5	<p>SWSAs including:</p> <p>a) <i>the impact(s) on the terrestrial habitat of a SWSA; and</i></p> <p>b) <i>the impacts of the proposed mining activities on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);</i></p>	Not Applicable
2.3.7.6	<p>FEPA sub catchments, including-</p> <p>a) <i>the impacts of the proposed mining activities on habitat condition and species in the FEPA sub catchment;</i></p>	Not Applicable
2.3.7.7	<p>Indigenous forests, including:</p> <p>a) <i>impact on the ecological integrity of the forest; and</i></p> <p>b) <i>percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.</i></p>	Not Applicable
2.4	The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.	
	<p>Part B: Results of the Floral Assessment as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities.</p> <p>Part C: Results of the Faunal Assessment as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities.</p>	
3	Terrestrial Biodiversity Specialist Assessment Report	
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	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 B: Section 1.3 (flora) Part C: Section 1.3 (fauna)
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Part A: Appendix C Part B: Section 2 (flora) Part B: Appendix A (flora) Part C: Section 2 (fauna) Part C: Appendix A (fauna)
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Part B: Section 1.3 (flora) Part C: Section 1.3 (fauna)
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Part B: Section 4 (flora) Part C: Section 4 (fauna)
	Impact Assessment Requirements	Part B: Section 5 (flora) Part C: Section 5 (fauna)
	3.1.7 Additional environmental impacts expected from the proposed mining activities;	



	<p>3.1.8 Any direct, indirect and cumulative impacts of the proposed mining activities;</p> <p>3.1.9 The degree to which impacts and risks can be mitigated;</p> <p>3.1.10 The degree to which the impacts and risks can be reversed;</p> <p>3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources;</p> <p>3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);</p>	
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	Not Applicable to this report
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed mining activities, if it should receive approval or not; and	Part A: Executive summary Part B: Section 6 (flora) Part C: Section 6 (fauna)
3.1.15	Any conditions to which this statement is subjected.	Part B: Section 5.4 (flora) Part C: Section 5.4 (fauna)
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	Not Applicable to this report
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	Not Applicable to this report



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ACRONYMS

ADU	The Animal Demography Unit online database: http://vmus.adu.org.za/ .
AIP/AIPs	Alien Invasive Plant/Alien Invasive Plants
CR	Critically Endangered
DFFE	Department of Forestry, Fisheries and the Environment
EAP	Environmental Assessment Practitioner
EIS	Ecological Importance and Sensitivity
EN	Endangered
GIS	Geographic Information System
GPS	Global Positioning System
Ha	Hectares
IEM	Integrated Environmental Management
IUCN	International Union for Conservation of Nature and Natural Resources
Km	Kilometres
LC	Least Concern
NA	Not Applicable
NBA	National Biodiversity Assessment, as it related to the NEMBA
NT	Near Threatened
NE	Not Evaluated
NEMBA	National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)
NYBA	Not yet been assessed
NWBSP	North West Biodiversity Sector Plan
NWDETECT	North West Department: Economic Development, Environment, Conservation and Tourism
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
PR	Protected in the North West Province under the Transvaal Nature Conservation Ordinance (12 of 1983).
QDS	Quarter Degree Square
R	Rare
RDL	Red Data Listed
RSA	Republic of South Africa
SABAP2	Southern African Bird Atlas Project 2
SANBI	South Africa National Biodiversity Institute
SP	Specially Protected
STS	Scientific Terrestrial Services CC
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
WRD	Waste Rock Dump



GLOSSARY OF TERMS

Alien and Invasive species	A species that is not an indigenous species; or an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
Carrying Capacity	The maximum population size of a biological species that can be sustained by that specific environment, given the food, habitat, water, and other resources available.
CBA (Critical Biodiversity Area)	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges.
Corridor (ecological)	Open areas of native vegetation, providing habitat that connects wildlife populations in isolated areas that are separated by human activities or structures. Corridors provide cohesion in otherwise fragmented ecosystems. Through the connection of fragmented habitats, the viability of animal and plant species is improved by enlarging habitats, for example to improve the search for food, dispersion of young animals and re-use of "empty" habitats (Sicirec, 2009)
Diversity	Abundance and species richness of faunal classes
Ecosystem	A community of living organisms in conjunction with the non-living components of their environment, interacting as a system. These biotic and abiotic components are linked together through nutrient cycles and energy flows.
Endangered (according to IUCN)	Organisms at very high risk of extinction in the wild
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.
ESA (Ecological Support Area)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
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.
Habitat Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
Least Concern	Unlikely to become extinct in the near future. A least-concern species is a species that has been categorized by the International Union for Conservation of Nature (IUCN) as evaluated as not being a focus of species conservation. They do not qualify as threatened, near threatened, or (before 2001) conservation dependent.
Least Threatened	Least threatened ecosystems are still largely intact.
Near Threatened (according to IUCN)	Close to being at high risk of extinction in the near future.
Protected	Species of high conservation value or national importance that require protection, according to NEMBA: TOPS 2007 species list
Refugia (ecological)	Refugium (plural: refugia) is a location which supports an isolated or relict population of a once more widespread species. This isolation can be caused by climatic changes, geography, or human activities such as deforestation and overhunting.
Resource (ecological)	In biology and ecology, a resource is a substance or object in the environment required by an organism for normal growth, maintenance, and reproduction.
RDL (Red Data listed) species	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
Rupicolous	Living or growing on or among rocks
Sourveld	African veld that is largely covered with coarse seasonal perennial grasses and affords inferior grazing.
SCC (Species of Conservation Concern)	The term SCC in the context of this report refers to all RDL (Red Data) and IUCN (International Union for the Conservation of Nature) listed threatened species as well as protected species of relevance to the project.
Termitaria	Termite colonies, typically within a tall mound of cemented earth.
Vulnerable (according to IUCN)	Species meets one of the 5 red list criteria and thus considered to be at high risk of unnatural (human-caused) extinction without further human intervention.



1. INTRODUCTION

1.1. Project Background

Scientific Terrestrial Services CC (STS) was appointed to conduct a Biodiversity Assessment as part of the Environmental Impact Assessment (EIA) phase in support of obtaining Environmental Authorisation (EA) process for the proposed expansion of the Tharisa Mine, henceforth be referred to as the “**study area**”.

The proposed activities associated with the Tharisa Mine expansion, that will take place within the study area, will include the following (Figure 1):

1. Extending a previously approved waste rock dump (WRD) – referred to as the “**West Above Ground WRD**”; and
2. Establishing a WRD above backfilled portions of the East and West pits – referred to as the “**East Above Ground WRD**”.

The purpose of this report is to define the faunal ecology of the study area as well as mapping and defining areas of increased Ecological Importance and Sensitivity (EIS) and to define the Present Ecological State (PES) of the study area. The objective of this study is:

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

1.2. Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal



communities have been accurately assessed and considered and the information provided is considered sufficient to allow informed decision making to take place and facilitate integrated environmental management;

- The field assessment was undertaken from the 26th of April 2022 (autumn), to determine the faunal ecological status of the study area, and to “ground-truth” the results of the desktop assessment (presented in Section A). A more accurate assessment would require that assessments take place in all seasons of the year, especially in summer after the rainy season. However, on-site data was significantly augmented with all available desktop data and specialist experience in the area, and the findings of this assessment are considered to be an accurate reflection of the ecological characteristics of the study area;
- Due to the nature and habits of most faunal taxa and the level of surrounding anthropogenic activities, it is unlikely that all species would have been observed during a field assessment of limited duration, especially during the winter season when invertebrate, herpetofaunal and bird activity are lower. Therefore, site observations were compared with literature studies where necessary;
- The faunal assessment was limited to the study area and did not assess in detail the surrounding properties. Faunal activity within the surrounding properties were noted on an ad-hoc basis whilst moving to and from the study area, with data extrapolated to these areas through the use of satellite imagery;
- 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. The survey was also undertaken during winter when a large component of the faunal assemblage, notably insects, reptiles and birds, would be in metamorphosis, hibernating or may have migrated. Thus, for more accurate and complete data collection, summer assessments are considered more reliable; and
- The scientific and common names of the Species of Conservation Concern (SCC) listed under Transvaal Nature Conservation Ordinance, 1983 (Act No. 12 of 1983) in Appendix B, have been updated since the release of this particular legislation. The updated scientific and common names of these SCC are used in this report, and not the old names listed in the ordinance.



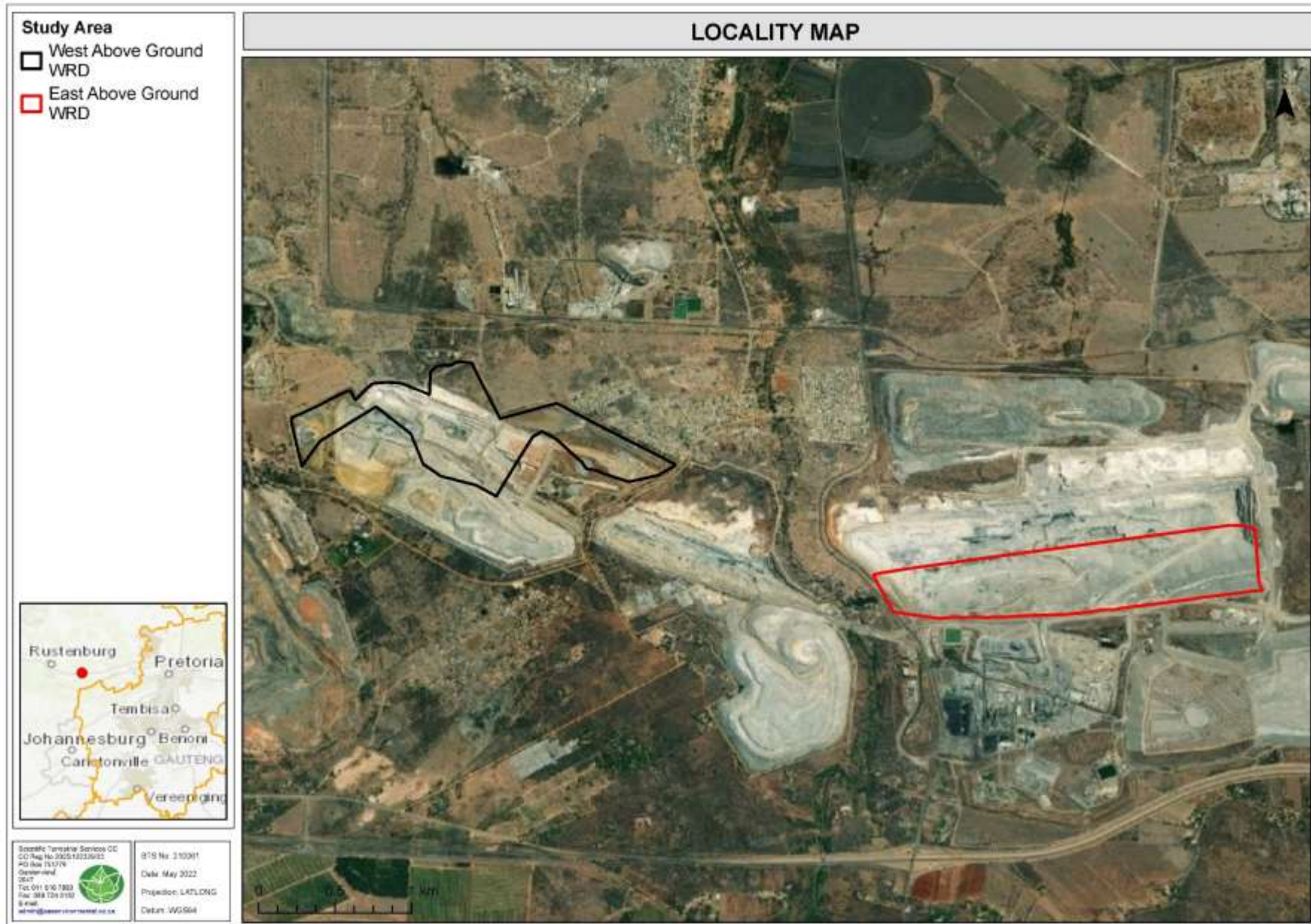


Figure 1: The study area, in relation to its surroundings, overlaid on digital satellite imagery.



2. ASSESSMENT APPROACH

The field assessment was undertaken from the 26th of April 2022, to determine the faunal ecological status of the study area. A reconnaissance ‘walkabout’ was initially undertaken to determine the general habitat types found throughout the study area, following this, specific study sites were selected that were considered to be representative of the habitats found within the study area, with special emphasis being placed on areas that may potentially support faunal SCC. Sites were investigated on foot in order to identify the occurrence of fauna within the study area. Sherman traps were used to increase the likelihood of capturing and observing small mammal species (rodents), notably nocturnal and reclusive mammals.

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

2.1 General approach

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

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



2.2 Sensitivity Mapping

All the ecological features associated with the study area were considered, and sensitive areas were assessed. In addition, identified locations of protected species were marked by means of Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto satellite imagery and/or topographic maps. The sensitivity map should guide the final design and layout of the proposed mining activities. Please refer to Section 4 of this report for further details.

2.3 Faunal Species of Conservational Concern Assessment

During field assessments, it is not always feasible to identify or observe all species within an area, largely due to the secretive nature of many faunal species, possible low population numbers or varying habits of species. As such, and to specifically assess an area for faunal SCC, a Probability of Occurrence (POC) estimation is used, considering several factors to determine the probability of faunal SCC occurrence within the study area. Species listed in Appendix B whose known distribution ranges and habitat preferences include the proposed infrastructure development sites were taken into consideration. Faunal species likely to occur within the study area are indicated and briefly discussed within each of the relevant dashboards, along with their POC.

3. FAUNAL ASSESSMENT RESULTS

3.1 Faunal Habitat

Only one habitat unit was identified within the study area (and thus within the West Above Ground WRD and the East Above Ground WRD), namely the Transformed Habitat (Figure 3). This habitat comprised approximately 165 ha and was associated with areas of 1) historic mining activities (i.e., in which low vegetation cover was identified and AIP and native pioneer species were recorded), 2) current mining activities (i.e., in the existing pits in which vegetation cover was largely absent), and 3) associated road and building infrastructure. Overall, the habitat within the study area was characterised by areas in which vegetation cover ranged from almost absent to very low. The lack of vegetation within the study area is attributed to its location within an active mining area. The notable absence to low level of vegetation cover is not considered conducive to supporting fauna, as noted during the site assessment. It is noted however that the areas of low vegetation cover may be utilised by common, hardy insect species, reptiles and some avifauna.

Within the surrounding areas there are Freshwater Features and areas of natural, vegetation. The Freshwater features that are present within the area surrounding the study area, namely



an unchanneled valley bottom wetland (UCVBW; in the north of the West Above Ground WRD), a channelled valley bottom wetland (CVBW; in the north of the West Above Ground WRD), and the Sterkstroom River (between the West and East Above Ground WRDs; Figure 2). These features are largely degraded and have been extensively modified by anthropogenic activities, e.g., historic, and current mining as well as historic agricultural activities. Despite this, the freshwater features, especially the CVBW and the Sterkstroom River provide connective corridors within the greater landscape (SAS 202238, 2022). The surrounding vegetated areas are largely degraded in nature (because of edge effects from mining activities, and historic mining and agriculture (SAS 213199 (2013)).



Figure 2: Image illustrating the freshwater features surrounding the study area. Freshwater Features include an UCVBW (light blue feature above the West Above Ground WRD, red polygon), a CVBW (cyan feature in the north of the West Above Ground WRD, yellow polygon), and the Sterkstroom River (dark blue feature between the West and East Above Ground WRDs).

Sections 3.2 - 3.4 provide a dashboard report of the findings of each faunal class.



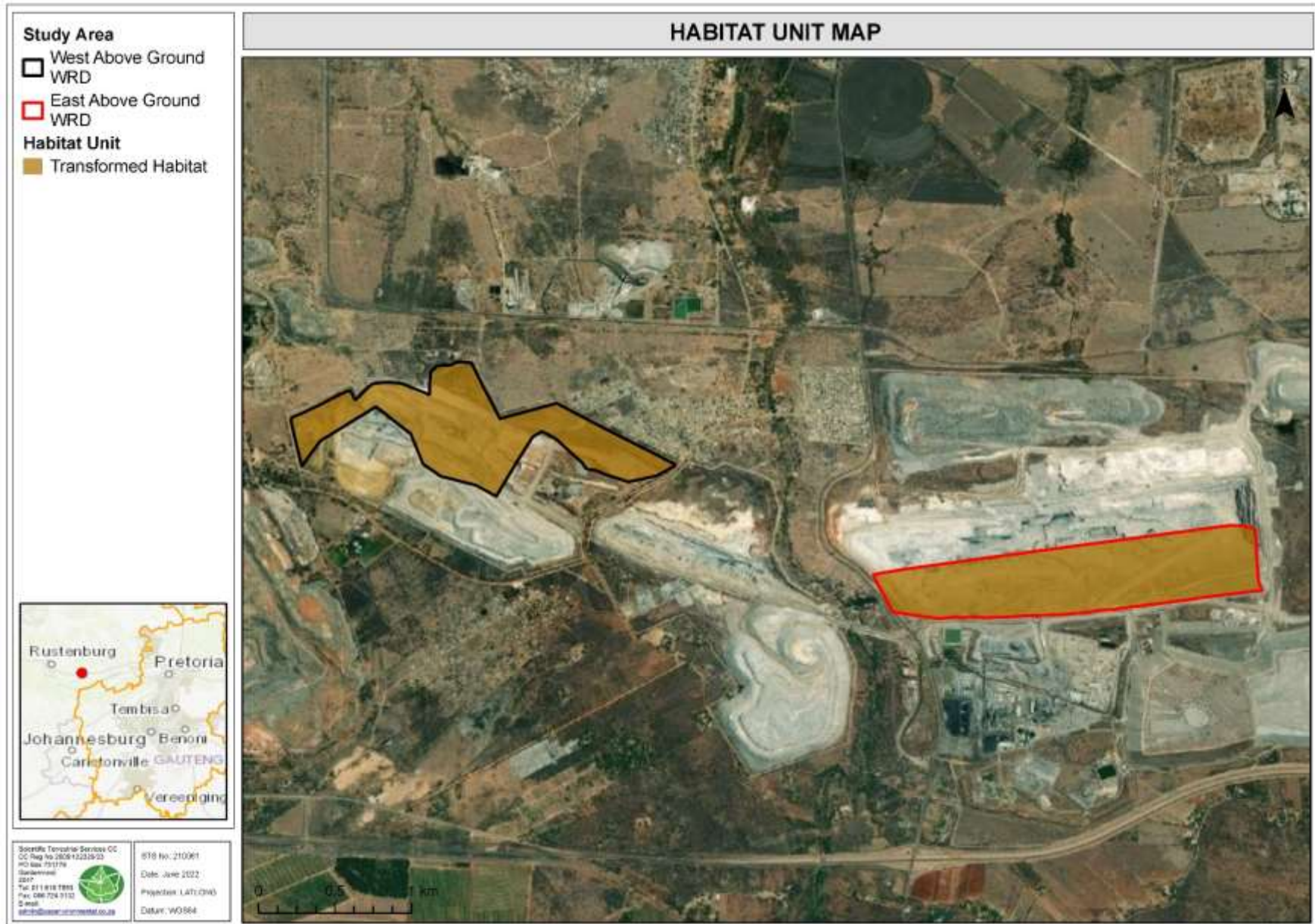










Figure 3: Conceptual illustration of the habitat unit associated with the study area



3.2 Vertebrates

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

Photographs			
			
			
<p>Above: Images left to right indicating habitat conditions within the study area.</p> <p>Below: Left to right, common avifauna observed around the study area, <i>Spilopelia senegalensis</i> (Laughing Dove), <i>Merops bullockoides</i> (White-fronted Bee-eater), <i>Ploceus velatus</i> (Southern Masked Waver) and <i>Saxicola torquatus</i> (African Stonechat).</p>			
Vertebrate SCC potentially occurring in the study area			
Species	Habitat and Resources in the Study area	Red List Status	POC
<i>Crocidura maquassiensis</i> (Makwassie Musk Shrew)	This is a rare species endemic to South Africa, Swaziland and Zimbabwe, existing in moist grassland habitats in the savannah and grassland biomes. They are often associated with intact wetlands in these areas. Given the degree of habitat disturbance and degradation, it is unlikely that this species will occur within the study area.	VU	Low




<p><i>Dasymys robertsii</i> (Marsh Rat)</p>	<p>This species has been recorded from a wide variety of habitats, including forest and savannah, swampland and grasslands, but they rely on intact wetlands in these areas. They occur specifically in reed beds and among semi-aquatic grasses in wetlands. These rodents are opportunistic omnivores, feeding predominantly on the succulent stems and fruiting heads of semi-aquatic grasses supplementing their diets with insects. Given the degree of habitat disturbance and degradation, it is unlikely that this species will occur within the study area.</p>	<p>VU</p>	<p>Low</p>
<p><i>Sagittarius serpentarius</i> (Secretarybird)</p>	<p>Occupies a wide range of habitats, including open savannah and agricultural areas. This species is known to travel long distances while foraging. The lack of suitable habitat and food resources will preclude this species from the study area.</p>	<p>NT</p>	<p>Low</p>
<p><i>Chrysospalax villosus</i> (Rough-haired golden mole)</p>	<p>This species occurs in sandy soils in grasslands, meadows and along edges of wetlands in the savannah and grassland biomes of South Africa. The study area provided no suitable habitat for this species and as such, no individuals are likely to occur within or adjacent to the proposed activities.</p>	<p>VU</p>	<p>Low</p>
<p>Discussion</p>	<p>Historic and current mining activities have led to a loss of habitat within the study area and the subsequent displacement of vertebrate species. Food resources have been notably reduced due to vegetation clearing and land transformation. The net result is that the study area is not considered suitable for vertebrate habitation, nor does the transformed habitat serve an important ecological function for vertebrate ecology in the region. The study area and transformed habitat are not considered important for vertebrate movement nor does the study area serve as an important corridor for movement. During the site assessment, no mammal or herpetofaunal species were observed whilst only a few common and widespread avifaunal species were observed within the study area. Although not observed, it is possible that common species such as <i>Lemniscomys rosalia</i> (Single-striped Mouse), <i>Lepus saxatilis</i> (Scrub Hare), <i>Rhabdomys pumilio</i> (Xeric Four-striped Mouse), <i>Procavia capensis</i> (Cape Rock Hyrax), <i>Trachylepis punctatissima</i> (Speckled Rock Skink), <i>Sclerophrys garmani</i> (Olive Toad) and <i>Sclerophrys gutturalis</i> (Guttural Toad) may occur in the areas surrounding the proposed East and West Aboveground WRDs. These species likely only forage in in the semi-vegetated areas surrounding the pits periodically and are unlikely to be reliant on the study area for survival. The three vertebrate species listed by the Screening Tool are unlikely to occur within or make use of the study area due to unsuitable habitat, the lack of food resources and the continuous anthropogenic activities. As such, these three species were assigned a low POC for the study area.</p>		
<p>Conclusion</p>	<p>Vertebrate diversity and abundance has been notably impacted upon as a result of the mining activities and subsequent habitat loss. Continued activities relating to mining within the footprint area likely pose little to not threat to vertebrate species. Whilst some vegetation within the study area will be cleared as part of the East and West WRD expansion plans, this is unlikely to impact on vertebrate species or their habitat. No vertebrate SCC are expected to occur within the study area, nor are the proposed activities expected to pose a threat to any such species which may occur in the greater region.</p> <p>The proposed activities zone or influence on vertebrate species is likely to be limited to the footprint areas only within the mine and are unlikely to impact beyond these boundaries.</p>		



3.3 Invertebrates

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

Photographs			
			
<p>Above: Images left to right, <i>Papilio demodocus demodocus</i> (Citrus Swallowtail), <i>Eurema brigitta</i> (Broad-bordered Grass Yellow) and <i>Danaus chrysippus orientis</i> (African Plain Tiger).</p>			
Vertebrate SCC potentially occurring in the study area			
Species	Habitat and Resources in the Study area	Red List Status	POC
<i>Opisththalmus</i> sp (Burrowing Scorpion)	This genus of scorpions is known from the region encompassing the study area. Species of this Genus often burrow under rocks, grass tufts and logs. Although known from the area, the degree of habitat disturbance, degradation and increased ground vibration impacts from mining as well as the notably low availability of food resources, it is unlikely that this species will occur in the study area.	Protected-TOPS	Low
<i>Hadogenes</i> sp (Flat Rock Scorpion)	This Genus of scorpions is often found amongst rocky outcrops or in some instances where waste rock has been dumped and left undisturbed for extended periods of time, allowing the vegetation around the waste rock to regrow. It favours tight crevices between rock however has also been known to seek refuge under fall logs. This species is known from the region however given the significant degree of habitat disturbance, increased ground vibration impacts from mining and the notably low availability of food resources, it is unlikely that this species will occur in the study area.	Protected-TOPS	Low



<p>Discussion</p>	<p>The extensive and continued mining activities in the study area has resulted in the loss of invertebrate habitat in the active mining areas, notably the pits and immediate surrounds. A semblance of habitat was noted in small areas to the north of the West Above Ground WRD, though as a result of active mining activities and edge effects, these patches of vegetation are considered suboptimal and likely only support a small assemblage of common and hardy invertebrate species, adapted to areas of continued edge effect disturbance, notably dusts, noise and vibrations. Much of the vegetation herein is alien plant species, which provides limited food resources to indigenous insect species. Consequently, this has resulted in a low abundance and diversity of insects, a primary food resource for arachnid species, limiting their occurrence in the study area.</p> <p>No arachnid species were observed during the site assessment, nor were any signs thereof (discarded webs) observed. Species that may occur in the study area will likely be limited to small, ground dwelling species that are active hunters such as the Family Lycosidae (Wolf Spiders). Insect species observed were predominantly of the Orders Lepidoptera (Butterflies and Moths) and Orthoptera (Grasshoppers and Crickets). Some of the more common members of these Orders appear to be more resilient to habitat disturbance and are able to inhabit degraded and disturbed sites, though, at decreased population numbers.</p>
<p>Conclusion</p>	<p>Invertebrate diversity and abundance has been notably impacted upon as a result of the mining activities and subsequent habitat loss. The proposed mining expansions may lead to the displacement of the remaining invertebrates from the study area, however, there is sufficient suitable habitat outside of the mining property to host these species, and given the likely low numbers within the study area, such displacement of these species will not result in increased competition for resources or habitat in the adjacent areas. The proposed mining activities therefore are unlikely to pose a significant threat to invertebrates, nor are the activities likely to impact upon any SCC.</p> <p>The zone of influence in term of noise and dust likely already extends beyond that of the study area already, with the current proposed activities unlikely to add to these significantly nor lead to an increase in the zone of influence / impact.</p>

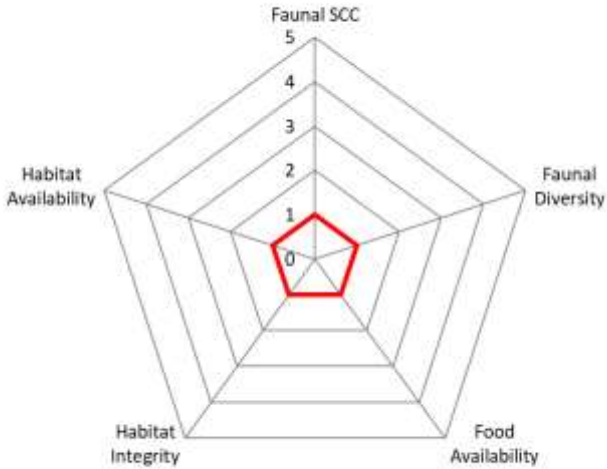


4. SENSITIVITY MAPPING

Figure 4 below conceptually illustrates the faunal ecological sensitivity for the various areas. The areas are depicted according to their sensitivity in terms of the presence or potential for faunal SCC, habitat integrity, levels of disturbance and overall levels of diversity. Table 3 below presents the sensitivity of each habitat along with an associated conservation objective and implications for the proposed activities.



Table 3: A summary of the sensitivity of each habitat unit and implications for the proposed activities.

Habitat Unit	Habitat Sensitivity	Conservation Objective	Key Habitat Characteristics
<p>Transformed Habitat</p>	<p>Low</p>	<p>Optimise development potential.</p>	<ul style="list-style-type: none"> - Much of this habitat has been impacted upon and disturbed as a result of the current mining activities; - Limited (dominated by alien plants) to no habitat for faunal species remains; - No faunal SCC were observed or are expected to occur herein and - Expansion within this habitat will have very limited impacts to faunal species.
			



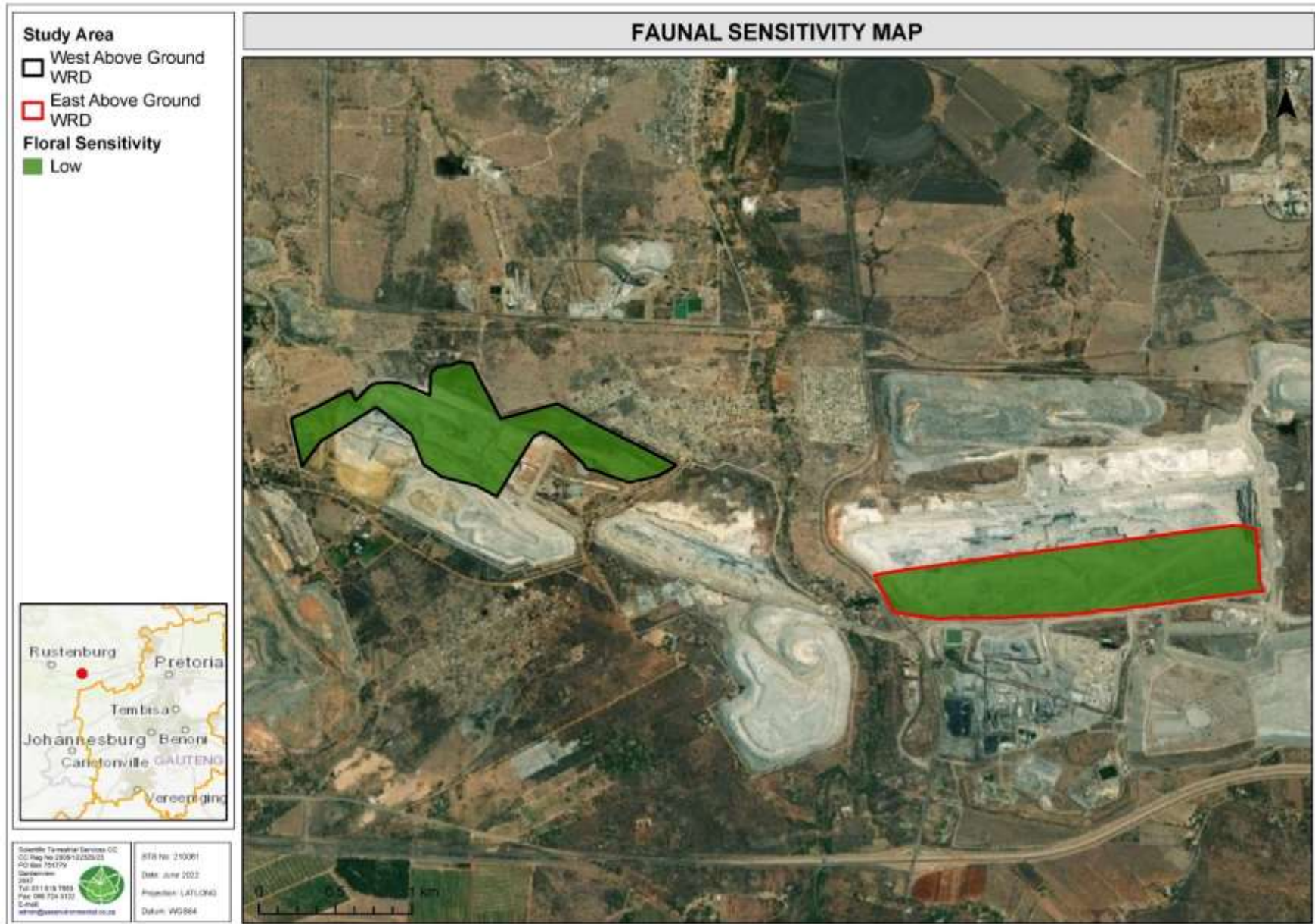


Figure 4: Overview of the faunal habitat sensitivity map for the study area.



5. IMPACT ASSESSMENT

An impact discussion and assessment of all potential i) Mining Phase (i.e., Construction and Operational), and ii) Decommissioning & Rehabilitation Phase impacts are provided in Section 5.2 (Tables 5 – 8). All mitigatory measures required to minimise the perceived impacts are presented in Section 5.4 and Table 9. The impact assessment (as provided by the proponent) was undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

The proposed activities associated with the Tharisa Mine expansion, that will take place within the study area, will include the following:

1. Extending a previously approved WRD – i.e., the West Above Ground WRD; and
2. Establishing a WRD above backfilled portions of the East and West pits – i.e., the East Above Ground WRD.

Freshwater features although not present within the study area are present within the surrounding area. As freshwater features are not located directly within the study area, the direct impacts of the proposed mining activity are not included in the impact assessment. However, the associated indirect impacts associated with the proposed mining development on these freshwater features are included in the impact assessment, specifically as impacts associated with the surrounding area.

5.1 Activities and Aspect Register

The table below indicates the perceived risks to faunal species associated with the activities proposed for the activities.

Table 4: Activities and aspects during all phases of the proposed mining activities, that will likely impact on the faunal resources of the study area.

ACTIVITIES AND ASPECTS REGISTER	
Mining (i.e., Construction & Operational) Phase	
-	Site clearing and the removal of vegetation.
-	Impact: Loss of faunal habitat, diversity, and the possible loss of faunal SCC.
-	Proliferation of AIP species that can lead to the further transformation of adjacent natural habitat.
-	Impact: Loss of faunal habitat outside of the direct development footprint, including a decrease in species diversity and a potential loss of faunal SCC.
-	Potentially poorly managed edge effects: <ul style="list-style-type: none"> • Ineffective rehabilitation / management of eroded areas resulting in a potential increase in disturbance footprints; and • Ineffective management of edge effects (e.g., AIP proliferation) that will impact surrounding freshwater habitats.
-	Impact: Loss of habitat in the adjacent areas leading to a decrease in faunal species diversity and abundance.



ACTIVITIES AND ASPECTS REGISTER	
<ul style="list-style-type: none"> - Dumping of excavated and construction material outside of designated areas. - Impact: Loss of faunal habitat and species diversity. 	
<ul style="list-style-type: none"> - Dust generated during mining activities accumulating on the surrounding plant species. - Impact: Declines in plant functioning leading to decreased plant growth and habitat structure. Dust accumulating on plants will likely be less palatable, decreasing useable food resources for herbivorous faunal species. 	
<ul style="list-style-type: none"> - Possible increased fire frequency during construction. - Impact: Loss or alteration of faunal habitat and species diversity in the surrounding areas. 	
<ul style="list-style-type: none"> - Risk of discharge and contamination from all operational facilities may pollute receiving environment with special mention of the salinisation of soils and nearby freshwater habitats (refer to Freshwater Assessment: SAS 202238 2022). - Impact: Altered freshwater and faunal habitat. 	
<ul style="list-style-type: none"> - On-going disturbance during the Mining Phase may lead to erosion and sedimentation of surrounding habitat. - Impact: Degradation of faunal habitat in the areas adjacent the study area. 	
Decommissioning & Rehabilitation Phase	
<ul style="list-style-type: none"> - Ineffective rehabilitation of exposed and impacted areas, increasing erosion risk and AIP proliferation within the surrounding areas. - Impact: Permanent loss of faunal habitat, diversity and potential SCC, and a higher likelihood of edge effect impacts on adjacent vegetated areas. 	
<ul style="list-style-type: none"> - Potential poor management and failure to monitor rehabilitation efforts, leading to: <ul style="list-style-type: none"> • Landscapes remains fragmented, resulting in reduced dispersal capabilities of faunal species and an overall decrease in faunal abundance and diversity; • Compacted soils limiting the re-establishment of natural vegetation; • Increased risk of erosion in areas left disturbed. - Impact: Long-term (or permanent) loss of faunal habitat, diversity, and potential SCC. 	
<ul style="list-style-type: none"> - On-going seepage and runoff may affect the groundwater regime and nearby freshwater features beyond closure. - Impact: Loss of faunal habitat and associated species. 	

5.2 Impact Assessment Results

The sections below provide the significance of perceived impacts arising from the proposed mining activities for the study area. The impact assessment is based on the layout provided by the proponent as illustrated in Figure 1.

5.2.1 IMPACT: Loss of Faunal Habitat and Species Diversity.

The Transformed habitat is of low sensitivity. This habitat was significantly transformed and modified and provided limited habitat to faunal species.

Impacts associated with the Mining Phase: this phase will result in the clearing of the remaining small patches of vegetation for the proposed WRD development. The clearance activities may lead to a loss of impacted habitat and common faunal species in the footprint area. In addition to this, there may be a loss of faunal habitat and species diversity outside of the direct mining footprint during the Mining Phase if:

- i. Alien plants and edge effects associated with the mining activities are not managed;
- ii. Mining related material is dumped outside of designated areas;
- iii. Discharge and contamination occurs, potentially impacting on the soils and nearby freshwater habitats (refer to Freshwater Assessment: SAS 202238 2022); and



- iv. Dust generated during mining activities accumulates on the surrounding vegetation, decreasing palatability of plants and impacting plant growth.

If mitigation measures as presented in Section 5.4 are implemented, then the significance ratings of the impacts can be reduced. The impact significance i) prior to mitigation measures is expected to be medium, and ii) post mitigation is expected to be low (Table 5).

Table 5: Assessment of impact for the Mining Phase: Loss of faunal habitat and species diversity in the Transformed Habitat.

Issue: loss of faunal habitat and diversity		
Phases: Mining Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	L	VL
Duration	M	M
Extent	M	VL
Consequence	M	L
Probability	VH	VH
Significance	Medium (M)	Low (L)
Nature of cumulative impacts		
	The proposed mining activities may further impact on the faunal habitat and species diversity in the surrounding areas of the mine as a result of edge effect impacts. This may lead to habitat and species loss beyond that of the mining footprint.	
Degree to which impact can be reversed		
	Moderate. The impact can be somewhat reversed once the Mining Phase is completed, and management measures are put in place and adhered to.	
Degree to which impact may cause irreplaceable loss of resources		
	Low	
Residual impacts		
	Residual impacts are anticipated to be low. Potential residual impacts include: <ul style="list-style-type: none"> - Permanent loss of and altered faunal species diversity because of poorly managed edge effects. 	

Impacts associated with the Decommissioning & Rehabilitation Phase: The proposed mining activities will likely have a decreased impact during this phase. This is as a result of no further vegetation clearance and active mining taking place. However, ongoing, or permanent loss of faunal habitat and species diversity may occur during the Decommissioning and Rehabilitation Phase if:

- i. AIP Management and/or control programmes are poorly implemented leading to further habitat transformation;
- ii. Further disturbance of soils, impacting on rehabilitation and revegetation effectiveness, limiting recolonisation of faunal species;
- iii. Continued contamination from mining facilities beyond closure if not decommissioned effectively; and
- iv. Poorly implemented and monitored rehabilitation effort leaving the landscape fragmented and with substandard revegetation taking place.



If mitigation measures as presented in Section 5.4 are implemented, then the significance ratings of the impacts can be reduced. The impact significance i) prior to mitigation measures is expected to be medium, and ii) post mitigation is expected to be very low (Table 6).

Table 6: Assessment of impact for the Decommissioning & Rehabilitation Phase: Loss of faunal habitat and species diversity in the Transformed Habitat.

Issue: loss of faunal habitat and diversity		
Phases: Decommissioning & Rehabilitation Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	L	VL
Duration	H	L
Extent	M	L
Consequence	M	VL
Probability	H	M
Significance	Medium (M)	Very Low (VL)
Nature of cumulative impacts		
	Unmanaged edge effects may lead to further habitat loss in the surrounding areas, which when combined with substandard rehabilitation of the mining site will cumulatively add to long term, possibly permanent loss of habitat and faunal species in the area	
Degree to which impact can be reversed		
	Impact can be partially reversed during the decommissioning phase if management measures are put in place and strictly adhered to. WRDs, even when rehabilitated will not replace the habitat originally lost, but a semblance of habitat can be recreated.	
Degree to which impact may cause irreplaceable loss of resources		
	Very low	
Residual impacts		
	Residual impacts are anticipated to be low. Potential residual impacts include: <ul style="list-style-type: none"> - Permanent loss of and altered faunal species diversity; and - Edge effects such as further habitat fragmentation and habitat loss. 	

5.2.2 IMPACT: Loss of Faunal SCC

No faunal SCC were observed at the time of assessment, and suitable habitat to support SCC was completely lacking within the study area (attributed to the level of transformation and location of the study area within an active mining area).

Impacts associated with the Mining Phase: this phase will result in the clearing of the remaining small patches of vegetation for the proposed WRD development. The clearance activities may lead to a loss of impacted habitat in the footprint area, though no loss of faunal SCC are expected. In addition to this, there may be a loss of habitat and outside of the direct mining footprint during the Mining Phase if:

- i. Edge effects are poorly managed leading to the surrounding vegetated areas outside of the study area being impacted upon.

If mitigation measures as presented in Section 5.4 are implemented, then the significance ratings of the impacts can be reduced. The significance i) prior to mitigation measures is expected to be low, and ii) post mitigation the significance is expected to be very low (Table 7).



Table 7: Assessment of impact for the Mining Phase: Loss of Faunal SCC within the Transformed Habitat.

Issue: loss of faunal SCC habitat and diversity		
Phases: Mining Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	L	VL
Duration	M	M
Extent	M	VL
Consequence	M	L
Probability	L	L
Significance	Low (L)	Very Low (L)
Nature of cumulative impacts		
	The current mining activities have already resulted in the loss of potential faunal SCC. Impacts to the surrounding habitats outside of the study area may lead to further habitat impacts, decreasing the remaining useable areas for SCC whilst also impacting on future opportunities for SCC to recolonise these areas post mining.	
Degree to which impact can be reversed		
	Moderate. The impact can be somewhat reversed once the Mining Phase is completed, and management measures are put in place and adhered to.	
Degree to which impact may cause irreplaceable loss of resources		
	Low	
Residual impacts		
	Residual impacts are anticipated to be low. Potential residual impacts include: - Permanent loss of potential SCC habitat both in the mining area and possibly the surrounding areas.	

Impacts associated with the Decommissioning & Rehabilitation Phase: Provided that mitigation measures are in place and that edge effects are suitably managed, this phase should have no impacts to faunal SCC. Poorly managed edge effects and a poorly implemented AIP Management program can lead to the permanent loss and / or alteration of habitat for faunal SCC. Suboptimal habitat rehabilitation will inhibit faunal SCC from recolonising and making use of the area post mining.

If mitigation measures as presented in Section 5.4 are implemented, then the significance ratings of the impacts can be reduced. The significance i) prior to mitigation measures is expected to be very low, and ii) post mitigation the significance is expected to be insignificant (Table 8).

Table 8: Assessment of impact for the Decommissioning & Rehabilitation Phase for the Loss of Faunal SCC within the Transformed Habitat.

Issue: loss of faunal SCC habitat and diversity		
Phases: Decommissioning & Rehabilitation Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	L	L
Duration	L	L
Extent	L	VL
Consequence	L	VL
Probability	L	L



Issue: loss of faunal SCC habitat and diversity	
Significance	Very low (VL) Insignificant (VL)
Nature of cumulative impacts	Failure to rehabilitate suitably will lead to permanent loss of habitat. Alien plant proliferation will be likely, further degrading the habitat both in the study area and likely the surrounding areas.
Degree to which impact can be reversed	Moderate
Degree to which impact may cause irreplaceable loss of resources	Low
Residual impacts	Potential residual impacts include: <ul style="list-style-type: none"> - The loss of suitable habitat for faunal species; and - Inability for faunal SCC to recolonise the study area.

5.3 Impact discussion

The impact assessment was undertaken on all aspects of faunal ecology deemed likely to be affected by the proposed mining activities.

Prior to mitigation measures the i) Mining (i.e., Construction and Operational) Phase and ii) Decommissioning & Rehabilitation Phase scored an impact significance as follows:

- Mining Phase: this phase scored an impact significance ranging between medium (prior to mitigation implementation) and very low (with mitigation implemented); and
- Decommissioning & Rehabilitation Phase: this phase scored an impact significance ranging between low (prior to mitigation implementation) and insignificant (with mitigation implemented).

5.3.1. Impact on Faunal Habitat and Diversity

The proposed mining activities will result in the clearance of small areas of potential faunal habitat. These vegetated areas, like the rest of the study area, are considered to be of low sensitivity to faunal species. Low to very low significance impacts are anticipated due to the transformed nature and the low diversity of faunal species. Many of the faunal species within this habitat are common and widely occurring in the region and of low abundances, as such, the proposed WRD expansion is unlikely to result in a significant loss of these faunal species.

5.3.2. Impact on Faunal SCC

No faunal SCC were observed at the time of assessment whilst suitable habitat for faunal SCC was lacking. The expansion of the WRDs is unlikely to pose a threat to faunal SCC provided that impacts are managed and mitigated.



5.4 Integrated Impact Mitigation

Table 9 below highlights the key integrated mitigatory measures that are applicable to the study area in association with the proposed mining activities in order to suitably manage and mitigate the ecological impacts that are associated with the proposed mining activities. Provided that **all** the management and mitigatory measures as stipulated in this report are implemented the overall risk associated with the activities may be minimised, although impacts are still considered unavoidable.

Table 9: A summary of the mitigatory requirements for faunal resources.

Project phase	MINING PHASE (CONSTRUCTION AND OPERATION)
Impact Summary	Loss of faunal habitat, species and faunal SCC
Proposed mitigatory and management measures:	
Development footprint	
<ul style="list-style-type: none"> - The footprint and daily operation of all mining surface infrastructure areas must be strictly monitored to ensure that edge effects from the operational facilities do not affect the surrounding faunal habitat beyond the allowed footprint; - The footprint areas of all proposed surface infrastructure must be minimised to what is absolutely essential and within a designated and approved boundary. It should be ensured that no mining related activities take place outside of this demarcated footprint; - Faunal habitat beyond the demarcated area should not be altered or disturbed, therefore vegetation outside of the footprints is not to be cleared; - Where topsoil is excavated, it must be stored with associated native vegetation debris for subsequent rehabilitation use; - No dumping of waste on site should take place. As such it is advised that waste disposal containers and bins be provided during the construction phase for all dilapidates, rubble and general waste; - Active dust suppression must be undertaken; - The future WRDs must be planned in such a way as to help maximise rehabilitation and habitat restoration post mining. Suitable designing and dumping of waste rock during the operational phase will help limit post closure costs and time as the WRD will not have to be significantly reshaped; - The base of the WRDs should be revegetated and monitored. This will help trap sediment runoff, promote natural vegetation re-establishment, provide a vegetated buffer between the WRD and the surrounding natural areas and help limit alien plant proliferation in these areas. - If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder faunal rehabilitation later down the line. Spill kits should be kept on site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised preventing the ingress of hydrocarbons into the topsoil; - No hunting/trapping or collecting of faunal species is allowed; - No informal fires by construction personnel are allowed; and - Smaller species of invertebrates and reptiles are likely to be less mobile during the colder period, as such should any be observed in the footprint areas during clearing and operational activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Operational personnel are to be educated about these species and the need for their conservation. Harmless reptiles should be carefully relocated by a suitably nominated construction person or nominated mine official. For larger venomous snakes, a suitably trained mine official should be contacted to affect the relocation of the species, should it not move off on its own. 	
Fauna SCC	
<ul style="list-style-type: none"> - No collection of faunal SCCs may be allowed by mining personnel; and - In the unlikely event that a faunal SCC be found, and should it not relocate outside of the disturbance area itself, it should be relocated by a suitably qualified specialist once the appropriate permits have been obtained. 	
Project phase	DECOMMISSIONING AND CLOSURE PHASE
Impact Summary	Loss of faunal habitat, species and faunal SCC
Proposed mitigatory and management measures:	
Development footprint	
<ul style="list-style-type: none"> - No additional habitat is to be disturbed during the Decommissioning & Rehabilitation Phase; - No vehicles are allowed to indiscriminately drive through undisturbed habitat and natural areas; - No dumping of litter must be allowed on-site; and - Edge effects must be continually monitored and controlled, notably erosion and alien plant proliferation. 	



Rehabilitation

- All mining footprints that will be decommissioned should be concurrently rehabilitated in accordance with a rehabilitation plan compiled by a suitable specialist;
- Where needed, the WRDs should be re-sloped and profiled in order to give them a more natural profile that not only fits in with the landscape, but which also allows for the establishment of a diversity of plants and faunal species. In the regard, the WRD should be designed to have terraces and troughs so as to create areas of unique plant growth and faunal habitat;
- Stormwater must be suitably managed so that surface water runoff is captured on the WRD and not simply discharged down the slope;
- All soils compacted because of construction activities falling outside of the project area should be ripped and profiled. Special attention should be paid to alien and invasive control within these areas;
- Any natural areas beyond the direct footprint, which have been affected by the mining activities, must be rehabilitated using indigenous species;
- All rehabilitated areas should be rehabilitated to a point where natural processes will allow the ecological functioning and biodiversity of the area to be re-instated as per the post-closure land-use objective; and
- Rehabilitation efforts must be implemented for a period of at least five years after decommissioning. A mix of indigenous grass seeds can be used during rehabilitation activities.

6. CONCLUSION

STS was appointed to conduct a Biodiversity Assessment as part of the EIA phase in support of obtaining EA for the proposed expansion of the Tharisa Mine WRDs. The proposed activities associated with the Tharisa Mine expansion, that will take place within the study area, will include the following:

1. Extending a previously approved WRD – referred to as the “West Above Ground WRD”; and
2. Establishing a WRD above backfilled portions of the East and West pits – referred to as the “East Above Ground WRD”.

During the field assessment, a single habitat unit within the study area was identified, namely Transformed Habitat. This habitat unit, from a faunal perspective, is deemed to be of **low sensitivity** due to its degraded nature. During the site assessment, no faunal SCC were observed. Following the assessment of the available habitat, it was further established that it is unlikely that the study area will support any SCC given its degraded nature, lack of suitable habitat and proximity to active mining areas.

Following the biodiversity assessment within the study area, the impacts associated with the proposed WRDs were determined. Prior to mitigation measures the i) Mining (i.e., Construction and Operational) Phase and iii) Decommissioning & Rehabilitation Phase scored an impact significance as follows:

- Mining Phase: The impact significance ranged between medium and very low; and
- Decommissioning & Rehabilitation Phase: The impact significance ranged between medium and insignificant.



With mitigation measure implemented, the direct and indirect impacts on the faunal ecology for the study area may be reduced to very low or insignificant levels for all phases associated with the proposed WRDs expansion.

It is the opinion of the ecologists that this study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development.



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APPENDIX A: Faunal Method of Assessment

It is important to note that due to the nature and habits of fauna, varied stages of life cycles, seasonal and temporal fluctuations along with other external factors, it is unlikely that all faunal species will have been recorded during the site assessment. The presence of anthropogenic activities near the study area may have an impact on faunal behaviour and in turn the rate of observations. In order to increase overall observation time within the study area, as well as increasing the likelihood of observing shy and hesitant species, Sherman traps were strategically placed within the study area. Sherman traps were used to increase the likelihood of capturing and observing small mammal species, notably small nocturnal mammals.

Mammals

Mammal species were recorded during the field assessment with the use of visual identification, spoor, call and dung. Specific attention was given to mammal SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (IUCN).

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 in order 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 IUCN.

Reptiles

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

Amphibians

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

Invertebrates

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

Arachnids

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



Faunal Species of Conservation Concern Assessment

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 Habitat Sensitivity

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

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

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



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

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



APPENDIX B: Faunal SCC

Faunal Species of Conservation Concern

Table B1: Mammal species of conservation concern in the North West Province (NW BSP, 2015).

Scientific Name	Common Name	Friedmann & Daly (2004)	IUCN Status	POC
<i>Acinonyx jubatus</i>	Cheetah	VU	VU	Low
<i>Atelerix frontalis</i>	African Hedgehog	NT	LC	Low
<i>Ceratotherium simum</i>	White Rhino	LC	NT	Low
<i>Chrysospalax villosus</i> *	Rough-haired golden mole*	CR	VU	Low
<i>Cloeotis percivali</i>	Short-eared trident bat	CR	LC	Low
<i>Crocuta crocuta</i>	Spotted Hyena	NT	LC	Low
<i>Damaliscus lunatus</i>	Tsessebe	EN	LC	Low
<i>Dasymys incomtus</i>	African Marsh Rat	NT	LC	Low
<i>Diceros bicornis minor</i>	Black Rhinoceros	CR	CR	Low
<i>Eidolon helvum</i>	Straw-Coloured Fruit Bat	NT	NT	Low
<i>Felis nigripes</i>	Black-Footed Cat	LC	VU	Low
<i>Hippopotamus amphibius</i>	Hippo	LC	VU	Low
<i>Hippotragus equinus</i>	Roan Antelope	VU	LC	Low
<i>Hippotragus niger</i>	Sable Antelope	VU	LC	Low
<i>Hyaena brunnea</i>	Brown Hyena	NT	NT	Low
<i>Leptailurus serval</i>	Serval	NT	LC	Low
<i>Loxodonta africana</i>	African Savanna Elephant	LC	VU	Low
<i>Lutra (Hydricis) maculicollis</i>	Spotted-necked otter	NT	NT	Low
<i>Lycaon pictus</i>	African Wild dog	EN	EN	Low
<i>Mellivora capensis</i>	Honey Badger	NT	LC	Low
<i>Miniopterus schreibersii</i>	Shreibers' Long-Fingered Bat	NT	NT	Low
<i>Myotis tricolor</i>	Temminck's Hairy Bat	NT	LC	Low
<i>Mystromys albicaudatus</i>	White-tailed mouse	EN	VU	Low
<i>Ourebia ourebi</i>	Oribi	EN	LC	Low
<i>Panthera leo</i>	Lion	LC	VU	Low
<i>Panthera pardus</i>	Leopard	LC	VU	Low
<i>Pelea capreolus</i>	Grey Rhebok	LC	LC	Low
<i>Pipistrellus rusticus</i>	Rusty Pipistrelle	NT	LC	Low
<i>Poecilogale albinucha</i>	African Striped Weasel	DD	LC	Low
<i>Redunca arundinum</i>	Southern Reedbuck	LC	LC	Low
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	NT	LC	Low
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	NT	LC	Low
<i>Rhinolophus denti</i>	Dent's Horseshoe Bat	NT	LC	Low
<i>Smutsia temminckii</i>	Ground Pangolin	VU	VU	Low

CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, DD = Data Deficient; LC = Least Concern

* This species was previously listed in the North West Province Environmental Outlook Report of 2008 (NW DACE, 2008). The NW BSP states that an on the ground effort is required to determine whether any golden moles are present within the province.



Table B2: Avifaunal species of conservation concern in the North West Province (NWBP, 2015).

Scientific name	Common name	Provincial (2012)	IUCN Status	POC
<i>Alcedo semitorquata</i>	Half-collared Kingfisher	NT	LC	Low
<i>Anastomus lamelligerus</i>	African Openbill Stork	NT	LC	Low
<i>Anthropoides paradiseus</i>	Blue Crane	VU	VU	Low
<i>Aquila rapax</i>	Tawny Eagle	VU	LC	Low
<i>Ardeotis kori</i>	Kori Bustard	VU	NT	Low
<i>Buphagus erythrorhynchus</i>	Red-billed Oxpecker	NT	LC	Low
<i>Certhilauda chuana</i>	Short-clawed Lark	NT	LC	Low
<i>Charadrius pallidus</i>	Chestnut-banded Plover	NT	NT	Low
<i>Ciconia nigra</i>	Black Stork	NT	LC	Low
<i>Circus macrourus</i>	Pallid Harrier	NT	NT	Low
<i>Circus maurus</i>	Black Harrier	NT	VU	Low
<i>Circus ranivorus</i>	African Marsh Harrier	VU	LC	Low
<i>Ephippiorhynchus senegalensis</i>	Saddle-billed Stork	EN	LC	Low
<i>Eupodotis senegalensis</i>	White-bellied Korhaan	VU	LC	Low
<i>Falco biarmicus</i>	Lanner Falcon	NT	LC	Low
<i>Falco naumanni</i>	Lesser kestrel	VU	LC	Low
<i>Falco peregrinus</i>	Peregrine Falcon	NT	LC	Low
<i>Glareola nordmanni</i>	Black-winged Pratincole	NT	NT	Low
<i>Gorsachius leuconotus</i>	White-backed Night Heron	VU	LC	Low
<i>Gyps africanus</i>	African White-backed Vulture	VU	CR	Low
<i>Gyps coprotheres</i>	Cape Vulture	VU	EN	Low
<i>Hieraaetus ayresii</i>	Ayres's Eagle	NT	LC	Low
<i>Leptoptilos crumeniferus</i>	Marabou Stork	NT	LC	Low
<i>Mirafra cheniana</i>	Melodious Lark	NT	LC	Low
<i>Mycteria ibis</i>	Yellow-billed Stork.	NT	LC	Low
<i>Neotis denhami</i>	Denhams Bustard	VU	NT	Low
<i>Pelecanus onocrotalus</i>	Great White Pelican	NT	LC	Low
<i>Pelicanus rufescens</i>	Pink-backed Pelican	VU	LC	Low
<i>Phoenicopterus minor</i>	Lesser Flamingo	NT	NT	Low
<i>Phoenicopterus ruber</i>	Greater Flamingo	NT	LC	Low
<i>Podica senegalensis</i>	African Finfoot	VU	LC	Low
<i>Polemaetus bellicosus</i>	Martial Eagle	VU	EN	Low
<i>Pterocles gutturalis</i>	Yellow-throated Sandgrouse	NT	LC	Low
<i>Rostratula benghalensis</i>	Greater Painted Snipe	NT	LC	Low
<i>Rynchops flavirostris</i>	African Skimmer	Regionally EX	NT	Low
<i>Sagittarius serpentarius</i>	Secretarybird	NT	VU	Low
<i>Sterna caspia</i>	Caspian Tern	NT	LC	Low
<i>Terathopius ecaudatus</i>	Bataleur	VU	NT	Low
<i>Torgos tracheliotus</i>	Lappet-faced Vulture	VU	EN	Low
<i>Tyto capensis</i>	African Grass Owl	VU	LC	Low

CR = Critically endangered; EN = Endangered; VU = Vulnerable, NT = Near Threatened, EX = Extinct, LC = Least concern,



Table B3: Reptile species of conservation concern in the North West Province (NW BSP, 2015).

Scientific name	Common name	Power & Verbugt (2014)	IUCN Status	POC
<i>Chamaesaura aenea</i>	Coppery Grass Lizard	NT	NYBA	Low
<i>Crocodylus niloticus</i>	Nile Crocodile	VU	LC	Low
<i>Homoroselaps dorsalis</i>	Striped Harlequin snake	NT	LC	Low
<i>Python natalensis</i>	Southern African Python	LC	NYBA	Low

NT = Near Threatened, VU = Vulnerable; NYBA= Not Yet Been Assessed, LC = Least Concern

Table B4: Amphibian species of conservation concern in the North West Province (NW BSP, 2015).

Scientific Name	Common Name	Power & Verbugt (2014)	IUCN Status	POC
<i>Pyxicephalus adspersus</i>	African Giant Bullfrog	NT	LC	Low

NT = Near Threatened, LC = Least Concern

Table B5: Arachnid species of conservation concern in the North West Province (NW BSP, 2015).

Scientific name	Common Name	IUCN Status	POC
<i>Aelurillus cristatopalpus</i>	Jumping Spiders	NYBA	Low
<i>Afromarengo bimaculata</i>	Jumping Spiders	NYBA	Low
<i>Ariadna similis</i>	Jack-in-a-box Spiders	NYBA	Low
<i>Austrachelas merwei</i>	Corrinid Sac Spider	NYBA	Low
<i>Cyatholipus isolatus</i>	Spotted Tree Sheet-web Spiders	NYBA	Low
<i>Diores femoralis</i>	Zodariid Ground Spiders	NYBA	Low
<i>Diphya simoni</i>	Long-jawed Orb Weavers	NYBA	Low
<i>Eusparassus borakalalo</i>	Huntsman Spiders	NYBA	Low
<i>Evarcha flagellaris</i>	Jumping Spiders	NYBA	Low
<i>Galeosoma coronatum</i>	Armoured Trapdoor Spiders	NYBA	Low
<i>Galeosoma crinitum</i>	Armoured Trapdoor Spiders	NYBA	Low
<i>Galeosoma scutatum</i>	Armoured Trapdoor Spiders	NYBA	Low
<i>Idiops pallus</i>	Armoured Trapdoor Spiders	NYBA	Low
<i>Langona manicata</i>	Jumping Spiders	NYBA	Low
<i>Pseudicius gracilis</i>	Jumping Spiders	NYBA	Low
<i>Rhene konradi</i>	Jumping Spiders	NYBA	Low
<i>Setaphis sexmaculata</i>	Ground Spiders	NYBA	Low

NYBA = Not Yet Been Assessed

Table B6: Threatened invertebrate species of North West Province (NW DACE, 2008).

Scientific name	Common Name	NW Status 2008	IUCN Status	POC
<i>Lepidochrysops hypopolia</i>	Morant's blue	EX	EX	Low
<i>Lepidochrysops praeterita</i>	Highveld Blue	EN	NYBA	Low
<i>Metisella meninx</i>	Marsh Sylph	VU	NYBA	Low
<i>Platylesches dolomitica</i>	Hilltop Hopper	VU	NYBA	Low

EN = Endangered, VU = Vulnerable, EX=Extinct, NYBA= Not Yet Been Assessed



Table B7: Red Data faunal species listed in the Transvaal Nature Conservation Ordinance, 1983 (Act No. 12 of 1983).

Schedule 2A (Protected Game)			
Reptiles and Mammals			
Scientific Name	Common Name	South African (RSA) Red List Status	POC
<i>Pyxicephalus adspersus</i>	Bullfrog	NT (EWT)	Low
<i>Varanus niloticus</i> , <i>Varanus Albigularis</i> and all species of the Sub Order <i>Serpentes</i>	All species of reptiles excluding the water 32orcas32, rock 32orcas32 and all species of snakes	Varied	Low
<i>Atelerix frontalis</i>	Southern African Hedgehog	NT	Low
<i>Cercopithecus albogularis</i>	Samango monkey	VU	Low
<i>Otolemur crassicaudatus</i>	Thick-tailed Greater Bushbaby	LC	Low
<i>Galago moholi</i>	Night ape/Lesser Bushbaby	LC	Low
<i>Manis/Smutsia temminckii</i>	Ground Pangolin	VU	Low
<i>Proteles cristatus</i>	Aardwolf	LC	Low
<i>Hyaena brunnea</i>	Brown hyaena	NT	Low
<i>Orycteropus afer</i>	Antbear	LC	Low
<i>Equus zebra zebra</i>	Cape Mountain zebra	LC	Low
<i>Equus zebra</i>	Hartmann's zebra	VU	Low
<i>Hippopotamus amphibius</i>	Hartmannae hippopotamus	LC	Low
<i>Giraffa camelopardalis</i>	Giraffe	LC	Low
<i>Tragelaphus angasi</i>	Nyala	LC	Low
<i>Tragelaphus oryx</i>	Common Eland	LC	Low
<i>Cephalophus natalensis</i>	Red duiker	NT	Low
<i>Philantomba monticola</i>	Blue duiker	VU	Low
<i>Redunca arundinum</i>	Southern Reedbuck	LC	Low
<i>Redunca fulvorufula</i>	Mountain reedbuck	EN	Low
<i>Kobus ellipsiprymnus</i>	Waterbuck	LC	Low
<i>Hippotragus niger</i>	Sable antelope	VU	Low
<i>Hippotragus equinus</i>	Roan antelope	EN	Low
<i>Oryx gazella</i>	Gemsbok	LC	Low
<i>Connochaetes gnou</i>	Black wildebeest	LC	Low
<i>Alcelaphus buselaphus</i>	Red hartebeest	LC	Low
<i>Damaliscus 32orcas dorcas</i>	Bontebok	LC	Low
<i>Damaliscus lunatus</i>	Tsessebe	LC	Low
<i>Oreotragus oreotragus</i>	Klipspringer	LC	Low
<i>Ourebia ourebi</i>	Oribi	EN	Low
<i>Raphicerus campestris</i>	Steenbok	LC	Low
<i>Raphicerus sharpei</i>	Sharpe's grysbok	LC	Low
<i>Neotragus moschatus</i>	Suni	EN	Low
<i>Pelea capreolus</i>	Grey Rhebuck	NT	Low
Birds – any wild bird excluding a) bird which is ordinary game (as listed below)			
<i>Plectropterus gambensis</i>	Spur-winged goose	LC	Low
<i>Alopochen aegyptiacus</i>	Egyptian goose	LC	Low
<i>Anas undulata</i>	Yellow-billed duck	LC	Low



<i>Anas erythrorhyncha</i>	Red-billed teal	LC	Low
<i>Peliperdix coqui</i>	Coqui francolin	LC	Low
<i>Dendroperdix sephaena</i>	Crested francolin	LC	Low
<i>Scleroptila afra</i>	Grey-winged francolin	LC	Low
<i>Scleroptila shelleyi</i>	Shelley's francolin	LC	Low
<i>Scleroptila levaillantii</i>	Red-winged francolin	LC	Low
<i>Scleroptila levaillantoides/gutturalis</i>	Orange River francolin	LC	Low
<i>Pternistis adspersus</i>	Red-billed spurfowl	LC	Low
<i>Pternistis natalensis</i>	Natal spurfowl	LC	Low
Birds – any wild bird excluding b) Schedule 3 Ordinary game as per the following list			
<i>Phalacrocorax lucidus</i>	White-breasted cormorant	LC	Low
<i>Phalacrocorax africanus</i>	Reed cormorant	LC	Low
<i>Streptopelia semitorquata</i>	Red-eyed turtle dove	LC	Low
<i>Streptopelia capicola</i>	Cape turtle dove	LC	Low
<i>Streptopelia senegalensis</i>	Laughing dove	LC	Low
<i>Family colidae</i>	All species of mousebirds	LC	Low
<i>Corvus albus</i>	Pied crow	LC	Low
<i>Corvus capensis</i>	Cape crow	LC	Low
<i>Pycnonotus nigricans</i>	Red-eyed bulbul	LC	Low
<i>Pycnonotus barbatus</i>	Black-eyed bulbul	LC	Low
<i>Onychognathus morio</i>	Red-winged starling	LC	Low
<i>Passer melanurus</i>	Cape sparrow	LC	Low
<i>Ploceus cucullatus</i>	Village weaver	LC	Low
<i>Ploceus capensis</i>	Cape weaver	LC	Low
Schedule 2A (Specially Protected Game)			
<i>Loxodonta africana</i>	Elephant	LC	Low
All species of the Family Rhinocerotidae	All species of rhinoceros	NT-CR	Low
Schedule 4 (Protected Wild animals)			
<i>Lycaon pictus</i>	Wild dog	EN	Low
<i>Acinonyx jubatus</i>	Cheetah	VU	Low
<i>Panthera pardus</i>	Leopard	VU	Low
<i>Panthera leo</i>	Lion	LC	Low
<i>Syncerus caffer</i>	African buffalo	LC	Low
Schedule 7 (Invertebrate species)			
<i>Ceratogyrus</i> spp. & <i>Harpactira</i> spp.	All species of baboon spiders belonging to:	Species specific	Low
<i>Pterinochilus</i> spp.	The genera	Species specific	Low
<i>Poecilmitis aureus</i>	Golden copper butterfly	EN	Low
<i>Charaxes</i> spp.	All species of charaxes (emperor butterflies)	Species specific	Low
<i>Aloeides dentatis dentatis</i>	Scarce copper butterfly	VU	Low

R = Rare; NYBA = Not Yet Been Assessed by the IUCN



Table B8: NEMBA TOPS list (2007) of all faunal SCC that require a permit should they need to be relocated as a result of the proposed mining activities and activities and its activities.

Scientific Name	Common Name
CRITICALLY ENDANGERED SPECIES	
REPTILIA	
<i>Caretta caretta</i>	Loggerhead Sea Turtle
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle
<i>Eretmochelys imbricate</i>	Hawksbill Sea Turtle
AVES	
<i>Grus carunculatus</i>	Wattled Crane
<i>Hirundo atrocaerulea</i>	Blue Swallow
<i>Neophron percnopterus</i>	Egyptian Vulture
<i>Poicephalus robustus</i>	Cape Parrot
MAMMALIA	
<i>Bunolagus monticularis</i>	Riverine Rabbit
<i>Chrysospalax</i>	Rough-haired Golden Mole
ENDANGERED SPECIES	
REPTILIA	
<i>Chelonia mydas</i>	Green Turtle
<i>Cordylus giganteus</i>	Giant Girdled Lizard
<i>Lepidochelys olivacea</i>	Olive Ridley Turtle
<i>Psammobates geometricus</i>	Geometric Tortoise
AVIFAUNA	
<i>Anthropoides paradiseus</i>	Blue Crane
<i>Balearica regulorum</i>	Grey Crowned Crane
<i>Ephippiorhynchus senegalensis</i>	Saddle-billed Stork
<i>Gypaetus barbatus</i>	Bearded Vulture
<i>Gyps africanus</i>	White-backed Vulture
<i>Gyps coprotheres</i>	Cape Vulture
<i>Necrosyrtes</i>	Hooded Vulture
<i>Pelecanus rufescens</i>	Pink-backed Pelican
<i>Scotopelia peli</i>	Pel's Fishing Owl
<i>Torgos tracheliotus</i>	Lappet-faced Vulture
MAMMALIA	
<i>Amblysomus robustus</i>	Robust Golden Mole
<i>Damaliscus tunatus</i>	Tsessebe
<i>Diceros bicornis</i>	Black Rhinoceros
<i>Equus zebra</i>	Mountain Zebra
<i>Lycaon pictus</i>	African Wild Dog
<i>Neamblysomus gunningi</i>	Gunning's Golden Mole
<i>Ourebia ourebi</i>	Oribi
<i>Paraxerus palliatus</i>	Red Squirrel
<i>Petrodromus tetradactylus</i>	Four-toed Elephant-shrew
INVERTEBRATA	
<i>Colophon spp – species</i>	Stag Beetles
VULNERABLE SPECIES	
AVES	
<i>Trionoceph occipitalis</i>	White-headed Vulture
<i>Aquila rapax</i>	Tawny Eagle
<i>Ardeotis kori</i>	Kori Bustard
<i>Ciconia nigra</i>	Black Stork
<i>Circaetus fasciolatus</i>	Southern Banded Snake Eagle
<i>Eupodotis caerulescens</i>	Blue Korhaan
<i>Falco fasciinucha</i>	Falcon
<i>Falco naumanni</i>	Lesser Kestrel
<i>Falco peregrinus</i>	Peregrine Falcon



Scientific Name	Common Name
<i>Geronticus calvus</i>	Bald Ibis
<i>Neotis ludwidgei</i>	Ludwig's Bustard
<i>Polemaetus bellicosus</i>	Martial Eagle
<i>Terathopius ecaudatus</i>	Bateleur
<i>Tyto capensis</i>	Grass Owl
MAMMALIA	
<i>Acinonyx jubatus</i>	Cheetah
<i>Chrysospalax trevelyani</i>	Giant Golden Mole
<i>Cricetomys gambianus</i>	Giant Rat
<i>Damaliscus pyrgorgus pygargus</i>	Bontebok
<i>Dendrohyrax arboreus</i>	Tree Hyrax
<i>Hippotragus equinus</i>	Roan Antelope
<i>Pholidota temminckii</i>	Pangolin
<i>Neamblysomus julianae</i>	Juliana's Golden Mole
<i>Neotragus moschatus</i>	Suni
<i>Panthera leo</i>	Lion
<i>Panthera pardus</i>	Leopard
<i>Philantomba monticola</i>	Blue Duiker
INVERTEBRATA	
<i>Peripatopsis alba</i>	White Cave Velvet Worm
PROTECTED SPECIES	
AMPHIBIA	
<i>Pyxicephalus adspersus</i>	Giant Bullfrog
<i>Pyxicephalus edulis</i>	African Bullfrog
REPTILIA	
<i>Bitis gabonica</i>	Gaboon Adder
<i>Bitis schneideri</i>	Namaqua Dwarf Adder
<i>Bradypodion taeniabronchum</i>	Smith's Dwarf Chameleon
<i>Cordylus cataphractus</i>	Girdled Lizard
<i>Crocodylus niloticus</i>	Nile crocodile
<i>Python natalensis</i>	African Rock Python
AVES	
<i>Bucowus leadeateri</i>	Southern Ground-Hornbill
<i>Circus ranivorus</i>	African Marsh Harrier
<i>Neotis denhami</i>	Denham's Bustard
<i>Spheniscus</i>	Jackass Penguin
MAMMALIA	
<i>Atelerix frontalis</i>	South African Hedgehog
<i>Ceratotherium simum</i>	White Rhinoceros
<i>Connochaetes</i>	Black Wildebeest
<i>Crocuta crocuta</i>	Spotted Hyaena
<i>Felis nigripes</i>	Black-footed Cat
<i>Parahyaena brunnea</i>	Brown Hyaena
<i>Leptailurus serval</i>	Serval
<i>Loxodonta africana</i>	African elephant
<i>Lutra maculicollis</i>	Spotted-necked Otter
<i>Millivora capensis</i>	Honey Badger
<i>Raphicerus sharpei</i>	Sharpe's Grysbok
<i>Redunca</i>	Reedbuck
<i>Vulpes chama</i>	Cape Fox
INVERTEBRATA	
<i>Aloeides clarki</i>	Coega Copper Butterfly
<i>Echinodiscus bisperforatus</i>	Pansy Shell
<i>Dromica spp – All species</i>	Tiger Beetles
<i>Graphipterus assimilis</i>	Velvet Ground Beetle



Scientific Name	Common Name
<i>Hadogenes spp -species</i>	Flat Rock Scorpions
<i>Opisthacanthus spp – All species</i>	Creeping Scorpions
<i>Opisththalmus spp – All species</i>	Burrowing Scorpions
<i>Haliotis midae</i>	South African Abalone
<i>Harpactira spp – All species</i>	Common Baboon Spiders
<i>Ceratogyrus spp – All species</i>	Horned Baboon Spiders
<i>Pterinochilus spp – All species</i>	Golden Baboon Spiders
<i>Ichneostoma – Aspecies</i>	Fruit Chafer Beetles
<i>Manticora spp – Aspecies</i>	Monster Tiger Beetles
<i>Megacephala asperata</i>	Tiger Beetle
<i>Megacephala regalis</i>	Tiger Beetle
<i>Nigidius auriculatus</i>	Stag beetle
<i>Oonotus adspersus</i>	Stag Beetle
<i>Oonotus interioris</i>	Stag Beetle
<i>Oonotus rex</i>	Stag Beetle
<i>Oonotus sericeus</i>	Stag Beetle
<i>Platychile pallida</i>	Tiger Beetle
<i>Prosopocoilus petitclerci</i>	Stag Beetle
<i>Prothyma guttipennis</i>	Tiger Beetle

Table B9: Faunal SCC according to the DFFE National Web-based screening tool and the ground-truthed POC of each species within the study area, following the field assessment

Scientific Name	Common Name	RSA Red List Status	POC
<i>Chrysospalax villosus</i>	Rough-haired Golden Mole	VU	Low
<i>Crocidura maquassiensis</i>	Maquassie Musk Shrew	VU	Low
<i>Dasymys robertsii</i>	African Marsh Rat	VU	Low
<i>Sagittarius serpentarius</i>	Secretary Bird	VU	Low



APPENDIX C: Faunal Species List

Table C1: Mammal species that may make use of the study area.

Observed during the field assessment		
Scientific Name	Common Name	National Red List Status
<i>Lemniscomys rosalia</i>	Single-striped Mouse	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC
<i>Procavia capensis</i>	Cape Rock Hyrax	LC
<i>Rhodomys pumilio</i>	Xeric Four-striped Mouse	LC

LC = Least Concern

Table C2: Avifauna species observed in the study area during the field assessment.

Scientific Name	Common Name	RSA Red List Status
<i>Merops bullockoides</i>	White-fronted Bee-eater	LC
<i>Saxicola torquatus</i>	African Stonechat	LC
<i>Ploceus velatus</i>	Southern Masked Weaver	LC
<i>Melaenornis silens</i>	Fiscal Flycatcher	LC
<i>Streptopelia capicola</i>	Cape Turtledove	LC
<i>Streptopelia senegalensis</i>	Laughing Dove	LC

LC = Least Concern

Table C3: Reptile likely to occur in the study area.

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

LC = Least Concern

Table C4: Amphibian species which may occur in the vegetated areas of the study area.

Scientific Name	Common Name	RSA Red List Status
<i>Schismaderma carens</i>	Red Toad	LC
<i>Sclerophrys garmani</i>	Olive Toad	LC
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC

LC = Least Concern

Table C5: Invertebrate species observed during the field assessment.

Scientific Name	Common Name	RSA Red List Status
OBSERVED DURING THE FIELD ASSESSMENT		
INSECTS		
<i>Gastrimargus</i> sp	Grasshopper	LC
<i>Eurema brigitta</i>	Broad-bordered Grass Yellow	LC
Family Mantidae	Common Mantids	LC
<i>Danaus chrysippus orientis</i>	African Plain Tiger	LC
<i>Papilio demodocus demodocus</i>	Citrus Swallowtail	LC
<i>Acrotylus</i> sp	Burrowing Grasshopper	LC

LC = Least Concern;

Table C6: Avifaunal Species for the pentads including and directly adjoining the study area: 2540_2725 and 2540_2730 within the QDS 2527CB & 2527DA.

Pentads	Link to pentad summary on the South African Bird Atlas Project 2 web page
2540_2725	http://sabap2.birdmap.africa/coverage/pentad/2540_2725
2540_2730	http://sabap2.birdmap.africa/coverage/pentad/2540_2730

