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BIODIVERSITY ASSESSMENT AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED KOLOMELA MINE EXPANSION NEAR POSTMASBURG, NORTHERN CAPE

Prepared for

EXM Environmental Advisory (Pty) Ltd

July 2021

Part C: Faunal Assessment

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Report Reference: STS 210024

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.

No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	Section in report/Notes
Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
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 development 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 development 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 development 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) **For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS ??)*
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: 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: *a) the reasons why an area has been identified as a CBA;* *b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;* *c) 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);* *d) the impact on ecosystem threat status;* *e) the impact on explicit subtypes in the vegetation;* *f) the impact on overall species and ecosystem diversity of the site; and* g) *the impact on any changes to threat status of populations of species of conservation concern in the CBA;*	**Part A**: Section 3 (desktop analysis) **Part B**: Section 3.1, 3.3, 5.3.3 **Part C:** Section 3, 4 & 5
2.3.7.2	Terrestrial Ecological Support Areas (ESAs), including:	

No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	Section in report/Notes
	a) the impact on the ecological processes that operate within or across the site; *b) the extent the proposed development will impact on the functionality of the ESA; and* c) *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;*	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including- *a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;*	**Part A**: Section 3 (desktop analysis) However, not applicable as no protected areas or areas of conservation concern are within 10 km of the proposed project,
2.3.7.4	Priority areas for protected area expansion, including- *a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;*	**Part A**: Section 3 (desktop analysis)
2.3.7.5	SWSAs including: *a) the impact(s) on the terrestrial habitat of a SWSA; and* b) *the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);*	Not Applicable
2.3.7.6	FEPA sub catchments, including- *a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;*	Not Applicable
2.3.7.7	Indigenous forests, including: *a) impact on the ecological integrity of the forest; and* b) *percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.*	Not Applicable
2.4	**The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.**	
	Part B: Results of the **Floral Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities. **Part C:** Results of the **Faunal Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities.	
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 3.1.7 Additional environmental impacts expected from the proposed development; 3.1.8 Any direct, indirect and cumulative impacts of the proposed development; 3.1.9 The degree to which impacts and risks can be mitigated; 3.1.10 The degree to which the impacts and risks can be reversed; 3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources; 3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	**Part B:** Section 5 (flora) **Part C:** Section 5 (fauna)
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 development, if it should receive approval or not; and	**Part A:** Executive summary **Part B:** Section 6 (flora) **Part C:** Section 6 (fauna)

No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	Section in report/Notes
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

AIP	Alien Invasive Plant
BGIS	Biodiversity Geographic Information Systems
CR	Critically Endangered
DFFE	Department of Forestry, Fisheries and the Environment
EAP	Environmental Assessment Practitioner
EIS	Ecological Importance and Sensitivity
EN	Endangered
EW	Extinct in the Wild
GIS	Geographic Information System
GPS	Global Positioning System
IBA	Important Bird Area
IEM	Integrated Environmental Management
IUCN	International Union for Conservation of Nature and Natural Resources
LC	Least Concern
NA	Not Applicable
NT	Near Threatened
NEMBA	National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)
NYBA	Not yet been assessed
MAMSL	Meters Above Mean Sea Level
P	Protected
PES	Present Ecological State
POC	Probability of Occurrence
PRECIS	Pretoria Computerised Information System
QDS	Quarter Degree Square
RDL	Red Data Listed
RE	Regionally Extinct
SABAP	Southern African Bird Atlas Project
SANBI	South Africa National Biodiversity Institute
SP	Specially Protected
STS	Scientific Terrestrial Services CC
SCC	Species of Conservation Concern
VU	Vulnerable

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.
Endangered	Organisms in danger of extinction if causal factors continue to operate.
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.
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.
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.
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.

1. INTRODUCTION

1.1. Background

Scientific Terrestrial Services CC (STS) was appointed to conduct a Biodiversity Assessment as part of the Environmental Authorisation (EA) process for the proposed expansion activities at the Kolomela Mine, near Postmasburg, Northern Cape Province, henceforth referred to as the "assessment area". For the purpose of this report reference will be made to both the assessment area and the focus area. The assessment area includes the proposed infrastructure for the Kolomela Mine. The areas assessed by STS during the field assessment, which focused on portions of the proposed infrastructure, is referred to as the focus area.

The Sishen Iron Ore Company (Pty) Ltd, part of Kumba Iron Ore Limited (hereafter referred to as Kumba), owns and operates Kolomela Mine located approximately 8 km southwest of Postmasburg in the Tsantsabane Local Municipality, Northern Cape Province. The Kolomela Mine is located within the Tsantsabane Local Municipality which is an administrative area in the ZF Mgcawu District Municipality of the Northern Cape. The extent of the Kolomela Mine Expansion is located in Figures 1, 5, 6, 7 and 8.

The Minister of Mineral Resources granted a mining right for the mining of iron ore at Kolomela Mine on the 5th of May 2008, (Ref: (NC) 069 MR) and is valid until the 17th of September 2038, unless cancelled or suspended.

Kolomela Mine operates as a conventional open cast mine where ore is extracted by means of drilling, blasting, loading, and hauling. Ore extracted from the pits is transported to a direct shipping ore (DSO) plant which involves the crushing and screening of recovered ore material into stockpiles of 'lump' and 'fines'. The processed iron ore is loaded onto an internal railway line which is connected to a direct rail link to Transnet's Sishen-Saldanha railway line from where the iron ore is transported to the Port of Saldanha for export. Kolomela Mine also utilises a Modular Dense Media Separation (DMS) Processing Plant for the processing of low-grade ore not suitable for processing at the DSO plant. Kolomela produced 10.8 million tonnes during its first full year of production in 2013 and currently produces 13-14 million tonnes per annum (Mtpa) facilitated by enhanced stripping techniques and processing of 1-3 Mtpa of lower grade of ore at the Tierbult DMS Modular Plant.

Iron ore is currently extracted from three opencast pits, namely Klipbankfontein, Leeuwfontein and Kapstevel North. The Kolomela Mine is in the process of developing the Kapstevel South

Pit which is required to sustain the mining production at approximately 14 Mtpa (Mtpa) until 2031. The current the Life of Mine (LoM) including the Kapstevel South Pit currently stands until 2032, but with the potential to be extended in future with the development of the Ploegfontein, Tierbult and Heuningkranz ore bodies, the mining of which are already authorised.

Kolomela proposes to expand and amend some of the existing activities and develop new infrastructure to support continued and future production at the mine. This includes:

- Amendment of the Kapstevel South Pit footprint area.
- Amendment of the Kapstevel Waste Rock Dumps and haul roads.
- Amendment of Kapstevel Evaporation Ponds and stormwater management infrastructure.
- Additional park-up, laydown and ore stockpile areas.
- Development of new DMS tailings management infrastructure
- A new Photovoltaic Solar Facility.
- A new Waste Tyre Management Facility.
- A conveyor and railway line to transfer material to and from the DMS plant.
- Amendment to the future Kapstevel DMS conveyor footprint to facilitate widened haul roads.
- Amendment of Kapstevel Waste Rock Dumps and Additional Waste Rock Dumps.
- Additional Low Grade Ore Storage Areas.
- New radio masts.
- Provision for an area of relaxation and safety berms around pits.

The existing and planned infrastructure at Kolomela mine are shown in (Figure 1). Authorisation is thus being sought from the Department of Mineral Resources & Energy (DMRE) for activities listed under the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) as well as amendment of the environmental management programme in terms of Section 102 of the Minerals & Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

The purpose of this report is to define the faunal ecology of the focus 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 focus area. The objective of this study is:

- To provide inventories of faunal species as encountered within the focus area;

- To determine and describe habitat types, communities and the ecological state of the focus 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) and Species of Conservation Concern (SCC) assessment, including species as listed in the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (Government, Notice 389 of 2013), and the overall potential for such species to occur within the focus area;
- To provide detailed information as well as relevant mitigation measures that must be implemented to guide the proposed development activities associated with the focus area; and
- To ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements and the provision of ecological services in the local area.

1.2 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The faunal assessment is confined to the focus area and does not include the neighboring and adjacent properties. The entire assessment zone and immediate surroundings were, however, included in the desktop analysis of which the results are presented in **Part A: Section 3**;
- After the field assessment, minor alterations to the proposed project footprint were provided to the specialist. Although these areas were not specifically assessed in detail during the field assessment, the proponent provided recent photographs of the amended areas, which were used in conjunction with brief visual assessments of the areas in question whilst on site, to confidently extrapolate on the associated floral habitat;
- 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 and habits of most faunal taxa, it is unlikely that all species would have been observed during a field assessment of limited duration (during the winter

season). Therefore, site observations were compared with literature studies where necessary;

- Faunal surveys are most successful when undertaken during summer when most invertebrates are active and avian migrants are present. To confirm the absence or presence of many of these species within the site an additional summer survey would be necessary;
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the footprint area may therefore have been missed during the assessment; and
- As part of the assessment, a field investigation was undertaken from the 28th of June to the 2nd of July 2021 to determine the ecological status of the focus area and to "ground-truth" the results of the desktop assessment (as presented in Part A). On-site data was significantly augmented with all available desktop data and specialist experience in the area, and the findings of this assessment are considered to be an accurate reflection of the ecological characteristics associated with the locality of the focus area.

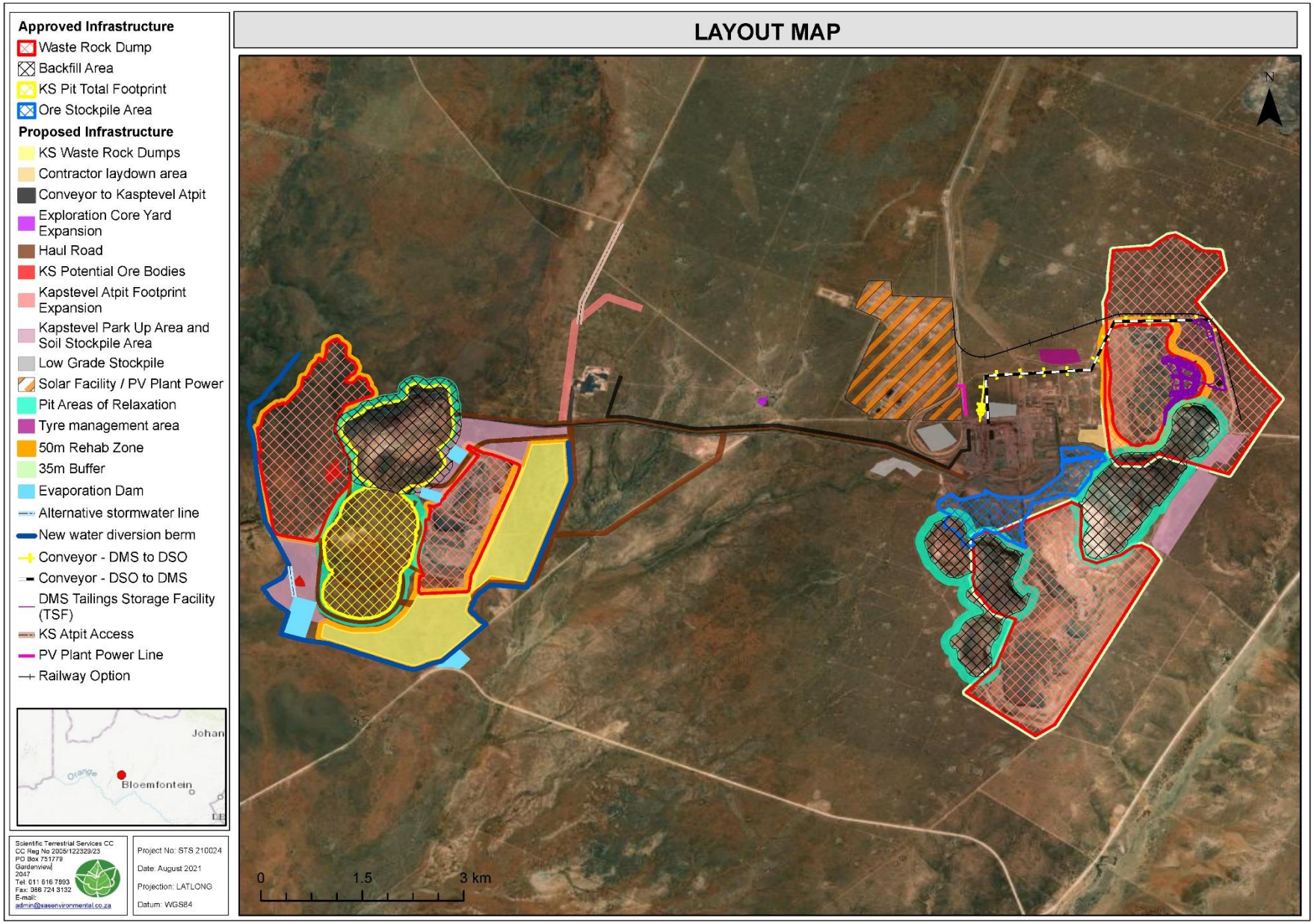


Figure 1: Conceptual illustration of the assessment zone, in which the focus area is situated, in relation to the surrounding areas.

2. ASSESSMENT APPROACH

The field assessment was undertaken from the 28th of June to the 2nd of July 2021 (Winter season), to determine the faunal ecological status of the focus area. The fieldwork was initially scheduled for the April (19th – 21st) and was initiated but cut short on the first day due to an incident on the mine which led to all contractors having to cease their work. The field investigation consisted of a reconnaissance 'walkabout' which was initially undertaken to determine the general habitat types found throughout the focus area, following this, specific study sites were selected that were considered to be representative of the habitats found within the focus 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 focus area. Sherman and camera traps were used to increase the likelihood of capturing and observing mammal species, 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 Appendix C of Part A of the study.

2.1 General approach

In order to accurately determine the PES of the focus 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 focus area was made in order to confirm the assumptions made during consultation of the digital satellite imagery;
- A literature review with respect to habitats, vegetation types and species distribution was conducted;
- Relevant databases considered during the assessment of the focus 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 Northern Cape Biodiversity Areas Database (2016) and the National Biodiversity Assessment (NBA, 2018) (refer to report provided in Part A);
- 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 focus 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 development 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 focus 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 focus area are indicated and briefly discussed within each of the relevant dashboards, along with their POC.

3. FAUNAL ASSESSMENT RESULTS

3.1 Faunal Habitat

Based on the results of the field investigation in June/July 2021, five broad habitat units were distinguished for the focus area:

1. **Thornveld Habitat:** This vegetation type was associated with deep red soils and was characterised by the presence of thorny woody species, particularity *Vachellia* and *Senegalia* species. Floral species diversity as well as habitat integrity ranged throughout the habitat unit. Different community compositions were supported within the habitat unit and as such, three subunits are recognised: (*Tarconanthus-Senegalia* Thornveld, *Senegalia* Thornveld and Thornveld Habitat). From a floral perspective dominant species separated the subunits as described below.

a. ***Tarconanthus-Senegalia Thornveld*:** this subunit consisted largely of open thornveld habitat that was dominated by *Senegalia mellifera* subsp. *detinens* and *Tarchonanthus camphoratus*. The grass layer was mostly continuous and dominated by species such as *Enneapogon cenchroides, Eragrostis echinochloidea, Eragrostis rigidior,* and *Schmidtia kalahariensis;*

b. ***Senegalia* Thornveld:** this subunit was largely dominated by *S. mellifera* subsp. *detinens*. Encroachment of *S. mellifera* subsp. *detinens* varied throughout the subunit, with some areas more encroached than others. As such, habitat integrity varied within this subunit. Overall species composition was the same throughout.

c. **Kalahari Thornveld Habitat:** this subunit was characterized by an open to semi-dense tree savanna interspaced by grassy plains. The subunit comprised of scattered *Vachellia erioloba* and *Boscia albitrucia* trees as well as other *Vachellia* and *Senegalia* species. Overall, the species diversity (particularly woody species) within this subunit was higher than the other Thornveld Habitat subunits. The grass layer was well developed and dominated by species such as *Aristida meridionalis*, *Enneapogon cenchroides, Eragrostis echinochloidea,* and *Schmidtia kalahariensis.*

From a faunal perspective these units comprised of similar mammal, avian and herpetofaunal assemblages. Invertebrate assemblages were hard to determine during the field investigation as it took place during the winter period. These subunits provided good grazing and browsing habitat for most faunal species. The variable habitat structure (trees and shrubs interspersed with grass) offers valuable shelter and foraging areas. The shrubs and trees provided valuable shelter for birds which were particularly abundant in this unit;

2. **Calcrete Habitat:** this habitat unit comprised largely of shallow, gravelly shrublands (in which the grass layer is poorly developed) which are mosaiced between shrubby grassland in which shrubs (particularly *Rhizogum trihotomum*) were present (and sometimes encroaching). The shallow, gravelly shrubland areas were characterized by small, scattered shrubs, including species such as *Hermannia comosa* and *Lacomucinaea lineata*, and succulent species, including *Ruschia calcarea*. Very little shelter for fauna was noted in this unit. The absence of trees and the lowered abundance reduces the value of this unit for browsers, concurrently limiting the available shelter for larger species. Grazing was abundant in this unit and sufficient biomass was noted for faunal forage.
3. **Moisture driven Habitat:** The Moisture-driven Habitat includes **watercourses** as delineated within the Freshwater Ecological Assessment (SAS 202147, 2021), and

includes cryptic wetlands, anthropogenic drainage lines and riverine habitat along linear drainage lines, but also includes **non-watercourse habitat** which is not considered true watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) (NWA), i.e., seasonal depressions. Different community compositions were supported within the habitat unit and as such, three subunits are recognised between the watercourse and non-watercourse habitats:

a. **Watercourse habitat:**
   i. Cryptic wetlands: pans considered to meet the classification as watercourses in the NWA (SAS 219099, 2021) with distinct vegetation communities considered to be key indicators of wetlands in arid regions. Throughout the focus area numerous pans are present that meet the definition of Cryptic Wetlands. These features are characterised by a rocky, bare or sparsely vegetated layer of vegetation normally surrounded by tree of shrubby vegetation.
   ii. Linear drainage line habitat: this subunit comprised part of areas typically associated with taller and denser woody species within the channel or immediately adjacent to it; and
   iii. Anthropogenic drainage line: these areas have been artificially created and support a range of species that have an affinity for wet conditions, including *Typha capensis*. Habitat integrity of this system has been largely impacted by neighbouring mining activities.

b. **Non-watercourse Habitat:**
   i. Seasonal depressions: these consisted of low-lying areas where water will preferentially flow or accumulate during rain events, but the floral communities lack wetland indicator vegetation (e.g., vegetation within the centre of the Seasonal Depressions especially differed from that of the Cryptic Wetlands).

The Moisture-driven Habitat comprises of cryptic wetlands, linear drainage lines, anthropogenic drainage lines and seasonal depressions. Understandably these features are dry for most of the year only filling up during high rainfall events. The cryptic wetlands and depressions offer unique habitat for waterfowl, invertebrates and amphibians while providing a water source for all fauna. The drainage lines tend to be more well wooded offering better browsing for herbivores and greater structural diversity which is often favoured by avifauna. Depressions are mostly surrounded by areas of increased bush or tree density with improved cover and browsing. The central portions of the depressions are grass and herb dominated or largely barren only providing limited forage. These habitats support the highest diversity and abundance

of avifauna and will also provide valuable habitat for water dependant fauna during high rainfall events.

4. **Mountain Bushveld:** this habitat unit consisted of a rolling hill with generally gentle to moderate slopes that were largely underlain by banded iron stone formations. The vegetation associated with this habitat unit was open bushveld with a well-developed grass layer providing valuable forage for fauna. Reptiles with an arboreal lifestyle as well as those species known to occur in rocky areas will find suitable habitat in this unit. The rocky nature of this habitat unit also provides sufficient burrows and basking locations for reptiles and invertebrates, particularly scorpions. Insects are likely to be abundant within this unit as trees and shrubs flower on mass.
5. **Transformed Habitat:** This habitat unit includes areas where vegetation is significantly degraded or entirely absent because of mining-related activities. This habitat has been severely impacted by anthropogenic activities and associated edge effects (e.g., dumping, AIP proliferation, and soil disturbance) which has resulted in the degradation of the unit and overall low species diversity. These areas do not favour habitation by fauna as a result of the disturbances to the habitat which have reduced forage and shelter availability.

Figure 5 - 8 below provide a visual representation of the above mentioned habitat units while Section 3.2 - 3.5 provide a dashboard report of the findings of each faunal class.

Biodiversity Management Units (BMU) have been previously identified for the Kolomela MRA (Omni Eko, 2019). For the purpose of aligning the current report with the Biodiversity Management Plan (BMP) (Omni Eko, 2019), we have indicated were the habitat units, as identified in this report, overlap the BMUs as previously identified in the BMP (Table 1 & Figures 2 - 4). It should be noted that the BMUs are broad and have been delineated as such to allow for practical implementation of fauna and flora management practices. The habitat units delineated by STS are more refined than that of the broad BMUs. As such, variations in the extent and distribution of STS's habitat units over the BMUs are expected. The BMUs may incorporate several different vegetation units as delineated by STS. Reasons justifying these overlaps are provided below (Table 1), although it should be noted that the more refined habitat units within the broad BMUs is not surprising.

Within the BMP, a Biodiversity Value (BV) has been assigned to each BMU to indicate the relative importance of each BMU for combined floral and faunal management intervention purposes. BV values are determined by a number of interacting factors, namely extent,

condition of the BMU, diversity within the BMU, functional status and ecological services provided by each BMU. BV values can be i) very high, ii) high, iii) moderate, or iv) low.

In this report, a floral and faunal sensitivity score has been assigned to each of the identified habitat units. This sensitivity score is determined by assessing

i. the propensity of a habitat unit to support SCC,
ii. ii) floral diversity,
iii. conservation status,
iv. habitat integrity, and
v. the presence of unique landscapes.

Sensitivity scores can thus be low, moderately low, intermediate, moderately high or high. The sensitivity of the study area for fauna was determined by considering five different parameters which influence faunal habitat, these include; the presence of faunal, habitat availability, food availability, faunal diversity and habitat integrity.

Differences in the BV values and the sensitivity scores for the habitat units as provided by STS are evident. The differences in these values are attributed to the following factors:

i. the BV values are based on the combined significance value of fauna and flora, whereas separate floral and faunal sensitivity scores have been provided for the habitat units provided by STS,
ii. differences in field assessments as well as the subjective discretion of different authors has resulted in differences in the delineated BMUs vs. habitat units,
iii. the broad scale approach to identifying BMUs vs the identification of habitat units as assessed in this report which was conducted at a smaller scale, thus resulting in more refined habitat unit delineations, and
iv. differences in methodologies used to assess and develop the BV values and the sensitivity scores has resulted in differences in the scores presented. Although differences exist between the BMUs and habitat units identified, and their associated BV and sensitivity scores, the general consensus is that they do align.

The seven BMUs identified within the MRA include:

- BMU 1: Wolhaarkop Sandveld
- BMU 2: Black Thorn Shrubland
- BMU 3: *Rhigozum* Grassland
- BMU 4: Wild Olive Woodland
- BMU 5: Camphor Bush Panveld
- BMU 6: Dwarf Karroid Shrubland

- BMU 7: Groenwaterspruit

Please note that the refined habitat units as defined in this report will be used to illustrate and discuss the significance, sensitivity and impacts associated with the proposed mining expansion activities for the mine.

Table 1: Table illustrating the overlap between the habitat units (as delineated by STS) and the BMUs. An explanation justifying the overalp is also provided. BMU = Biodiversity Management Unit (as defined by the BMP); BV = Biodiversity Value.

BMU	BV value	Habitat Unit Overlap (STS)	Floral Sensitivity as defined by STS	Faunal Sensitivity as defined by STS	Justification for overlap
BMU 1 Wolhaarkop Sandveld	Very High	NA	NA	NA	NA
BMU 2 - Black Thorn Shrubland	Moderate	Mountain Bushveld	Moderately High	Moderately High	• The BMP states that sensitive habitats are prevalent within the BMU. The Mountain Bushveld Habitat, as identified by STS, can be considered as one of these sensitive habitats.
BMU 3 - *Rhigozum* Grassland	High	Kalahari Thornveld	Intermediate	Intermediate	• This BMU is widespread according to the BMP. The Kalahari Thornveld, *Senegalia* Thornveld and the Calcrete Habitat all consist of a grassy layer. This grassy layer is the dominant feature in which these habitat units have been grouped at a broad scale. At a more local scale, this BMU can be micro mapped into different components as identified by STS. • Differences in methodologies, the subjective discretion of different authors, and the combined BV values vs separate floral and faunal sensitivities has resulted in differences "Habitat sensitivity" between the BMP and the present report. • Watercourse Habitat is scattered throughout the focus area and is often incorporated into the larger BMUs as "sensitive habitat". The refined habitat delineations provided by STS make provisions for these features to be mapped separately.
		Senegalia Thornveld	Moderately low	Intermediate	
		Calcrete Habitat	Intermediate	Intermediate	
		Transformed Habitat	Low	Low	
		Watercourse Habitat	Moderately High	Intermediate	
	Moderate	Calcrete Habitat	Intermediate	Intermediate	

BMU	BV value	Habitat Unit Overlap (STS)	Floral Sensitivity as defined by STS	Faunal Sensitivity as defined by STS	Justification for overlap
BMU 4 - Wild Olive Woodland		*Senegalia* Thornveld	Moderately Low	Intermediate	• According to the BMP, this BMU is not ecologically degraded across its entire distribution. This, together with factors such as different methodologies etc., has resulted in different sensitivities (as identified by STS) being identified across the BMU. • In areas close to existing mining operations (e.g., within the Transformed and *Senegalia* Thornveld habitat), factors such as edge effects have impacted the overall condition of these habitats. • Watercourse and Non-watercourse Habitat are scattered throughout the focus area and is often incorporated into the larger BMUs as "sensitive habitat" or unique features. The refined habitat delineations provided by STS make provisions for these features to be mapped separately.
		Transformed Habitat	Low	Low	
		Watercourse Habitat	Moderately high	Intermediate	
		Non-watercourse Habitat	Moderately Low	Intermediate	
BMU 5 - Camphor Bush Panveld	Very High	*Senegalia* Thornveld	Moderately Low	Intermediate	• The *Senegalia* Thornveld is likely a derivative of the *Senegalia- Tarchonanthus* Thornveld. With anthropogenic influences, this habitat has altered and is no longer extensively similar to the *Senegalia- Tarchonanthus* thornveld at a local scale. However, at a broad scale, several features of these habitat units are similar thus supporting the broad scale category of the BMU. • Watercourse and Non-watercourse Habitat are scattered throughout the focus area and is often incorporated into the larger BMUs as "sensitive habitat" or unique features. The refined habitat delineations provided by STS make provisions for these features to be mapped separately.
		Watercourse Habitat	Moderately high	Intermediate	
		Non-watercourse Habitat	Moderately Low	Intermediate	
		Senegalia- Tarchonanthus Thornveld	Intermediate	Intermediate	

BMU	BV value	Habitat Unit Overlap (STS)	Floral Sensitivity as defined by STS	Faunal Sensitivity as defined by STS	Justification for overlap
		Transformed Habitat	Low	Low	
BMU 6 - Dwarf Karroid Shrubland	Very High	Calcrete Habitat	Intermediate	Intermediate	• This BMU is widespread according to the BMP. The Kalahari Thornveld and the Calcrete Habitat all consist of a grassy layer. This grassy layer is the dominant feature in which these habitat units have been grouped at a broad scale. At a more local scale, this BMU can be micro mapped into different components as identified by STS. • Differences in methodologies, the subjective discretion of different authors, and the combined BV values vs separate floral and faunal sensitivities has resulted in differences "Habitat sensitivity" between the BMP and the present report. • Watercourse Habitat is scattered throughout the focus area and is often incorporated into the larger BMUs as "sensitive habitat". The refined habitat delineations provided by STS make provisions for these features to be mapped separately.
		Kalahari Thornveld (very small area of overlap)	Intermediate	Intermediate	
		Watercourse Habitat	Moderately high	Intermediate	
BMU 7 - Groenwaterspruit	Moderate	NA	NA	NA	NA

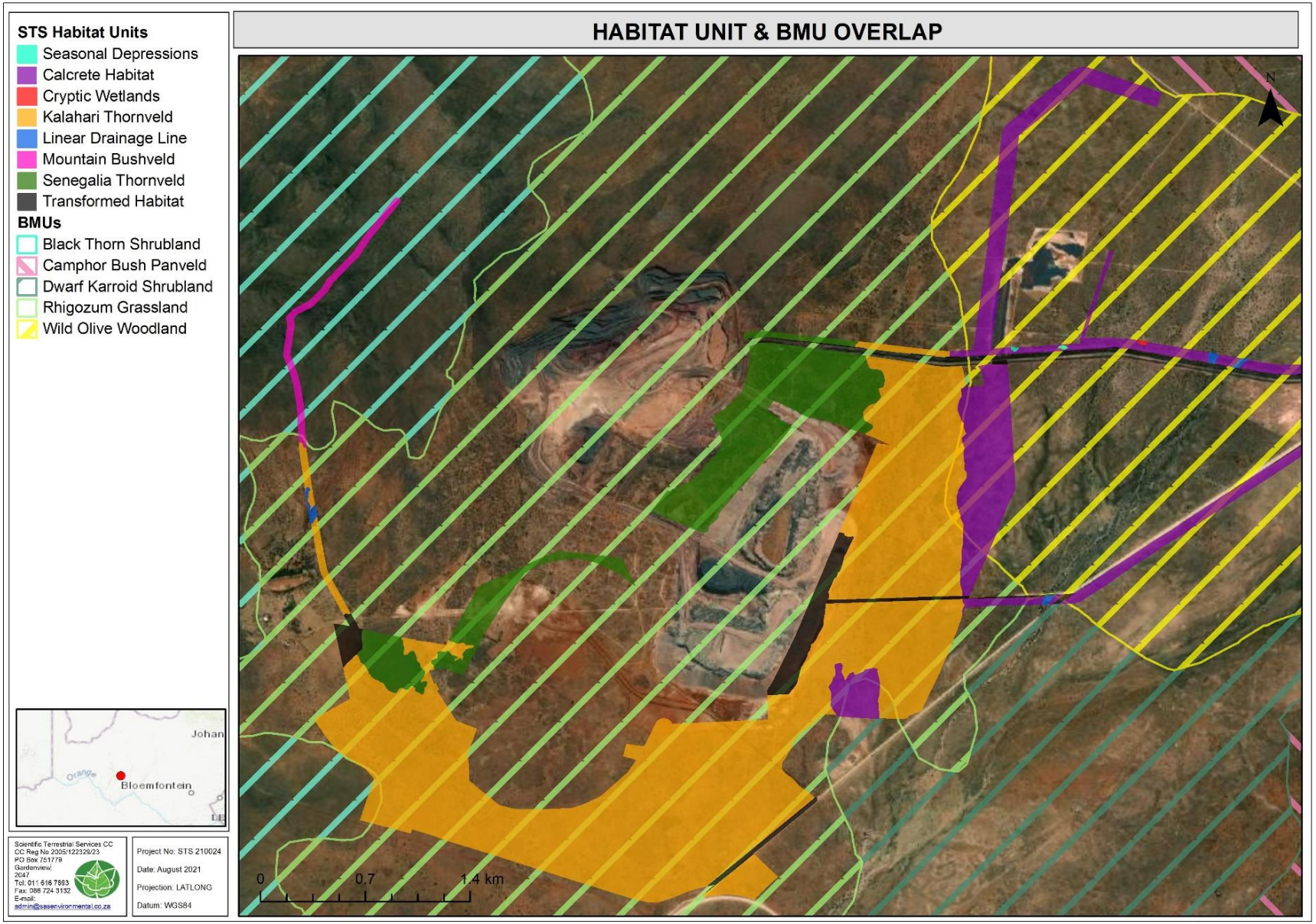


Figure 2: Conceptual illustration of the overlap of the habitat units (as defined by STS) and the BMUs associated with the western sections of the focus area.

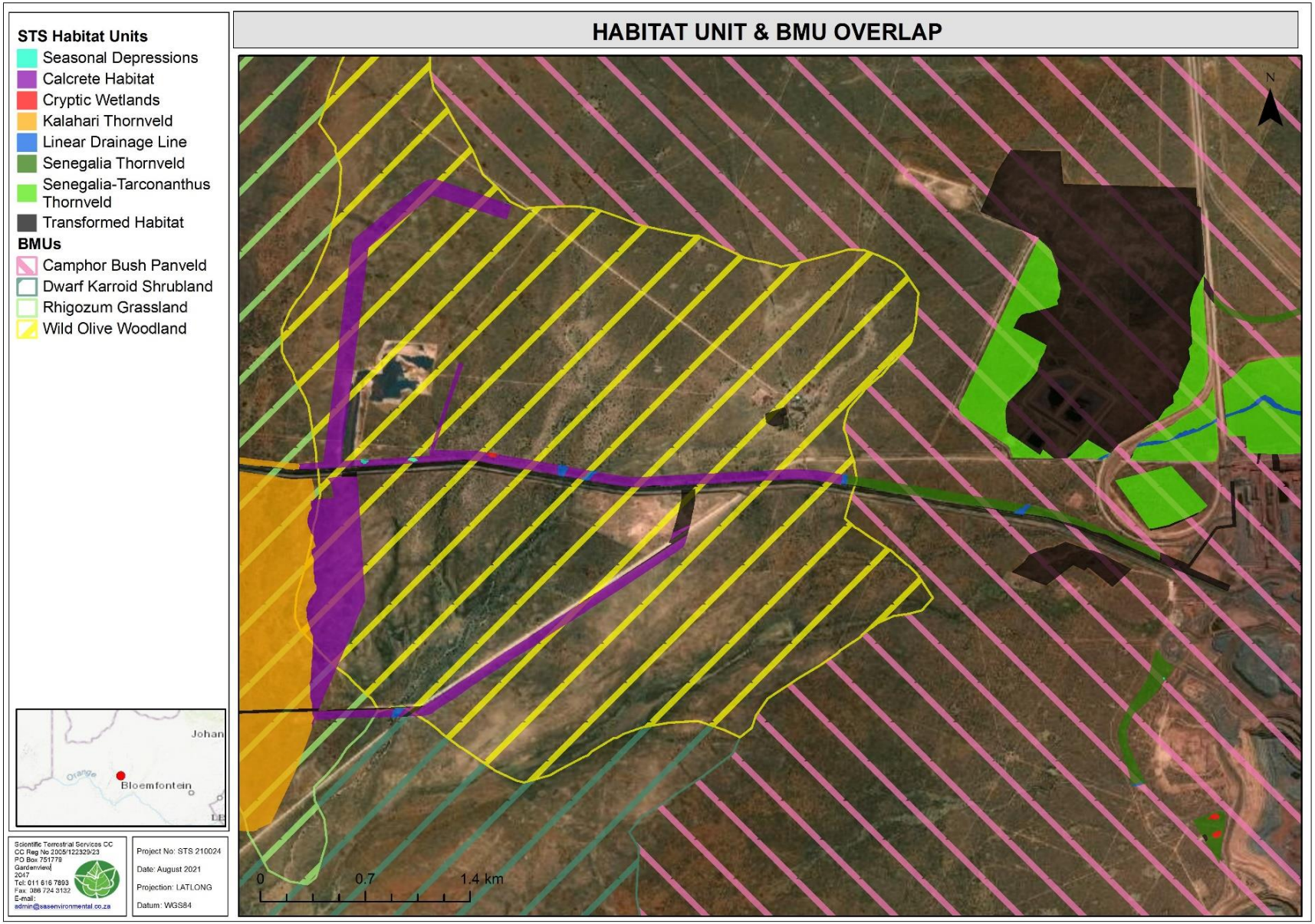


Figure 3: Conceptual illustration of the overlap of the habitat units (as defined by STS) and the BMUs associated with the central sections of the focus area.

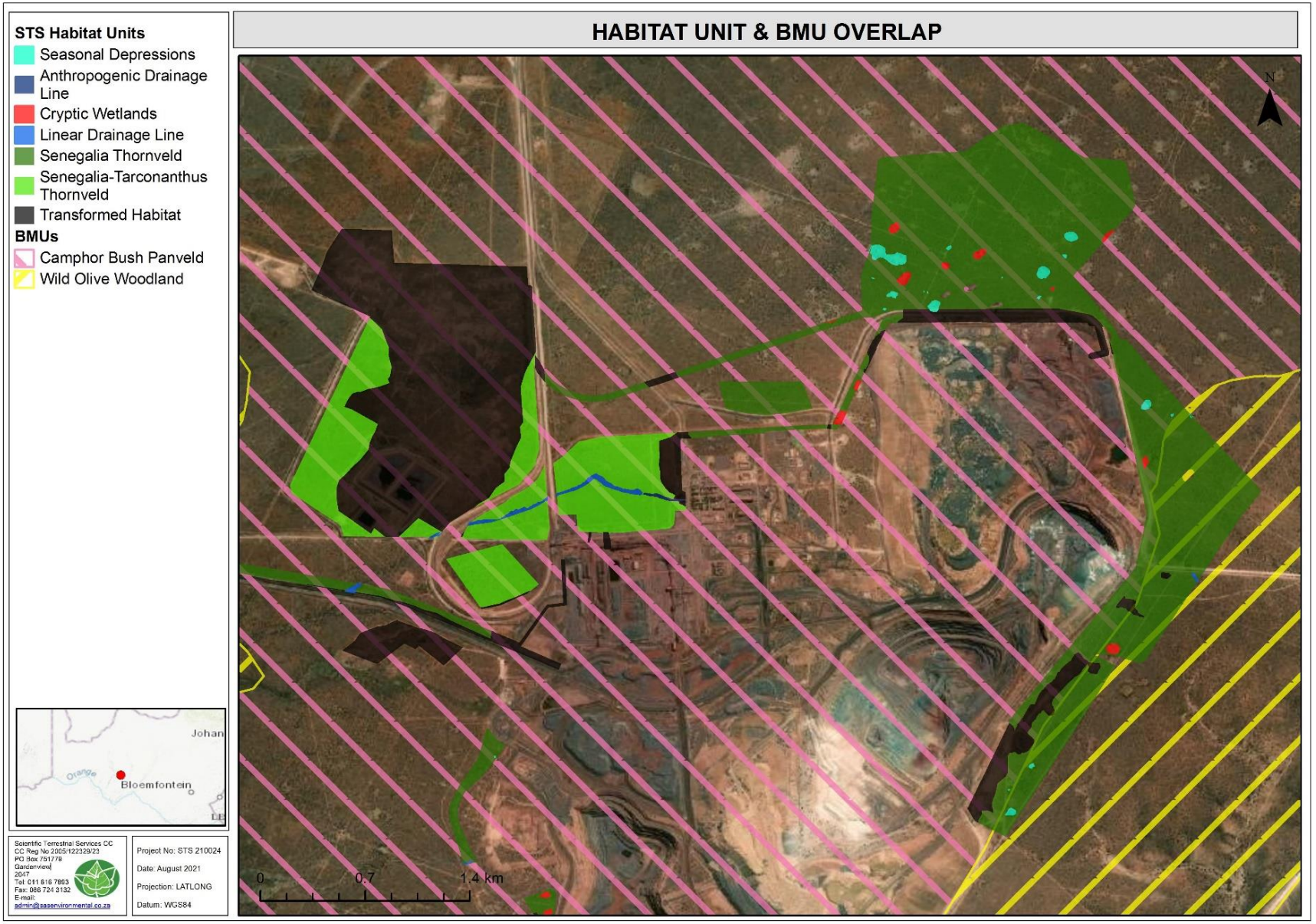


Figure 4: Conceptual illustration of the overlap of the habitat units (as defined by STS) and the BMUs associated with the eastern sections of the focus area.

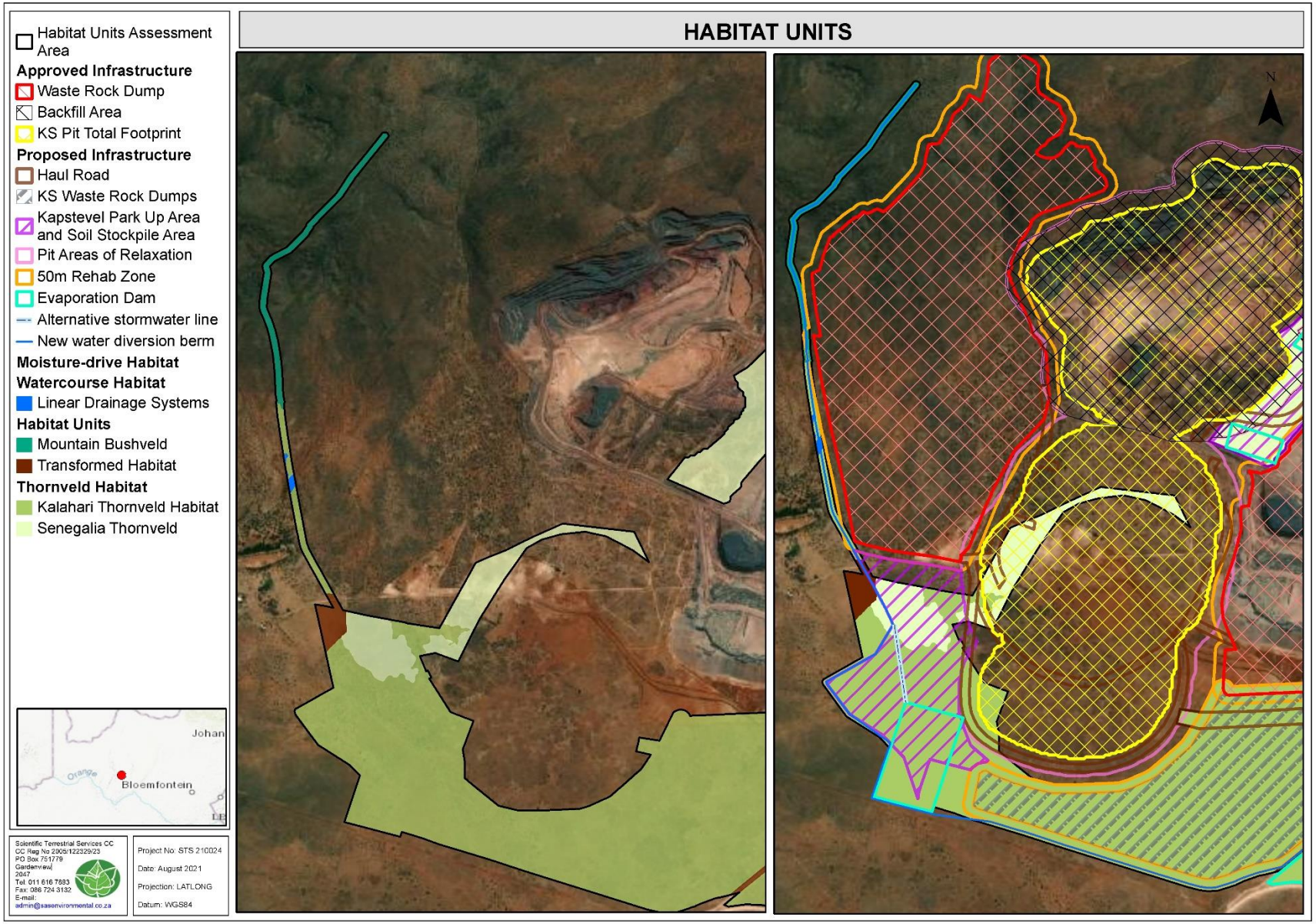


Figure 5: Conceptual illustration of the habitat units associated with the western sections of the focus area. The frame on the left depicts the only the habitat units whereas the frame on the right depicts the habitat units and the proposed and approved infrastructure layout.

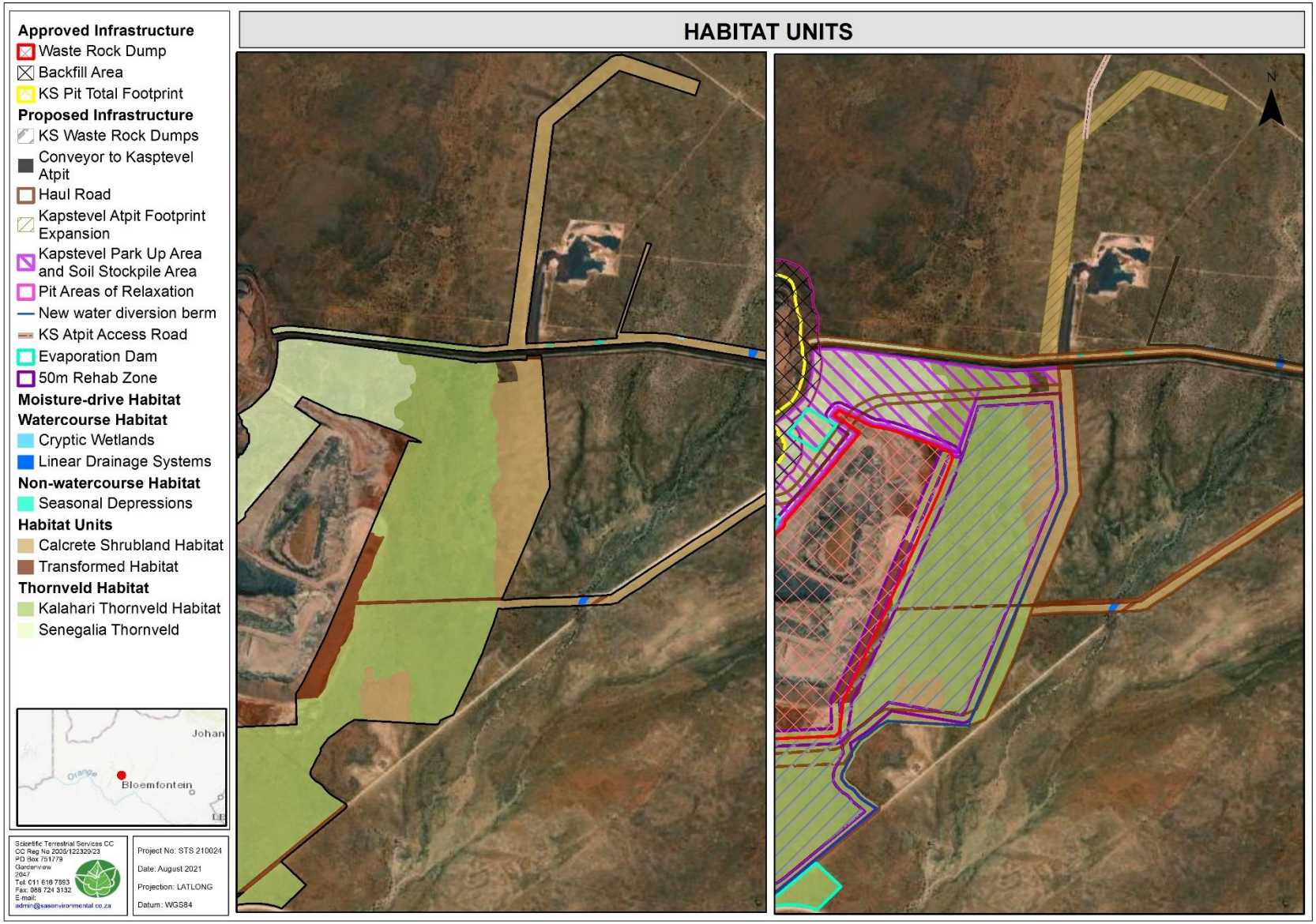


Figure 6: Conceptual illustration of the habitat units associated with the central-west sections of the focus area. The frame on the left depicts the only the habitat units whereas the frame on the right depicts the habitat units and the proposed and approved infrastructure layout.

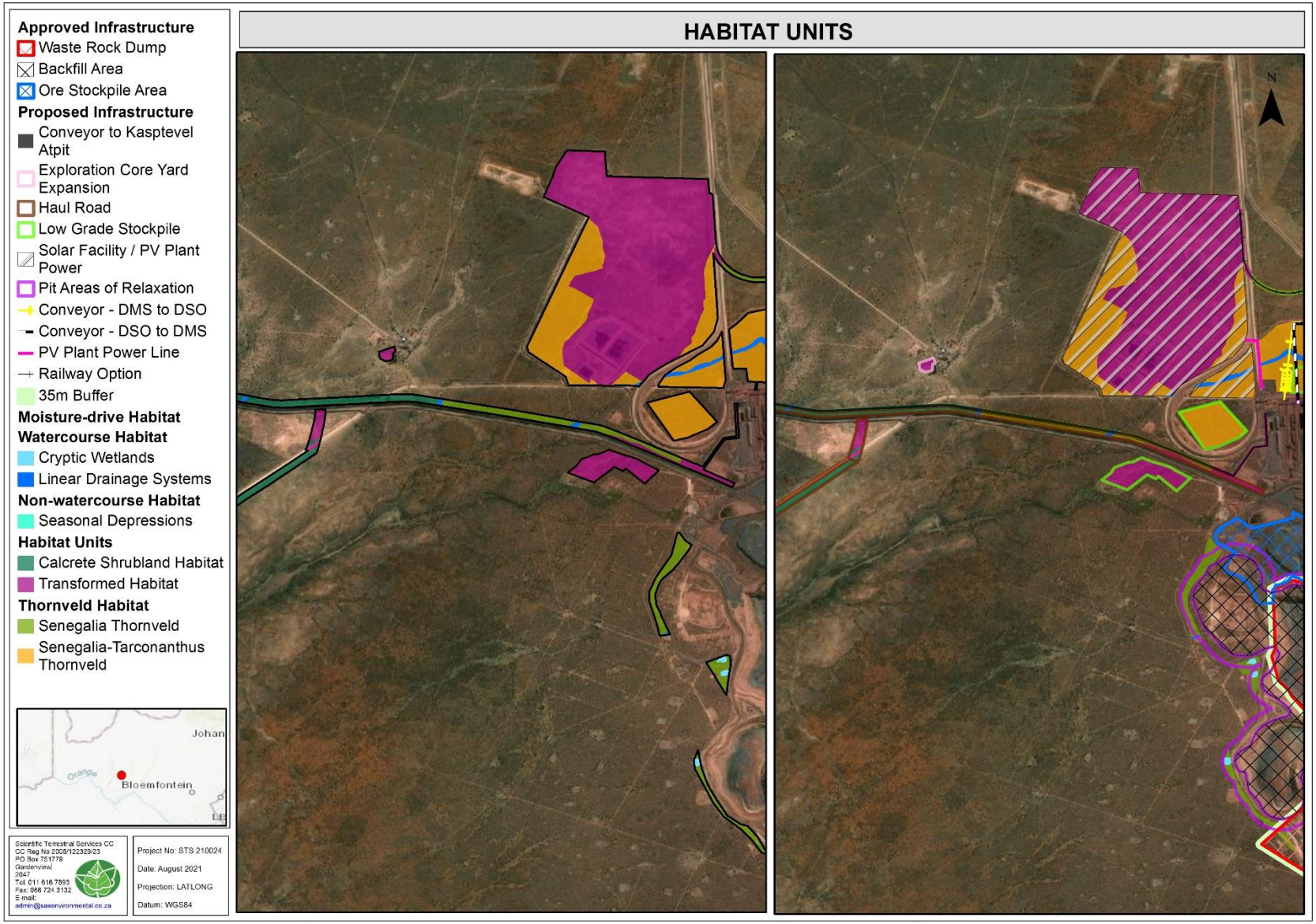


Figure 7: Conceptual illustration of the habitat units associated with the central-east sections of the focus area. The frame on the left depicts the only the habitat units whereas the frame on the right depicts the habitat units and the proposed and approved infrastructure layout.

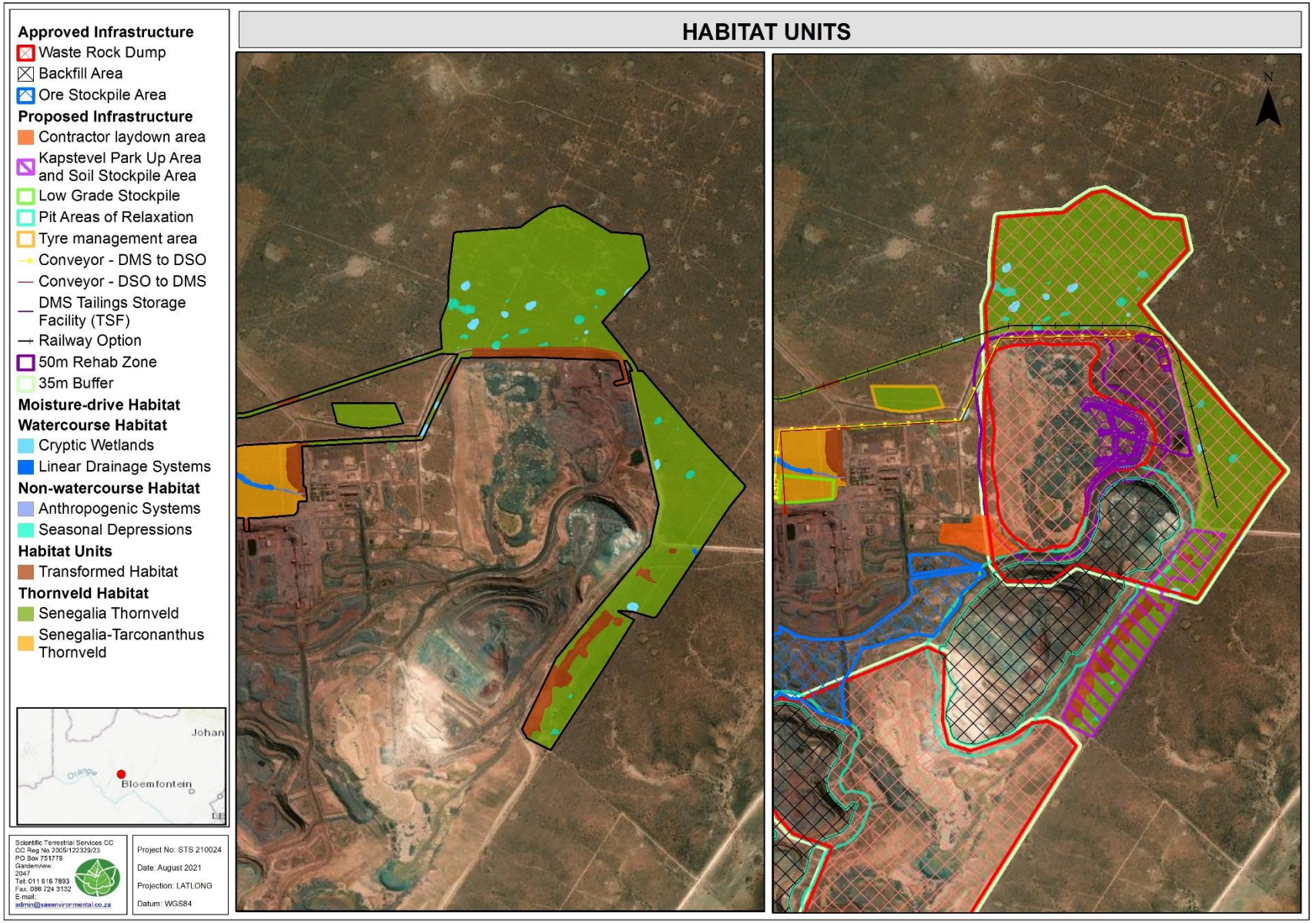


Figure 8: Conceptual illustration of the habitat units associated with the eastern sections of the focus area. The frame on the left depicts the only the habitat units whereas the frame on the right depicts the habitat units and the proposed and approved infrastructure layout.

3.2 Mammals

Table 2: Field assessment results pertaining to mammal species within the focus area.

Photograph Notes:	Mammal Species of Conservation Concern (SCC)			
Top: Left – *Antidorcas marsupialis* (Springbok) were abundant throughout the focus area. Center – *Oryx gazelle* (Gemsbok) were noted in the north western portion of the focus area. Right – *Raphicerus campestris* (Steenbok) were also common throughout the focus area. **Bottom:** Left to right – *Hippotragus equinus* (Roan Antelope) favoured the areas of minimal human movement in the northwestern section of the focus area, *Tragelaphus strepsiceros* (Kudu) and the remains of 2 small rodents.	**Species**	**Suitable habitat and resources in the focus area**	**Conservation Status**	**POC**
	*Orycteropus afer* (Aardvark)	Occurs in a wide variety of habitats where they feed almost exclusively on termites and ants. Only absent from hyper arid, marshy and very rocky habitats. Mountain Bushveld and	Specially Protected by the Northern Cape Nature Conservation Act (NCNCA)	Previously confirmed
	Otocyon megalotis (Bat-eared Fox)	In southern Africa mostly found in dry areas with short grass or bare ground. The range overlaps that of *Hodotermes* and *Microhodotermes*, termite genera prevailing in the diet sub-Saharan Africa.	Specially Protected (NCNCA)	Previously confirmed
	Hippotragus equinus (Roan Antelope)	This species is a selective grazer and prefers more savannah type landscapes to woodland. This species would prefer the Kalahari Thornveld and *Tarconanthus-Senegalia* Thornveld within the focus area.	Threratened Or Protected Species (TOPS) VU	Confirmed
	Poecilogale albinuch (African Striped Weasel)	Mainly found in savanna associations, although this species probably has a wide habitat tolerance. The species has been recorded in Forest, Savanna, Shrubland, Fynbos and Grassland habitats.	Specially Protected (NCNCA)	Medium
	Ictonyx striatus (Striped Polecat)	This species has a wide habitat tolerance but is absent from the Congo basin and west Africa to southern Africa. Has also been recorded in human modified habitats such as pastures and exotic timber plantations.	Specially Protected (NCNCA)	Previously confirmed
	Vulpus chama (Cape Fox)	Mainly associated with open country in the dry karoo and Kalahari regions where they feed on Rodents, hares, insects and carrion.	TOPS (Protected)	Previously confirmed
	Proteles cristata (Aardwolf)	Considered an obligate insectivore (favouring termites). The species is distributed throughout the country but favours the drier regions of the northern cape.	Specially Protected (NCNCA)	Previously confirmed

	Felis nigripes (Black footed Cat)	This species is extremely secretive with a nocturnal or crepuscular lifestyle. Inhabits drier parts of the country. Large parts of the study area are suitable for the species.	IUCN (VU) and TOPS (Protected)	Medium

General Mammal Discussion

Mammal diversity within the focus area was considered intermediate. Large mammal diversity is slightly lower that would have been historically observed as megaherbivores and large predators were absent. Small, medium and large sized mammal diversity appeared to be moderately high as most of its historic complement of fauna were observed within the focus area, however, most occur at low abundances and are actively managed. The landscape comprises of five broad floral habitat units, however, from a faunal perspective remains relatively homogenous (thornveld) limiting the habitats available and specialised niche's which would increase faunal diversity. Although the habitat is mostly thornveld, unique pans (seasonal depressions and cryptic wetlands) do occur throughout the focus area and some Mountain Bushveld exists in the west of the focus area. These units did not appear to contribute to the existence of further faunal species and largely mimicked the Thornveld Habitat. These units do, however provide valuable rocky habitat as well as temporary freshwater habitat within the Moisture Driven Habitat which will be favoured by rupicolous fauna and water dependant species. During the field investigation a single SCC, *Hippotragus equinus* (Roan Antelope), was observed within the Thornveld Habitat, although they have been introduced by the mine this species is endemic to the area. This species as well as *Oryx gazelle* (Gemsbok) have been brought in and managed on the mining property while the remainder of the mammals observed inhabit the assessment zone naturally. A further five SCC are anticipated to range within the focus area. Kudu and Springbok were the most abundant mammals and appeared very tame as they seldom ran from approaching vehicles or people. This indicates that limited persecution occurs within the focus area. The condition of the mammals observed looked good indicating that sufficient forage is available for mammals occupying the focus area. Forage availability for primary consumers is considered intermediate due to the arid nature of the region and the reduced primary productivity therein, furthermore, the abundance of mammals will reduce resource availability to a small extent. Forage for small carnivorous mammals like shrews and genets is anticipated to be intermediate. Mesopredators will occur within the study area but large predators were completely absent from the focus area.

The focus area is almost completely surrounded by natural land ensuring a high degree of available habitat for mammals. Postmasburg town and Beeshoek Mine disrupt this natural landscape to the north and north-west of the focus area. The habitat beyond this existing infrastructure is largely intact and only disturbed by domestic livestock grazing, reducing the integrity to a small degree. More specifically the focus area is a mosaic of existing mining areas interspersed with natural and disturbed habitat reducing the integrity of the focus area. As minimal fencing occurs within the focus area, a healthy diversity of common mammals utilise the natural portions of the locality, yet, the high degree of edge effects resulting from the historic and current mining disturbances do reduce the suitability of portions of the focus area located adjacent these activities. The mountain Bushveld is unique habitat for mammals within the focus area and will provide valuable foraging and browsing habitat where human disturbance is limited.

Business Case and Conclusion - Mammals

Clearing of vegetation for the proposed developments will have a direct impact on mammal habitat availability in areas where larger scale activities alter *Senegalia-Tarconanthus* Thornveld Habitat, *Senegalia* Thornveld Habitat, Calcrete Habitat and Kalahari Thornveld Habitat. Impacts within the Mountain Bushveld do not occur over a large extent but the sensitive nature of the habitat increases the impact on mammals. The increased human presence will lead to localised migration of many mammal species to adjacent habitats and result in a reduction of abundance and diversity within the focus area. Species that relocate into the surrounding areas will be subject to higher levels of competition for food resources and space. Impacts to mammal species within the focus area will result in the localised loss of habitat, diversity and mammal abundance, whilst edge effects such as noise, dust and potential footprint creep will impact on mammal species in the immediate vicinity of the proposed development. Additionally, the increased movement of vehicles as a result of the new development will increase mammal mortality rates due to potential vehicle collisions. Please refer to section 5.4 for a detailed list of mitigations regarding impacts to fauna in the focus area. No sensitive mammal species have been identified by the Department of Forestry, Fisheries and the Environment (DFFE) National screening tool.

3.3 Avifauna

Table 3: Field assessment results pertaining to avifaunal species within the focus area.

Photograph Notes:	Avifauna SCC			
Top: Left – *Batis pririt* (Pririt Batis) were abundant within the *Senegalia-Tarconanthus* Thornveld. Middle left – *Crithagra flaviventris* (Yellow Canary) *Uraeginthus granatinus* (Violet-eared Waxbill). Right – *Lophotis ruficrista* (Red-crested Korhaan). **Bottom:** Left to right – A pair of *Ardeotis kori* (Kori Bustard) were observed within the *Senegalia* Thornveld habitat. A very red stained *Philetairus socius* (Sociable Weaver) noted within the *Senegalia* Thornveld habitat. *Rhinopomastus cyanomelas* (Common Scimitarbill) noted foraging for invertebrates in the *Senegalia* Thornveld habitat. *Sigelus silens* (Fiscal Flycatcher) perched within the *Senegalia-Tarconanthus* Thornveld.	**Species**	**Suitable habitat and resources in the focus area**	**Conservation Status**	**POC**
	Neotis ludwigii (Ludwig's Bustard)	Inhabits mostly flat, semi-arid, open country in the Succulent Karoo, Nama Karoo and Namib.	EN	Medium
	*Polemeatus bellicosus* (Martial Eagle)	Martial eagles occur throughout southern Africa in varied habitat, only avoiding mountainous and forested areas.	EN	Medium
	Aquila rapax (Tawny Eagle)	Generally widespread throughout sub-Saharan Africa. This species prefers savanna habitat but does occur in grassy habitats where powerlines are utilised for nesting.	EN	Medium
	Ardeotis kori (Kori Bustard)	Inhabits mostly flat, arid, mostly open country (grassland, bushveld, thornveld, scrubland and savanna).	NT	Confirmed
	Cursorius rufus (Burchell's courser)	A nomadic species with little known about its movement. Often utilizes open short sward grassland, dry savannas overgrazed or burnt grasslands or pastures, bare or sparsely vegetated sandy or gravelly deserts.	VU	High
Species / **Suitable habitat and resources in the focus area** / **Conservation Status** / **POC**	*Gyps africanus*	This species has wide ranging habitats and would utilize the study area for foraging should	CR	Medium

Torgos tracheliotos (Lappet-faced Vulture)	This species has wide ranging habitats and would utilize the study area for foraging should a mammal carcass be present.	EN	Medium	(White-backed Vulture)	a mammal carcass be present. No breeding will occur in the assessment zone.		
Sagittarius serpentarius (Secretarybird)	The species is prefers open grassland and scrub with a height lower than 50cm where it stalks its prey on foot. It requires sufficient scattered trees in which to nest. Birds are normally found singly or in pairs. Will largely occur within the Kalahari Thornveld and *Tarconanthus-Senegalia* Thornveld.	VU	Medium	*Falco biarmicus* (Lanner Falcon)	Inhabits a wide variety of habitats and may illustrate crepuscular behaviour. Mostly resident with some birds migrating to west Africa. May utilize the entire study area.	VU	Medium

General Avifauna Discussion

During the field assessment *Ardeotis kori* (Kori Bustard, NT) was encountered on two occasions within the focus area. *Gyps africanus* (White-backed Vulture, CR), *Torgos tracheliotos* (Lappet-faced Vulture, EN) and *Neotis ludwigii* (Ludwig's Bustard, EN) have also been recorded within the pentads. The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland indicates that *Cursorius rufus* (Burchell's Courser, VU), *Polemeatus bellicosus* (Martial Eagle, EN), *Sagittarius serpentarius* (Secretarybird, VU), *Aquila rapax* (Tawny Eagle, EN) and *Falco biarmicus* (Lanner Falcon) have a distribution which overlays the focus area and, based on the site assessment, on-site habitat characteristics for foraging exist for these species.

Avifauna diversity for the focus area is considered intermediate, as mostly common species were observed during the field assessment. Most avifauna appeared to avoid the Transformed Habitat remaining within the more natural adjacent habitat units. Avifauna diversity appeared to be concentrated in the Thornveld subunits, the Moisture-driven Habitat and the Mountain Bushveld as the vegetation structure, often considered a primary determinant for bird communities, was more diverse than that of the Calcrete and Transformed Habitats. Ground dwelling birds (bustards, korhaans and coursers) which are anticipated to favour the more open Calcrete and Transformed Habitats were observed more often in the more dense Thornveld subunits. Waterfowl and bird species dependant on water were not observed during the field investigation, yet, Moisture-driven habitat will provide temporary habitat for these species should the currently dry pans and depressions fill after a period of high rainfall. The current and historic mining activities do reduce the integrity of the focus area for avifauna due to the disturbed habitat and the human activities which occur here reducing the suitability for avifauna. Beyond the mining activities a large extent of the habitat remains natural providing high integrity locations for avifauna adjacent to the mine and as such edge effects should be monitored to ensure habitat integrity remains high. A large portion of the focus area where the PV facility (STS 210053) is proposed has been transformed and the limited shelter and forage available largely excludes birds from this habitat. There is, however, good habitat and food availability to support avifauna within the focus area itself, as the intermediate abundance of grasses and insects will benefit granivore and insectivore species. A few tall *Vachellia erioloba* trees provide ideal roosting, nesting and perching locations for avifauna, yet, no SCC nests were observed. According to the DFFE screening tool, *Neotis ludwigii* (Ludwig's Bustard) and *Sagittarius serpentarius* (Secretarybird) are anticipated to occur within the focus area.

Business Case and Conclusion - Avifauna

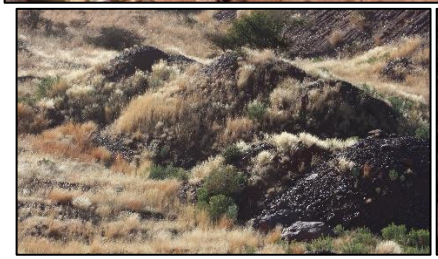
The avifaunal habitat sensitivity for the focus area is considered to be intermediate. Although a large contingent of SCC are considered likely to utilise the focus area for foraging, two SCC are deemed to potentially utilise the site for breeding, namely: *Ardeotis kori* (Kori Bustard, NT) (observed on site) and *Neotis ludwigii* (Ludwig's Bustard, EN), which often are noted within plains interspersed with gravelly/bare areas. SCC raptors (which are known to have wide ranging habits) are considered unlikely to breed within the focus area due to the limited abundance of tall trees which would be required to build their nests. Species abundance levels will vary within the focus area in accordance with rainfall and seasonal changes and their effect on available food resources.

Clearing of vegetation for the proposed development in the *Senegalia-Tarconanthus* Thornveld Habitat, *Senegalia* Thornveld Habitat, Calcrete Habitat and Kalahari Thornveld Habitat will have a direct impact on avifauna habitat availability in these areas, causing habitat loss in a large portion of the focus area. This will lead to localized migration of many avifauna species to adjacent habitats and result in a reduction of abundance and diversity within the focus area. Species that relocate into the surrounding areas will be subject to higher levels of competition for food

resources and space. Development impacts to avifauna species within the focus area will result in the localised loss of habitat, diversity and avifauna abundance, whilst edge effects such as noise, dust and potential footprint creep will impact on avifauna species in the immediate vicinity of the proposed development. Additionally, the increased movement of vehicles as a result of the new development may increase avian mortality rates due to vehicle collisions. The movement of avifauna (particularly Bustards, Korhaans, Coursers, Lapwings and Plovers) should be monitored and mitigations within Section 5.4 of the report must be considered.

3.4 *Herpetofauna* (Reptiles and Amphibians)

Table 4: Field assessment results pertaining to amphibian species within the focus area.

Photograph Notes:	Herpetofauna Species of Conservation Concern (SCC)
Very few reptiles were seen within the focus area. Below are observations of *Pedioplanis inornata* (Plain Sand Lizard) which was noted within the *Senegalia*-Thornveld Habitat Unit and Rocky Habitat Unit. No amphibians were seen within the focus area, the arid nature of the project area habitat likely precludes most amphibians from the focus area. The remaining images represent the habitat available.	No Amphibian or reptile SCC are anticipated to occur within the focus area. The edge of *Python sebae* (African rock python) distribution range may overlay the study area, but, for the most part this species is not anticipated to occur here as its distribution occurs further north and east of the current study area. Thus this species is anticipated to have a low POC for the study area.
   	**Business Case and Conclusion - Herpetofauna** The sensitivity of the site for herpetofauna is considered intermediate. According to online databases, the focus area has a low potential to support high reptile diversity. Even less opportunity is afforded to amphibians as a result of the absence of permanent freshwater resources and the arid nature of the habitat within the focus area. The proposed development will lead to the loss of habitat and food resources, leading to a reduction in the abundance of reptiles within the focus area. Clearing of vegetation for the proposed development as well as linear development of access roads will have a direct impact on habitat availability, leading to localised migration of reptile species into the surrounding areas. The movement of reptile species out of the disturbance footprint areas will result in higher levels of competition for food resources and habitat, which can potentially lead to a decrease in abundance and diversity levels as resource competition increases. Impacts on species diversity will be limited whilst reptile abundance will likely be reduced as edge effects may impact on reptile species and their food resources in the immediate vicinity of the development footprint. Additionally, the increased movement of vehicles traveling to and from the proposed development as well as increased conflict with humans will likely increases the risk of persecution for reptile species.
Herpetofauna Discussion	
A low reptile diversity was observed during the field assessment, likely a result of the low winter temperatures. Only two single species *Pedioplanis inornata* (Plain Sand Lizard) and a snake which could not be identified (individual was observed while moving and disappeared out of site before identification was possible) were observed during the assessment. Diversity and abundance are anticipated to be higher as the low abundances and diversities recorded during the investigation were likely due to the season and the associated cold temperatures that were experienced. Moreover, reptiles are inherently secretive and shy, making their detection and identification in the field challenging (specifically during site visits of a short duration). As such, based on the available databases, atlases, previous reports, food resources and habitat, it is deemed likely that the focus area will be able to support mostly common reptile species. ADU	

(Animal Demography Unit) records indicate 5 sprecies (*Acontias occidentalis* (Western Legless Skink), *Bitis arietans arietans* (Puff Adder), *Nucras intertexta* (Spotted Sandveld Lizard), *Boaedon capensis* (Brown House Snake) and *Pedioplanis lineoocellata lineoocellata* (Common Sandveld Lizard) who have previously been recorded in the QDS. *Stigmochelys pardalis* (Leopard Tortoise) have also been observed by mine staff and are considered to be common within the focus area. It is likely that the focus area will have a moderately low diversity as the region is not particularly rich in taxa from this class. Habitat for these resiliant species was observed within most of the focus area, even the Transformed habitat may offer shelter and foraging oppurtunities to repitles. The basking habitat for reptile species was abundant throughout much of the site where boulders, rocks or flat bare ground was observed within the focus area within most units. No limitations of reptile movement are anticipated within the area and they will readily utilise even transformed areas to move through. Habitat for more arboreal species was restricted to the dense, mostly shrubby Thornveld and Mountain Bushveld.

Rodent burrows and those of larger species, which are often utilised by snakes, were observed in low densities, providing limited shelter for burrowing snake species or food resources (rodents). There are likely sufficient levels of food resources for predatory snakes preying on small mammals however herbivorous and insectivorous reptile species are likely to have high resource competition due to the lower levels of available food resources. The invertebrate abundances noted within the focus area was moderately low limiting prey potential.

No amphibians were observed within the focus area during the field assessment. The arid nature of the locality and the absence of permanent watercourses or natural waterbodies reduces the suitability of the site for amphibians. The artificially augmented impoundments augmented with industrial water may be suitable habitat but only to amphibians able to withstand the poor water quality. The pans and depressions that do occur within the focus area will only be filled temporarily for a short period of time during times of high rainfall and may present the only areas where breeding may potentially occur. The Freshwater habitat, where amphibians are expected to occur was actively searched, however no species were observed during the site visit, neither are any records indicated for the QDS. iNaturalist has records for *Sclerophrys capensis* (Raucous Toad) and *Xenopus laevis* (African Clawed Frog) from within the broader locality while *Kassina senegalensis* (Bubbling Kassina) has been observed on an adjacent mine (Beeshoek). The general arid landscape does not lend itself to habitation by amphibians as a result of the arid nature of the landscape. Some species can be anticipated but will occur at low densities. The diversity anticipated within the focus area is low and was determined through literature reviews and based on the habitat suitability. Forage is not anticipated to be a limiting factor for amphibians. Overall, the focus area is considered to have an moderately low habitat availability as large areas are unsuitable for amphibians.

Reptiles are inherently adaptable and capable of surviving in transformed and degraded habitats thus it is expected that they will be able to utilise even transformed and degraded areas. The general locality is largely natural, with some portions of the Transformed habitat providing suitable refuge areas and basking habitat for various common reptile species. Sensitivity for amphibians is considered to be low as a result of the unsuitable arid landscape and the absence of watercourse or impoundments.

3.5 Invertebrates (Insects and Arachnids)

Table 5: Field assessment results pertaining to insect species within the focus area.

Photograph Notes:				Photographs
Top: Left – Scorpion burrow, possibly belonging to a species within the genus *Opistophthalmus* (Burrowing Scorpions). Middle – Baboon Spider burrow observed within the *Senegalia* Thornveld Habitat Unit; Right – Web belonging to a Grass funnel-web spider (Agelenidae) within the Calcrete Habitat. **Middle:**: Left – Cacoon of a *Gonometa postica* (African Silk Moth). Right: – A termite mound showing damage which may have been caused by an Aardvark. **Bottom:** Indication of habitat suitable for scorpions where burrows were noted within the *Senegalia* Thornveld Habitat habitat.				
Invertebrate Species of Conservation Concern (SCC)				
Species	**Habitat and Resources in the Focus area**	**Conservation Status**	**POC**	
Opistophthalmus carinatus (Robust Burrowing Scorpion), *Opistophthalmus wahlbergii* (Kalahari Burrower) and *Opistophthalmus pluridens*	These species all have suitable habitat within the focus area in the deep sands in the eastern lowlands of the site and within the more structured soils and rocky habitat of the *Senegalia-Tarconanthus* Thornveld and Rocky habitat.	TOPS (Protected) and Protected species under the NCNCA (2009).	Medium / High	
Opistophthalmus ater		TOPS (Protected)		
Harpactira baviana and possibly *Pterinochilus murinus*		TOPS (Protected) and Specially protected species under the NCNCA (2009).	High	

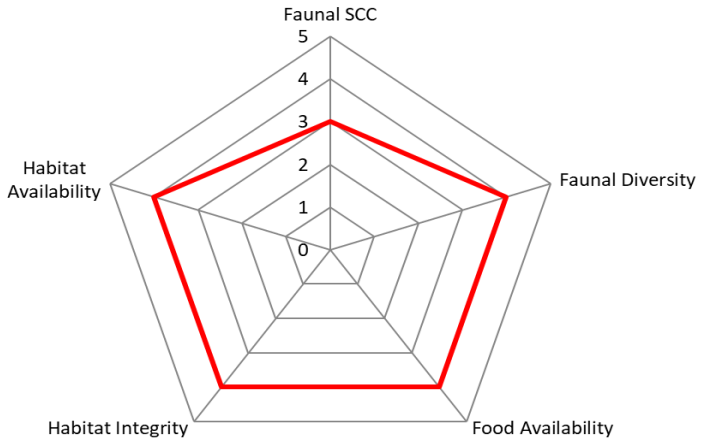
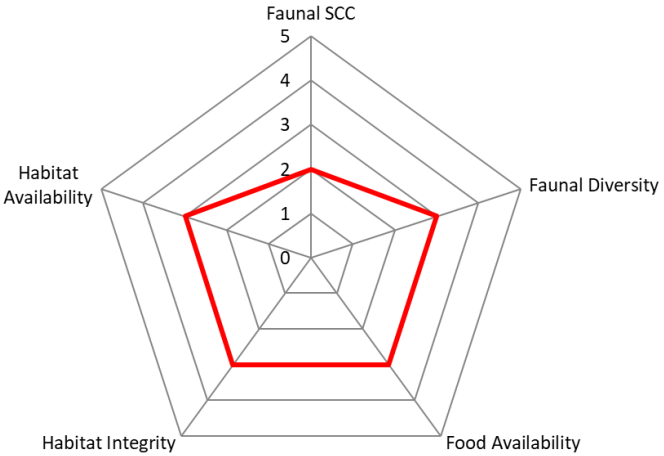
Invertebrate Discussion	The focus area is considered to have a moderately low invertebrate diversity, as does much or the arid north-western interior. Although the field investigation did take place at the end of winter it is unlikely that a rich assemblage occurs within the general locality. Large portions of the habitat adjacent the proposed activities have been degraded and transformed through earthworks, mining and excavations and offered very little habitat for invertebrates. Areas with bare ground and rock were particularly devoid of invertebrates. Natural portions of the Moisture-driven Habitat, Thornveld Habitat and Mountain Bushveld units provided more suitable habitat for invertebrates. Although not particularly rich in flora, the natural habitat within the focus area will support healthy invertebrate assemblages with suitable forage and shelter resources. Scorpions may particularly favour the Mountain Bushveld Habitat but are likely to find suitable habitat within the Thornveld habitat subunits. Arachnid webs, particularly of the genera, *Argiope* and *Stegodyphus* were noted in moderate abundances indicating that insect abundances, which are prey for scorpions and spiders are considered healthy. General invertebrate diversity was low at the time of the survey as temperatures were low and no rains had fallen prior to the field investigation. Insects are generally the most abundant macro-organisms within landscapes and often perform services vitally important for ecosystem functioning. Therefore, high insect abundance and diversity can indicate a healthy landscape. Insects serve as pollinators, remove detritus material, bury dung and associated parasites below the surface helping to cycle nutrients back into the soil while decreasing the parasitic load within an environment, reducing the risk of disease. Additionally, insects serve as a food resource for various fauna within the focus area, and as such a low insect diversity and abundance within the focus area may reduce forage sustainability for other faunal species as well as reduce ecosystem functioning. During the field investigation Coleopterans, Orthopterans and Dipterans were the most abundant species within the focus area at the time of the survey, yet the diversity was restricted to a few commonly occurring species. Lycaenidae butterflies (Coppers and Blues), which are all specially protected within the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA) are known to occur within the area. The habitat integrity of the focus area for invertebrates is considered intermediate. Although habitat transformation has occurred in several portions of the focus area, the natural habitat surrounding and within the focus area provides suitable and sufficient areas where niche habitats can be utilised. Competition for food resources for insects occurs in the form of wild game at low abundances is unlikely to affect forage availability. In terms of habitat, flora within the focus area contains several habitat units, increasing the diversity of forage for insects. Although several habitat units are the present the area is arid and not particularly diverse reducing the potential diversity of invertebrates, therefore it is expected that mostly common insect species will be encountered within focus area due to the lack of specialist habitat. Surface water and wetland environments which provide suitable habitat and year round access to water were limited. Many insects have overcome this by utilising a holometabolous lifecycle allowing a resting phase during dryer times of the year and thus invertebrate diversity and abundances are likely much higher after rainfall events. The low abundance of insects does not indicate that there was insufficient food resources but rather a poor time to undertake the survey. All baboon spiders of the genus' *Ceratogyrus, Harpactira* and *Pterinochilus* are also listed as protected in the TOPS list or as specially protected species under the NCNCA (2009). There is a high possibility that species within the genera *Pterinochilus* will occur on the site. Scorpions in the genera *Hadogenes, Opistacanthus and Opistophthamus* are also protected within Schedule 2 of the NCNCA (2009) and are protected under TOPS regulations. *Opistophthalmus carinatus* (Robust Burrowing Scorpion), *O. pluridens* and *O. wahlbergii* (Kalahari Burrower) are listed in Schedule 2 of the NCNCA (2009) as protected, no records indicate the presence of these species within the focus area. *O. ater,* a NEMBA TOPS species considered as critically endangered may also be present within the focus area.

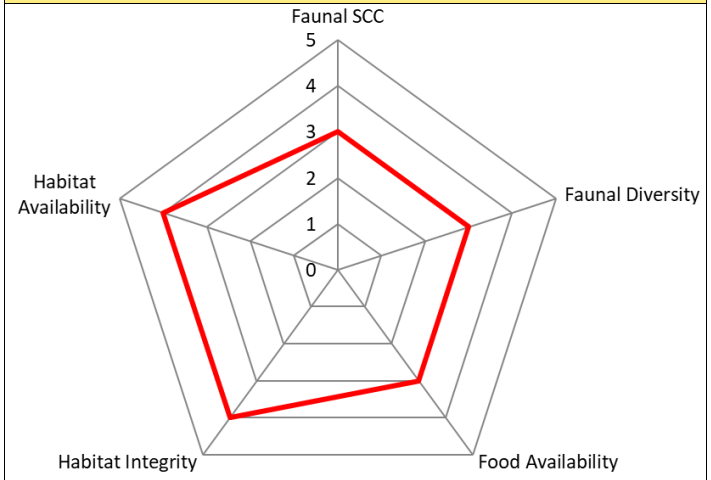
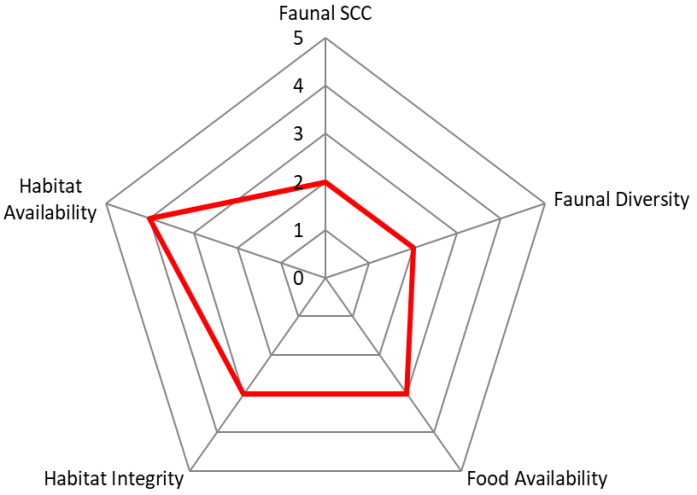
Business Case and Conclusion - Invertebrates	Overall, the invertebrate sensitivity associated with the focus area is considered intermediate. Insect and arachnid species diversity and abundance appeared to be highest in the Mountain Bushveld and Thornveld habitat as these areas are still in a good condition and provide suitable food and shelter for invertebrates. Arachnid species will favour the Mountain Bushveld habitat which provided valuable areas to shelter yet were still apparent in moderate abundances in the remaining natural vegetation within the focus area. The proposed development and associated infrastructure will lead to loss of habitat and food resources, reducing the diversity of insects that were observed in the focus area. There is a possibility that several invertebrate SCC, all arachnids occur within the focus area. As such it is recommended that a night-time walk through of the development footprint is undertaken to rescue and relocate scorpion SCC, prior to development to limit impacts on these species. As large portions of natural Thornveld and Calcrete habitats will be transformed and a loss of insect abundance and diversity will occur and may have a negative cascading effect on the other faunal species in the focus area. Impacts on insect species within the focus area will result in the localised loss of habitat and abundance, whilst edge effects such as additional lighting and footprint creep will impact on insect species in the immediate vicinity of the proposed development. Please refer to section 5.4. for a detailed list of recommended mitigatory measures.

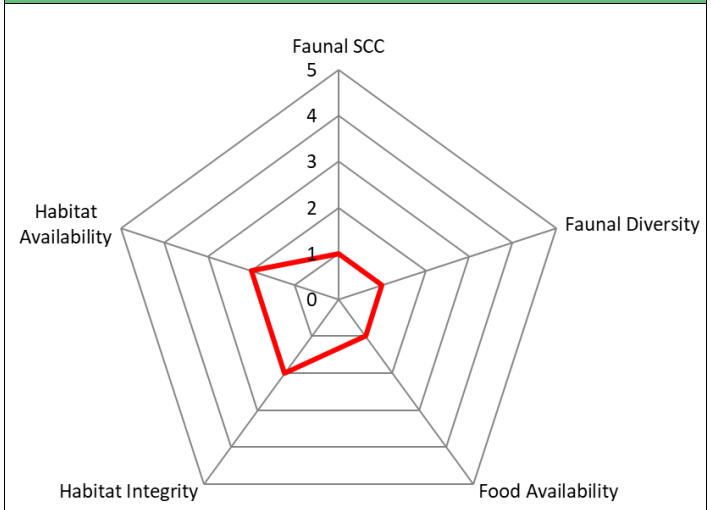
4. SENSITIVITY MAPPING

Figure 9 - 12 conceptually illustrate 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 6 below presents the sensitivity of each habitat along with an associated conservation objective and implications for the proposed activities.

Table 6. A summary of the sensitivity of each habitat unit and implications for the proposed activities

Habitat Unit	Habitat Sensitivity	Conservation Objective	Key Habitat Characteristics
Mountain Bushveld	Moderately High 	Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance.	- No SCC were observed within this unit, however, the habitat is unique within the landscape and may provide greater breeding and foraging opportunities for several SCC due to the unique rocky habitat, increased floral richness and habitat integrity; - This habitat is the smallest within the focus area and is considered to be of increased importance for faunal species in comparison to the remaining habitats, however this habitat cannot function in isolation and is supported by the surrounding lowland habitats; - This unit has not experienced any transformation and remains in a natural state; and - Development within this unit will lead to a reduction in habitat for both common species and SCC, and particularly reptile and arachnids SCC. As such development should avoid these areas.
Moisture driven Habitat **Watercourse habitat** (Cryptic wetlands, Linear drainage line habitat Anthropogenic drainage line) and **Non-watercourse Habitat** (Seasonal depressions)	Intermediate 	Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.	- This habitat is important in terms of niche habitat for water dependant fauna; - Food availability is lower within the Cryptic wetlands and seasonal depressions than the other subunits during the drier periods with increased food availability and quality after the rains; - The drainage line is an important ecological system and an important movement corridor for fauna; - For the most part, besides the anthropogenically impacted drainage line, these habitats remain important in terms of ecological function; and - The Freshwater habitat, although ephemeral in nature and fragmented, remains unique within the landscape and impacts may alter faunal movement patterns and potentially lead to local population fragmentation.

Habitat Unit	Habitat Sensitivity	Conservation Objective	Key Habitat Characteristics
Thornveld Habitat *Tarconanthus-Senegalia* Thornveld, *Senegalia* Thornveld and Kalahari Thornveld Habitat	Intermediate 	Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.	- *Ardeotis kori* (Kori Bustard, NT) were observed within the ***Tarconanthus-Senegalia Thornveld*** and ***Senegalia* Thornveld** habitat units at the time of the assessment. These habitat units provide valuable foraging and breeding opportunities for SCC due to suitable habitat; - These habitats provide suitable grazing and browsing habitat for most fauna. Moreover, the increased abundance of trees and shrubs provides opportunities for shelter and nesting locations; and - These habitats have increased shrub and tree densities providing valuable shelter for fauna, particularly avifauna.
Calcrete Habitat	Intermediate 	Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.	- No faunal SCC were observed within this habitat unit at the time of the assessment. This habitat may provide some foraging and breeding opportunities for SCC, however the reduced biomass and shelter reduces the suitability of this habitat for most larger SCC, yet arachnid SCC will utilize this unit; - Lowered faunal species richness was noted within this unit when compared to habitat units with higher tree and shrub density; and - Portions of these units have been heavily grazed which increases competition for resources for native fauna and decreases the forage value.

Habitat Unit	Habitat Sensitivity	Conservation Objective	Key Habitat Characteristics
Transformed Habitat	Low 	Optimise development potential.	- This habitat encompasses areas where previous development activities occurred and little natural vegetation occurs; - Expansion into this habitat will have very limited impacts to faunal species in terms of forage, habitat and shelter; and - No threatened species are expected to reside within this habitat unit on a permanent basis but may forage in these areas intermittently.

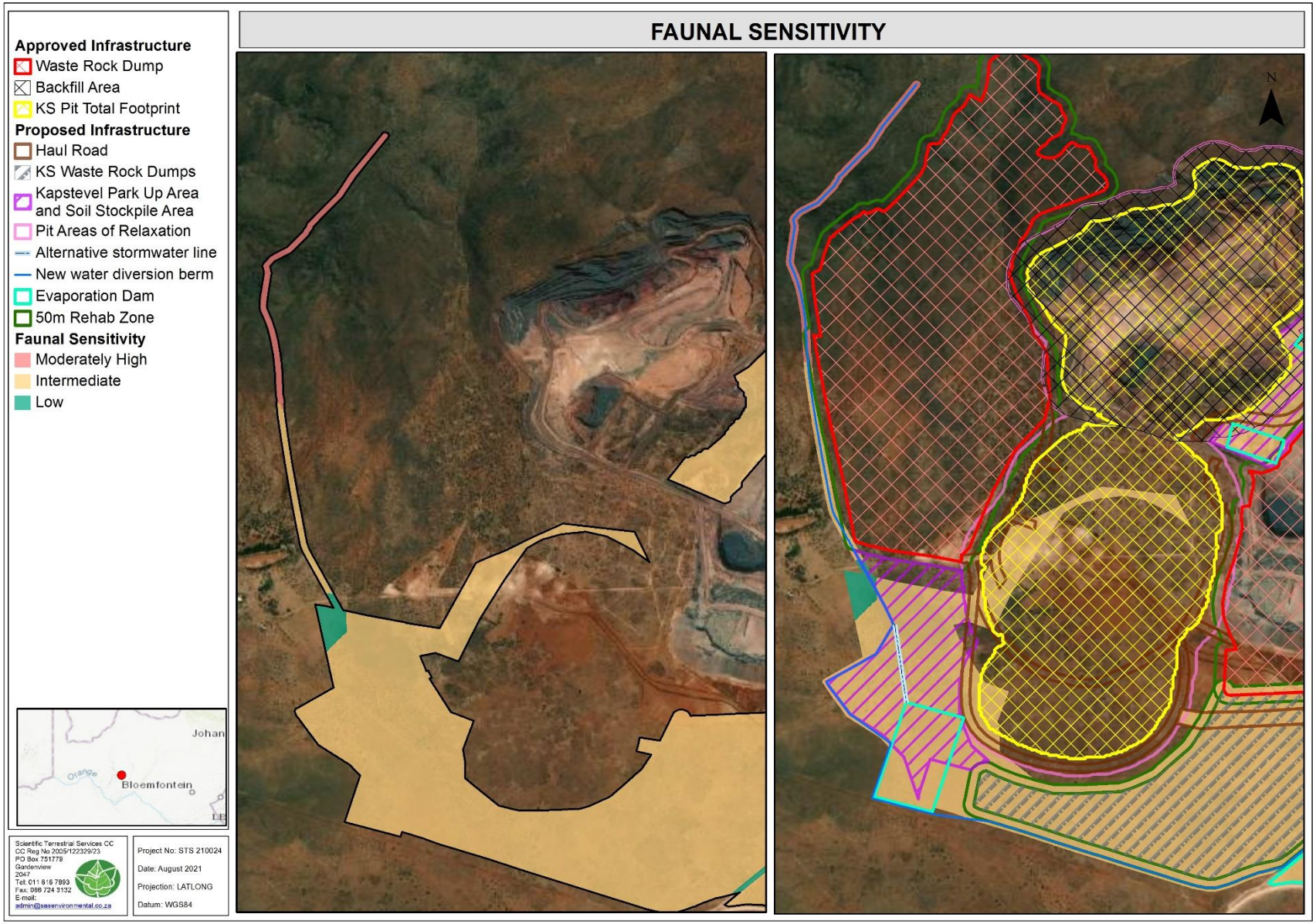


Figure 9: Faunal habitat sensitivity map for the western portions of the focus area.

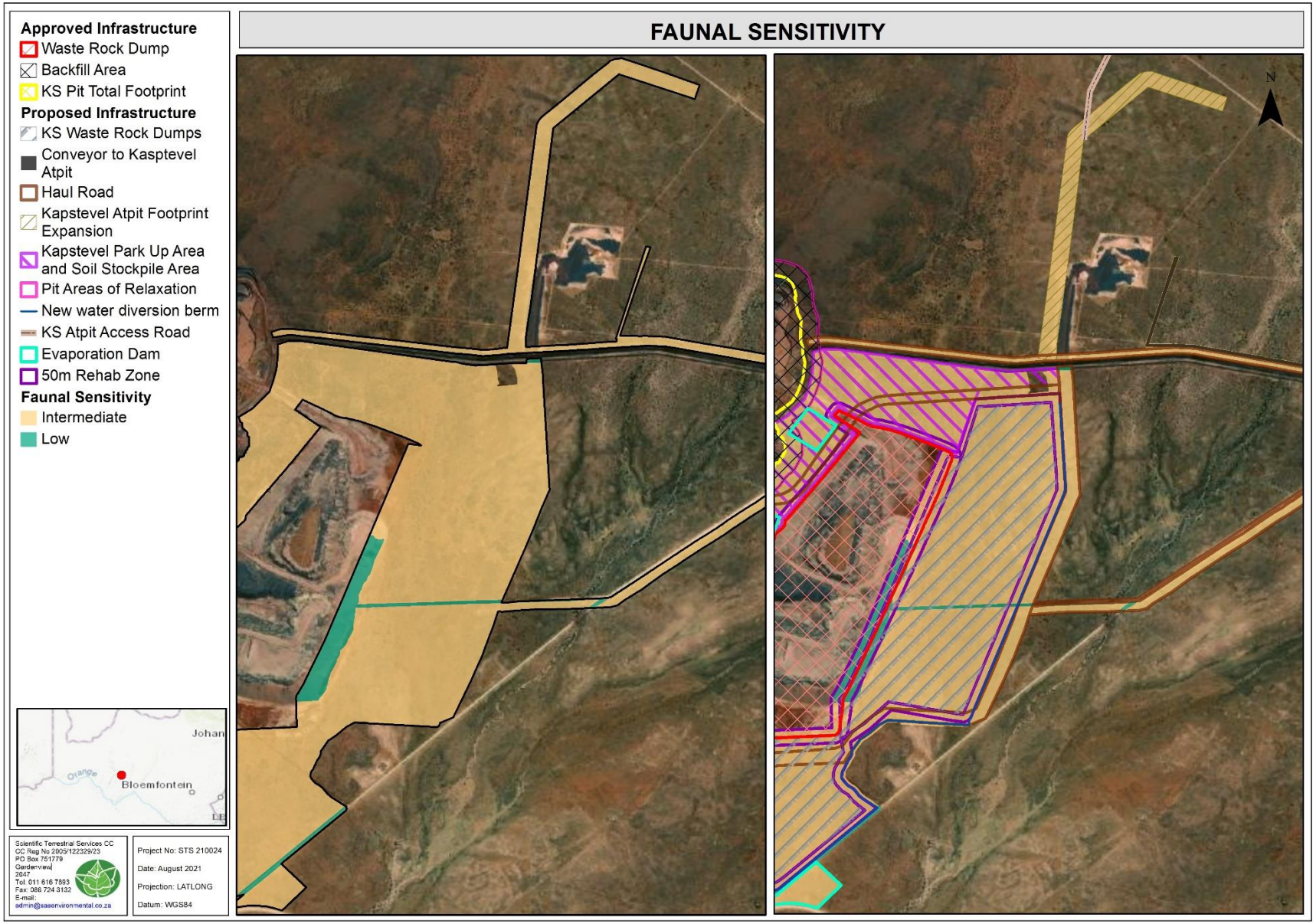


Figure 10: Faunal habitat sensitivity map for the western central portions of the focus area.

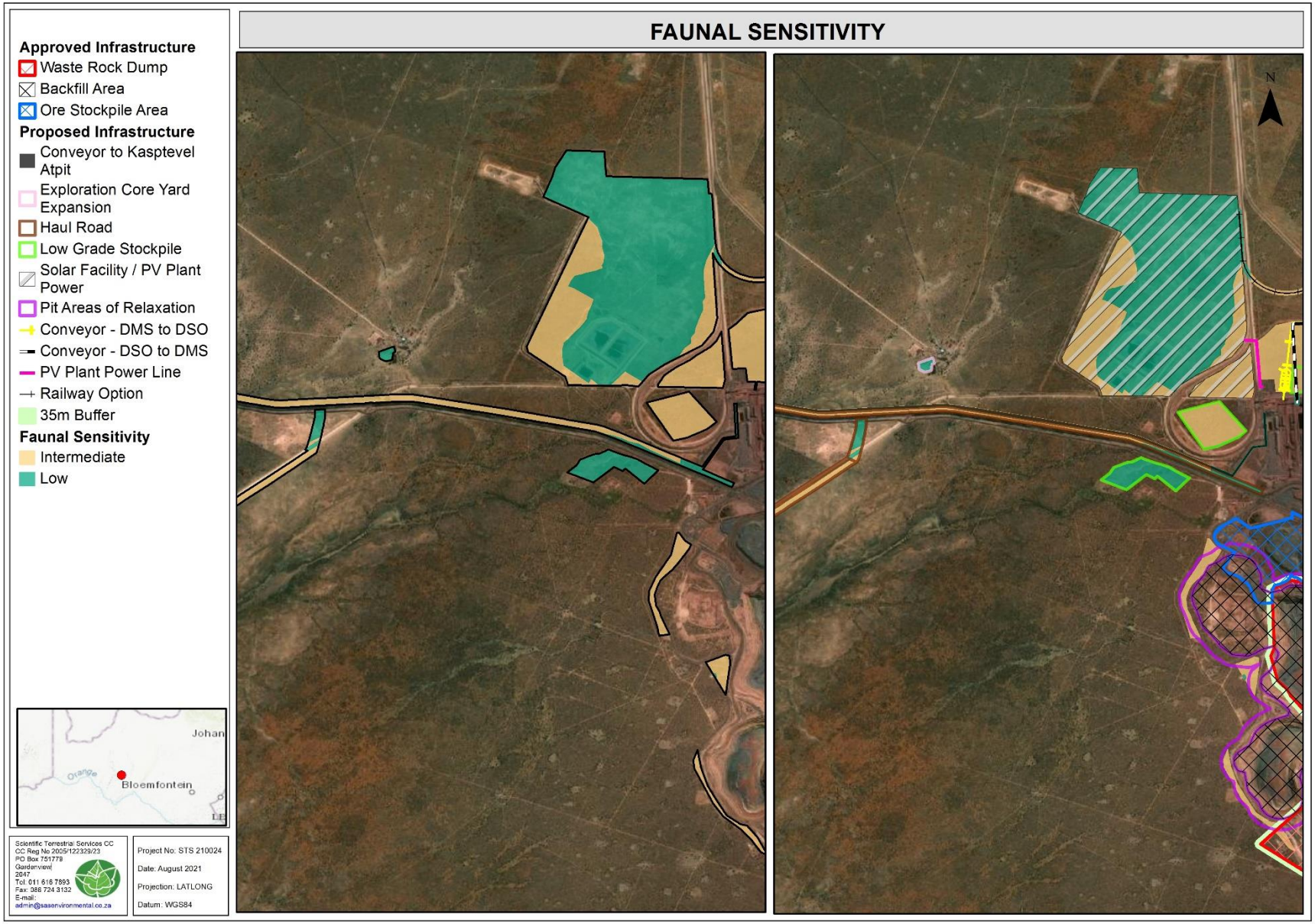


Figure 11: Faunal habitat sensitivity map for the eastern central portions of the focus area.

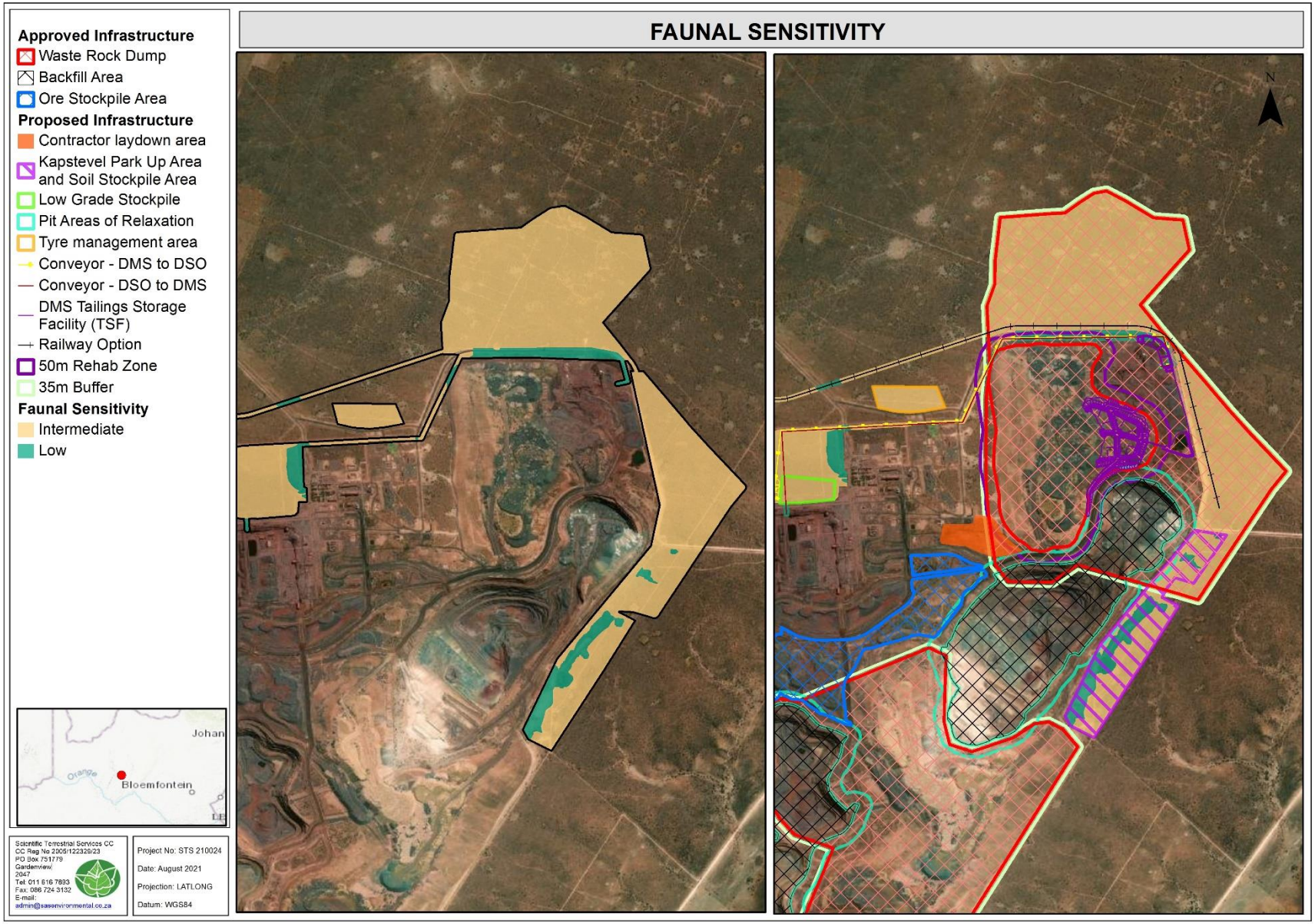


Figure 12: Faunal habitat sensitivity map for the eastern portions of the focus area.

5. IMPACT ASSESSMENT

The tables below serve to summarise the significance of perceived impacts on the terrestrial ecology of the focus areas habitat units, according to the method described in Part A: Background information report- Appendix C, with impacts in terms of faunal assemblage presented in Section 5.1 and 5.2 of this report. The impacts are first considered without mitigation having taken place and then are considered with mitigation having occurred. A summary of the potential impacts resulting from the proposed development activities is provided in the Section below. All the required mitigatory measures needed to minimise the impact is presented in Section 5.3 thereafter.

Activities and Aspect Register

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

Table 7: Activities and aspects during all phases of the proposed development, that will likely impact on the faunal resources of the focus area

ACTIVITIES AND ASPECTS REGISTER
Pre-Construction and Planning Phase
- Potential poorly planned placement of the proposed infrastructure encroaching into natural areas which carry out important ecological functions (such as the Drainage Line, Cryptic Wetlands and Mountain Bushveld). - **Impact**: Extensive and unnecessary loss of important faunal habitat, leading to a decline in faunal diversity, including a decline in faunal potential SCC numbers and diversity within the focus area.
- Potential failure to implement the required mitigation measures before and at the commencement of construction activities: • Failure to conduct a site walk down of the footprint areas for arachnid SCC, reptile SCC, nesting of avifaunal SCC and any other possible SCC present on site before vegetation clearing; • Potential failure to obtain the necessary permits for the removal of protected faunal species should they be needed resulting in delays to the construction activities; • Potential failure to have a Rehabilitation Plan developed, and implemented, before the commencement of the proposed activities; and • Potential failure to implement an Alien and Invasive Plant (AIP) Management/Control Plan before construction activities commence. - **Impact**: Long-term or permanent degradation and modification of the receiving environment and displacement or loss of faunal SCC.
- Failure to have a Rehabilitation Plan and Biodiversity Management Plan developed and ready for implementation before commencement of mining activities. Suitable migratory corridors in the high sensitivity areas that are suitable for fauna must be planned and implemented. - **Impact**: Without a Rehabilitation Plan in place prior to the construction phase, there could be potential delays in the implementation of the rehabilitation plan at later stages, thus leading to the loss of viable soils for optimal plant growth, postponing and limiting the reintroduction of faunal species and potentially resulting in permanent transformation resulting in a decrease in abundance and diversity of species, which may have regional impact.
- Potential failure to implement an AIP Management/Control Plan before construction activities commence which is required to allow for non-contaminated topsoil stockpiles and will subsequently aid with improved AIP management and rehabilitation down the line. - **Impact**: Loss of niche habitat, limiting the re-establishment potential of faunal SCC due to proliferation of unfavourable AIPs.

ACTIVITIES AND ASPECTS REGISTER
- Potential inadequate design of hazardous storage infrastructure leading to pollution of soils as a result of, e.g., seepage/leaks from infrastructure failure. - Impact: Contaminated soils lead to a loss of viable growing conditions for plants and results in a decrease of faunal habitat, diversity and SCC – rehabilitation effort will also be increased as a result.
Construction and Rehabilitation Phase / Construction and Operational Phase
- Inadequate planning and development layout optimisation, resulting in extensive site clearing and the removal of indigenous vegetation. - **Impact:** Loss of faunal habitat (Drainage Line, Cryptic Wetlands, Thornveld Habitat and Mountain Bushveld directly impacted) and the potential loss of faunal SCC.
- Additional pressure on faunal habitat 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; • Potential overexploitation through the trapping and/or hunting of faunal species, including faunal SCC, beyond the direct footprint area. • Increased human activity will lead to the displacement and/or loss of potential faunal SCC. - **Impact:** Loss of sensitive faunal habitat and local faunal abundance and diversity, including SCC
- Uncontrolled and unplanned site clearing, the removal of vegetation and destruction of faunal habitat and forage in the Drainage Line and Mountain Bushveld Habitat units. - **Impact:** Loss of sensitive faunal habitat and faunal species reliant on this specific habitat for survival.
- Potentially poorly managed edge effects: • Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to continual proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the floral and faunal habitat; and • Compaction of soil outside of the focus area due to indiscriminate driving of construction vehicles through natural vegetation. - **Impact:** Loss of faunal habitat, diversity and potential SCC within the direct footprint of the proposed development. Loss of surrounding faunal diversity SCC through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas.
- Dumping of material within areas where no activities are planned or within the sensitive habitat, thereby leading to further habitat disturbance - allowing the establishment and spread of AIPs and further alteration of faunal habitat. - **Impact:** Loss of preferred faunal habitat, forage, diversity and potential SCC as AIPs outcompete and replace native vegetation.
- Potential failure to concurrently rehabilitate bare or disturbed sites as soon as the mining activities have occurred will potentially result in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs. - **Impact:** Long-term loss of favourable habitat for historically recorded faunal species. Loss of faunal diversity and SCC which will disburse into the surrounding area in search of favourable habitat.
- Possible increased fire frequency during construction. - **Impact**: Loss or alteration of faunal habitat and species diversity.
- Risk of contamination from spills which may pollute receiving environment. - **Impact:** Potential displacement and /or loss of faunal species and habitat.
- Proliferation of AIP species that colonise areas of increased disturbances and may outcompete indigenous plant species, including further transformation of adjacent, undeveloped habitat. - **Impact:** Degradation of favourable faunal habitat outside of the direct construction and operational footprint, leading to a decrease in faunal diversity at a local scale and loss of land to meet biodiversity targets.
- Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to a continual proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the faunal habitat. - **Impact:** Loss of faunal habitat, diversity and SCC within the direct areas of the proposed development through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas.
- Habitat fragmentation resulting from poorly rehabilitated areas and inadequate planning for potential migratory corridors/routes following the proposed activities. - **Impact:** Long-term changes in faunal habitat, reduced faunal movement and potential loss of potential SCC.
- Potential failure to concurrently rehabilitate bare or disturbed sites as soon as the construction activities have occurred will potentially result in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs. - **Impact:** Long-term loss of favourable habitat for historically recorded faunal species. Loss of faunal diversity and potential SCC which will disperse into the surrounding area in search of favourable habitat.

ACTIVITIES AND ASPECTS REGISTER
- Dust generated during construction and operational activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants[1] and potentially further decreasing optimal growing/re-establishing conditions. - **Impact:** Declines in plant functioning leading to loss of floral species reducing the habitat and forage suitability for faunal species. Similarly, reduction in plant functionality will impact on inspect populations, which are a staple food source for various other faunal species.
Operational and Maintenance Phase / Decommissioning & Closure Phase
- 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 SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural faunal habitat of increased sensitivity. Further reduction of available habitat in the long-term, compounding the limiting factors to faunal assemblages.
- Increased human presence in the area once operational, potentially leading to persecution of fauna in the adjacent natural habitat, or an increased risk and frequency of fire, littering and other waste impacting on faunal communities outside of the development footprint. - **Impact:** Loss of faunal habitat, SCC, as well as overall species diversity within the local area.
- Potential poor management and failure to monitor rehabilitation efforts, leading to: • Landscapes being left fragmented, resulting in reduced migration capabilities of faunal species, isolation of faunal populations and a decrease in faunal diversity; • Increased storm water run-off; • 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 SCC and sedimentation of watercourses.
- Poorly implemented and monitored AIP Management programme leading to the reintroduction and proliferation of AIP species. - **Impact:** Permanent loss of surrounding faunal niche habitat, diversity and potential SCC.
- On-going risk of contamination from vehicles. - **Impact:** Permanent impact on faunal habitat through contamination of soils and downstream water resources.
- Rehabilitation of currently Degraded habitat and AIP clearance of already proliferated areas within the Transformed Habitat. - **Impact (positive):** The ecological functioning will be restored that has been lost due to AIP proliferation and habitat transformation.

Table 8 below provides all the impact scores pre- and post-mitigation measures (as stipulated in Section 5.3 below). It Is important to note that if ALL mitigations as stipulated in this report are not implemented, the post mitigation scoring may need to be amended. For the purpose of this report Moisture-Driven Habitat and Thornveld habitat are not scored per sub-unit as a result of the habitats being of the same sensitivity and because they provide similar structure and opportunities for fauna.

[1] Sett, R. (2017). Responses in plants exposed to dust pollution. Horticulture International Journal, 1(2), 00010.).

Table 8: Faunal Impact Assessment Results.

Habitat Unit	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
PRE-CONSTRUCTION & PLANNING PHASE																
Impact of faunal Habitat and Diversity																
Mountain Bushveld	3	4	3	3	3	**7**	**9**	**63** **Medium low**	3	4	2	3	2	**7**	**7**	**49** **Low**
Moisture driven Habitat **Watercourse habitat** (Cryptic wetlands, Linear Drainage Line habitat Anthropogenic drainage line) and **Non-watercourse Habitat** (Seasonal depressions) Kalahari Thornveld Habitat	3	3	3	2	3	**6**	**8**	**48** **Low**	3	3	3	2	2	**6**	**7**	**42** **Low**
Thornveld Habitat *Tarconanthus-Senegalia* Thornveld, Kalahari Thornveld and *Senegalia* Thornveld	3	3	4	3	3	**6**	**10**	**60** **Medium low**	3	3	3	3	2	**6**	**8**	**48** **Low**
Calcrete Habitat	3	3	3	2	3	**6**	**8**	**48** **Low**	3	3	3	2	2	**6**	**7**	**42** **Low**
Transformed Habitat	3	2	3	3	3	**5**	**9**	**45** **Low**	3	2	2	3	2	**5**	**7**	**35** **Low**

Impact on faunal SCC																
Mountain Bushveld	3	4	3	3	3	**7**	**9**	**63**	3	4	2	3	2	**7**	**7**	**49**
								Medium low								**Low**
Moisture driven Habitat **Watercourse habitat** (Cryptic wetlands, Linear Drainage line habitat Anthropogenic drainage line) and **Non-watercourse Habitat** (Seasonal depressions) Kalahari Thornveld Habitat	3	3	3	2	3	**6**	**8**	**48**	3	3	3	2	2	**6**	**7**	**42**
								Low								**Low**
Thornveld Habitat *Tarconanthus-Senegalia* Thornveld, Kalahari Thornveld and *Senegalia* Thornveld	3	3	4	3	3	**6**	**10**	**60**	3	3	3	3	2	**6**	**8**	**48**
								Medium low								**Low**
Calcrete Habitat	3	3	3	2	3	**6**	**8**	**48**	3	3	3	2	2	**6**	**7**	**42**
								Low								**Low**
Transformed Habitat	3	2	3	3	3	**5**	**9**	**45**	3	2	2	3	2	**5**	**7**	**35**
								Low								**Low**
CONSTRUCTION PHASE																
Impact of faunal Habitat and Diversity																
Mountain Bushveld	5	4	3	3	3	**9**	**9**	**81**	4	4	3	3	2	**8**	**8**	**64**
								Medium high								**Medium low**
Moisture driven Habitat **Watercourse habitat** (Cryptic wetlands, Linear Drainage line habitat Anthropogenic drainage line) and	5	3	5	2	4	**8**	**11**	**88**	4	3	4	2	3	**7**	**9**	**63**
								Medium high								**Medium low**

Non-watercourse Habitat (Seasonal depressions) Kalahari Thornveld Habitat															
Thornveld Habitat *Tarconanthus-Senegalia* Thornveld, Kalahari Thornveld and *Senegalia* Thornveld	5	3	5	3	4	**8**	**12**	**96** **Medium high**	4	3	4	3	4	**7**	**11**	**77** **Medium high**
Calcrete Habitat	5	3	4	2	4	**8**	**10**	**80** **Medium high**	4	3	3	2	3	**7**	**8**	**56** **Medium low**
Transformed Habitat	4	2	3	3	4	**6**	**10**	**60** **Medium low**	3	2	2	3	3	**5**	**8**	**40** **Low**
Impact on Faunal SCC																
Mountain Bushveld	5	4	4	3	3	**9**	**10**	**90** **Medium high**	4	4	3	3	2	**8**	**8**	**64** **Medium low**
Moisture driven Habitat **Watercourse habitat** (Cryptic wetlands, Linear Drainage line habitat Anthropogenic drainage line) and **Non-watercourse Habitat** (Seasonal depressions) Kalahari Thornveld Habitat	5	3	3	2	4	**8**	**9**	**72** **Medium low**	4	3	2	2	3	**7**	**7**	**49** **Low**
Thornveld Habitat *Tarconanthus-Senegalia* Thornveld, Kalahari Thornveld and *Senegalia* Thornveld	5	3	4	3	4	**8**	**11**	**88** **Medium high**	4	3	3	3	4	**7**	**10**	**70** **Medium low**
Calcrete Habitat	5	3	4	2	4	**8**	**10**	**80** **Medium high**	4	3	3	2	3	**7**	**8**	**56** **Medium low**

Transformed Habitat	4	2	3	3	4	**6**	**10**	**60**	3	2	2	3	3	**5**	**8**	**40**
								Medium low								**Low**
OPERATIONAL AND MAINTENANCE PHASE																
Impact of faunal Habitat and Diversity																
Mountain Bushveld	4	4	3	3	5	**8**	**11**	**88**	4	4	3	3	4	**8**	**10**	**80**
								Medium high								**Medium high**
Moisture driven Habitat **Watercourse habitat** (Cryptic wetlands, Linear Drainage line habitat Anthropogenic drainage line) and **Non-watercourse Habitat** (Seasonal depressions) Kalahari Thornveld Habitat	4	3	3	2	5	**7**	**10**	**70**	3	3	3	2	5	**6**	**10**	**60**
								Medium low								**Medium low**
Thornveld Habitat *Tarconanthus-Senegalia* Thornveld, Kalahari Thornveld and *Senegalia* Thornveld	4	3	4	3	5	**7**	**12**	**84**	4	3	3	3	4	**7**	**10**	**70**
								Medium high								**Medium low**
Calcrete Habitat	4	3	3	2	5	**7**	**10**	**70**	3	3	3	2	4	**6**	**9**	**54**
								Medium low								**Medium low**
Transformed Habitat	3	2	2	3	4	**5**	**9**	**45**	2	2	2	3	3	**4**	**8**	**32**
								Low								**Low**
Impact on faunal SCC																
Mountain Bushveld	4	4	3	3	5	**8**	**11**	**88**	4	4	3	3	4	**8**	**10**	**80**
								Medium high								**Medium high**
Moisture driven Habitat **Watercourse habitat** (Cryptic wetlands, Linear Drainage line habitat	4	3	3	2	5	**7**	**10**	**70**	3	3	3	2	5	**6**	**10**	**60**
								Medium low								**Medium low**

Anthropogenic Drainage line) and **Non-watercourse Habitat** (Seasonal depressions) Kalahari Thornveld Habitat																
Thornveld Habitat *Tarconanthus-Senegalia* Thornveld, Kalahari Thornveld and *Senegalia* Thornveld	4	3	4	3	5	**7**	**12**	**84** **Medium high**	4	3	3	3	4	**7**	**10**	**70** **Medium low**
Calcrete Habitat	4	3	3	2	5	**7**	**10**	**70** **Medium low**	3	3	3	2	4	**6**	**9**	**54** **Medium low**
Transformed Habitat	3	2	2	3	4	**5**	**9**	**45** **Low**	2	2	2	3	3	**4**	**8**	**32** **Low**

5.1. Impact discussion

Overall, the perceived impact significance of the proposed development (prior to mitigation) on faunal habitat, diversity and SCC range from medium high to low for all habitats within the focus area. With mitigation measures impacts can be reduced to lower levels in most cases. As impacts cover relatively large areas the impacts scores are relatively high, yet as a result of the footprint adjacent historic or current infrastructure no regional impacts are anticipated. The potential for large scale impacts is unlikely if recommended mitigation measures as stipulated in Section 5.3 are adhered to.

Impacts to SCC are anticipated as the focus area offers suitable habitat in terms of foraging and/or breeding for several SCC. Impacts do not reach high impacts as most SCC, except invertebrates, are anticipated to utilise the focus area on an intermittent basis for foraging and not on a permanent basis as a result of the constant human movement. *Ardeotis kori* (Kori Bustard, NT) (observed on site) and *Neotis ludwigii* (Ludwig's Bustard, EN) may breed within the focus area, however, the high degree of human movement may disturb these reclusive species pushing them to breed beyond the focus areas. Impacts, without mitigation, to SCC range from medium high to very low through all phases of the development. Mitigation, if implemented correctly, will reduce the impact significance to SCC in most habitats. However as the more sensitive Mountain Bushveld provides valuable habitat to several fauna impacts to this unit remain medium high.

5.1.1. Impact on Faunal Habitat and Diversity

Development, without mitigation, will have a medium-high impact on the Mountain Bushveld, Thornveld Habitat, Moisture-driven Habitat and Calcrete habitat, as a result of the removal of untransformed natural vegetation during the construction phase. The resulting impact will lead to reduction of faunal opportunities for shelter and forage and higher competition for resources within the remaining assemblage of fauna. The long-term nature of the anticipated impacts during the operational phase will incur medium-high impacts on the Mountain Bushveld and Thornveld habitat units. Currently the focus area supports a modest variety of faunal classes, and although mostly common species are anticipated to utilise the study area on a permanent basis, several SCC do occur within the study area and habitat for these species will be reduced. Large predators are largely absent from the focus area yet may intermittently pass through while foraging, there niche having largely been replaced by mesopredators.

The proposed development activities within the focus area will reduce the current levels of diversity within the faunal community and will possibly lead to the local reductions in faunal abundances, especially for faunal classes with poor dispersal abilities, such as terrestrial invertebrates. Impacts to the sensitive Mountain Bushveld will likely be responsible for a reduction in diversity are as this area is utilised as a movement corridor. Although limited habitat will be transformed the unit remains sensitive and retains high ecosystem functionality as a result of its water channelling ability.

5.1.2. Impact on Faunal SCC

There are several SCC that utilise the site on a permanent or temporary bases. These species include: *Orycteropus afer* (Aardvark), *Otocyon megalotis* (Bat-eared Fox), *Hippotragus equinus* (Roan Antelope), *Poecilogale albinuch* (African Striped Weasel), *Ictonyx striatus* (Striped Polecat), *Vulpus chama* (Cape Fox), *Proteles cristata* (Aardwolf), *Felis nigripes* (Black footed Cat), *Neotis ludwigii* (Ludwig's Bustard), *Polemeatus bellicosus* (Martial Eagle), *Aquila rapax* (Tawny Eagle), *Ardeotis kori* (Kori Bustard), *Cursorius rufus* (Burchell's courser), *Gyps africanus* (White-backed Vulture), *Torgos tracheliotos* (Lappet-faced Vulture), *Sagittarius serpentarius* (Secretarybird), *Falco biarmicus* (Lanner Falcon), *Opistophthalmus carinatus* (Robust Burrowing Scorpion), *Opistophthalmus wahlbergii* (Kalahari Burrower), *Opistophthalmus pluridens, Opistophthalmus ater, Harpactira baviana* and possibly *Pterinochilus murinus*.

All these species have suitable habitat to forage within the focus area and as such large scale developments will reduce the suitable habitat for these species within the focus area. Mammal SCC (*Orycteropus afer* (Aardvark), *Otocyon megalotis* (Bat-eared Fox), *Proteles cristata* (Aardwolf), *Hippotragus equinus* (Roan Antelope), and avifaunal SCC *Cursorius rufus* (Burchell's courser), *Polemeatus bellicosus* (Martial Eagle), *Aquila rapax* (Tawny Eagle), *Ardeotis kori* (Kori Bustard), *Gyps africanus* (White-backed Vulture), *Torgos tracheliotos* (Lappet-faced Vulture) and *Sagittarius serpentarius* (Secretarybird) require vast areas to fulfil their dietary requirements and as such are likely to only temporarily occur within the focus area. These species would readily be able to avoid any activities that may occur within the focus area and will avoid areas where future activities are proposed. The various identified Arachnid SCC as well as *Hippotragus equinus* (Roan Antelope) will breed within the focus area while *Ardeotis kori* (Kori Bustard) and *Neotis ludwigii* (Ludwig's Bustard) may breed here. However, anthropogenic disturbances likely exclude them from breeding adjacent human activities within the focus area. *Hippotragus equinus* (Roan Antelope) have been introduced by the mine, yet, they are endemic and maintain an important functional guild within the

landscape as few large herbivores remain. Although no signs of *Felis nigripes* (Black footed Cat) were noted the species is largely nocturnal and reclusive making observations difficult, should the species occur within the focus area it is likely to breed in this locality. As such SCC will lose valuable habitat for breeding and foraging. Local habitat destruction and increased human movement will lead to a reduction in SCC diversity and may lead to avoidance and migrations of SCC to adjacent habitat which may increase competition for resources in these areas.

If in the event that nests or burrows of faunal SCC as listed in Appendix B of this report are encountered during the construction of the proposed development, a biodiversity specialist must be consulted in order to ascertain the best way forward.

5.2. Probable Latent Impacts

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

- Continued loss of faunal habitat;
- Continued loss of potential SCC;
- Potential loss of and altered faunal species diversity;
- Reduction of faunal abundance, notably invertebrate, reptile and avifaunal abundance; and
- Disturbed areas are highly unlikely to be rehabilitated to baseline levels of ecological functioning and as such loss of faunal habitat, species diversity and faunal SCC will most likely be permanent.

5.3. Cumulative Impacts

Based on the general landscape and habitat within the focus area the site has the potential to host intermediate assemblages of fauna and potentially several SCC. Several Arachnid SCC have foraging and breeding habitat within the focus area and a Baboon Spider burrow was noted, as such, uncontrolled development within the respective habitats (particularly the Mountain Bushveld, Calcrete Shrubveld and the Thornveld habitats) will result in the loss of breeding or foraging habitat for these species. Two avian SCC *Neotis ludwigii* (Ludwig's Bustard) and *Ardeotis kori* (Kori Bustard) and the mammal *Hippotragus equinus* (Roan Antelope) may lose breeding habitat as a result of the developments. While avian and mammal SCC potentially breed within the focus area it is not considered an important breeding locality for these SCC and the development is not likely to result in changes to breeding productivity, however, reductions in abundance within the focus area are likely. The position of the

proposed activities, which are largely situated adjacent existing activities reduce the impacts of the proposed development as the proposed activities will occur where edge effects and human movement is high where integrity is reduced. As no heavily transformed areas surround the proposed focus area it is unlikely that any important dispersal corridors occur, except in the Mountain Bushveld, as wide open spaces do not funnel fauna. The increased human activity may however result in animals avoiding the broader area due to the disturbances from machinery.

The proposed activities will lead to the loss of faunal habitat within the development footprint and to a reduction in the abundance of fauna and a potential for local reductions in SCC presence. This will lead to the displacement of faunal species currently inhabiting these areas, driving them out into the surrounding vegetated areas, leading to increased competition for territories and breeding sites. Moreover, there is likely to be a knock-on dispersal effect, leading to increased resource competition and possible increased mortality rates as the carrying capacity is impacted, resulting in a decreased species abundance, decreased breeding potential and possible further loss of species diversity.

The most prominent threat to the faunal ecology within the focus area is the proposed development within the portions of natural Mountain Bushveld, Calcrete and Thornveld habitats. High development potential land occurs within the portions of Transformed habitat where threats to habitat and diversity are limited. Increased human presence and activity in the area, during construction and once the development is operational, could potentially lead to noise disturbance, illegal harvesting and persecution of fauna in or adjacent to the focus area. There is also an increased risk of fire frequency, which could negatively impact faunal communities outside the development footprint. Littering and dumping of other waste material in sensitive areas within or surrounding the focus area, is another cumulative impact that could increase substantially over the operations of the development.

5.4. Integrated Impact Mitigation

The table below highlights the key integrated mitigation measures that are applicable to the proposed focus area in association with the proposed activities in order to suitably manage and mitigate the ecological impacts that are associated with the proposed development. Provided that all the management and mitigation 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	*Pre-Construction and Planning Phase*
Impact Summary	*Loss of faunal habitat, species and faunal SCC*
Proposed mitigatory and management measures:	
Faunal Habitat and Diversity	
- Minimise loss of indigenous vegetation where possible through refining the final development footprint, optimising the design within habitat of lowered ecological importance and sensitivity (Transformed Habitat unit) and minimising development within the more sensitive habitats (Drainage Line, Cryptic Wetlands and Mountain Bushveld); - Culverts should be installed (where practicable and if possible) along any drainage lines under roads and fences to allow for the movement of smaller species (particularly small mammals and reptiles): - It is considered imperative that the mining development area be optimised and that all highly sensitive areas be avoided as far as possible (Mountain Bushveld and Linear Drainage Line habitat). This is in line with the DFFE (2013) mitigation hierarchy that stipulates high risk activities must be avoided first and foremost; - Design of infrastructure should be environmentally sound (infrastructure should not allow any chemicals or hazardous materials to escape into the local environment) and all construction equipment to be utilised must be in good working condition, and all possible precautions taken to prevent potential spills and /or leaks; and - The final development layout design of the proposed infrastructure should be made as small as feasibly possible and as far as possible the layout should remain outside of the Mountain Bushveld and Freshwater habitat. Should any changes occur the final layout design must be reviewed by a suitably qualified specialist to determine final impact scores.	
Alien Vegetation	
- Prior to the commencement of construction activities, an AIP Management/Control Plan should be compiled for implementation during the Construction and Operational Phases; and - Removal of alien invasive species should be planned to take place throughout the construction and operational phases. AIP clearing must be planned in a way that avoids the spread of propagules to areas outside of the focus area. An AIP Management/Control Plan should be compiled by a suitably qualified specialist.	
Project phase	*Construction Phase*
Impact Summary	Loss of faunal habitat, species and faunal SCC
Proposed mitigatory and management measures:	
Development footprint	
- No development should occur beyond the proposed footprint; - Faunal habitat beyond the demarcated area should not be altered; - Construction equipment should be restricted to travelling only on designated roadways or within the intended development footprint to limit the ecological footprint of the development activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal; - No dumping of litter, human refuse, garden waste or rubble on site should be allowed. As such it is advised vegetation cuttings (especially AIP) to be carefully collected and disposed of at a separate waste facility; - No hunting/trapping or collecting of faunal species is allowed; and - No informal fires by construction personnel are allowed. - Care should be taken during the construction and operation of the proposed development to limit edge effects to surrounding natural habitat. This can be achieved by: o Demarcating all footprint areas during construction activities; o 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; o All soil compacted as a result of construction activities (outside of the development footprint) should be ripped, profiled and reseeded; and o Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas.	
Alien Vegetation	
- All AIP must be managed according to existing AIP management plans. Should the plans not cover the new proposed footprint areas they should be extended to do so.	
Dust	
- The existing dust management plan must be followed to limit the potential impacts of dust on the local environment (faunal habitat).	
Faunal SCC	
- No collection of any fauna within the focus area may be undertaken by any construction personnel; - Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC habitat outside of the proposed development footprint;	

- Should any other faunal species protected under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) or the Northern Cape Nature Conservation Act (schedule 1) be encountered, construction should be halted and authorisation to relocate such species must be obtained from the Department of Environment, Forestry and Fisheries (DFFE) or Northern Cape Department of Agriculture, Environmental Affairs, Land Reform and Rural Development (DAELRRD). Should species as listed within schedule 2 be encountered, a specialist at the DAELRRD or at STS should be contacted to determine the best course of action;
- Prior to vegetation clearing activities in the natural vegetation unit (Mountains Bushveld, Thornveld and Calcrete Habitats), the site should be inspected for the presence of burrowing SCC scorpions and baboon spiders SCC. If located, these species should be carefully excavated ensuring no harm to the specimens and relocated to similar surrounding habitat outside of the footprint area. A night-time survey is recommended to aid in the collection of potential scorpion SCC. The survey should be undertaken in summer where these arachnids are more active;
- A suitable rescue and relocation plan should be developed and overseen by a suitably qualified specialist should SCC be identified within the focus area in order to ensure that species loss during construction activities is kept to a minimum; and
- Smaller species such as scorpions and reptiles are likely to be less mobile during the colder period, as such should any be observed in the study site 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 scorpion or reptiles should be carefully relocated by a nominated construction person or staff member. For venomous snakes or scorpions, a suitably trained official or specialist should be contacted to affect the relocation of the species, should it not move off on its own.

Fire

- No illicit fires must be allowed during the construction phase of the proposed development.

Rehabilitation

- Any natural areas beyond the development footprint, that have been affected by the construction activities, must be rehabilitated using indigenous plant species.
- All soils compacted as a result 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;
- Revegetation of disturbed areas should be carried out in order to restore habitat availability and minimise soil erosion and surface water runoff; and
- When rehabilitating a footprint site, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated, so that faunal species that were displaced by vegetation clearing activities are able to recolonize the rehabilitated area.

Project phase	*Operational and Maintenance Phase*
Impact Summary	Loss of faunal habitat, species and faunal SCC

Proposed mitigatory and management measures:

Development footprint

- It is recommended that the natural landscape be retained as far as possible;
- All vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the development activities;
- No dumping of litter should be allowed to remain on-site. As such it is advised that garden vegetation cuttings to be carefully collected and disposed of at a separate waste facility; and
- No hunting/trapping or collecting of faunal species is allowed.

Alien Vegetation

- All AIP must be managed according to existing AIP management plans. Should the plans not cover the new proposed footprint areas they should be extended to do so.

Faunal SCC

- No collection of firewood or fauna is allowed by mining personnel during the decommissioning.

Fire

- No illicit fires must be allowed during the decommissioning and closure phase of the proposed mining development;
- Fire break should be maintained during the decommissioning and closure phase.

Rehabilitation

- Where bare soils are left exposed as a result of construction activities, they should be immediately rehabilitated. Rehabilitated efforts should continue to be monitored throughout the operational phase, until natural processes will allow the ecological functioning and biodiversity of the area to be re-instated.

6. CONCLUSION

Scientific Terrestrial Services (STS) was appointed to conduct a biodiversity assessment as part of EA process for the proposed Kolomela Mine Expansion near Postmasburg, Northern Cape Province.

During the field assessment five broad habitat units were identified, namely the of Mountain Bushveld, Thornveld habitat, Calcrete Habitat Habitat, Moisture-driven Habitat and Transformed habitat units. The most sensitive habitat noted within the site from a faunal perspective was the Mountain Bushveld which was considered of moderately high sensitivity followed by the Intermediate sensitivity Thornveld Habitat which provided valuable habitat for fauna. The Calcrete and Moisture driven habitat were also of intermediate sensitivity but these units showed reduced faunal diversities and potential forage reducing faunal habitat sensitivity. The Transformed habitat was considered to be of low faunal sensitivity as a result of the historic earthworks and mining and the resulting alteration to faunal habitat. The Mountain Bushveld habitat provides valuable basking habitat for reptiles and valuable patchy niche habitat for invertebrates and small mammals while the Thornveld Habitat is resource rich in terms of forage and shelter for fauna. The Transformed habitat offers limited value for faunal utilisation. Habitat integrity within the focus area, besides the Transformed habitat is high as the surrounding areas have escaped development and remain in a largely natural state.

The site assessment indicated that the focus area has the potential to host several SCC. These species include: *Orycteropus afer* (Aardvark), *Otocyon megalotis* (Bat-eared Fox), *Hippotragus equinus* (Roan Antelope), *Poecilogale albinuch* (African Striped Weasel), *Ictonyx striatus* (Striped Polecat), *Vulpus chama* (Cape Fox), *Prosteles cristata* (Aardwolf), *Felis nigripes* (Black footed Cat), *Neotis ludwigii* (Ludwig's Bustard), *Polemeatus bellicosus* (Martial Eagle), *Aquila rapax* (Tawny Eagle), *Ardeotis kori* (Kori Bustard), *Cursorius rufus* (Burchell's courser), *Gyps africanus* (White-backed Vulture), *Torgos tracheliotos* (Lappet-faced Vulture), *Sagittarius serpentarius* (Secretarybird), *Falco biarmicus* (Lanner Falcon), *Opistophthalmus carinatus* (Robust Burrowing Scorpion), *Opistophthalmus wahlbergii* (Kalahari Burrower), *Opistophthalmus pluridens, Opistophthalmus ater, Harpactira baviana* and possibly *Pterinochilus murinus*. No signs of SCC breeding was noted within the focus area but it is likely the listed Arachnid SCC, *Hippotragus equinus* (Roan Antelope), *Ardeotis kori* (Kori Bustard) and *Neotis ludwigii* (Ludwig's Bustard) breed within the focus area, thus mitigation measures should be undertaken to reduce impacts to these species.

Prior to mitigation, the proposed development will result in medium high to low impacts to faunal communities. Higher impact activities occur within the Thornveld and Mountain Bushveld units where larger scale activities occur or where sensitive habitat is proposed to be developed. Should the recommended mitigatory measures be implemented in these habitats, impacts can be reduced to lower impact scores and lower impact levels in most cases. Impacts to faunal SCC are anticipated to be moderately high in the mountain bushveld due to the heterogenous habitat and the inability of arachnid SCC to disperse and the preference of avian and mammal SCC to the Thornveld Habitat. As activities are largely proposed adjacent to existing or already authorised infrastructure this limits the potential for regional scale impacts. Impacts, without mitigation, on SCC range from medium high to low through the construction and operational phases of the development. Mitigation, if implemented correctly, will reduce the impact significance in most cases to lower levels. The proposed development will result in a decrease in faunal diversity and abundance within the focus area, however, provided the proponent utilises the mitigation measures in this report no regional scale impacts are anticipated.

The objective of this study was to provide sufficient information on the faunal ecology of the area, together with other studies on the physical and socio-cultural environment, in order for the Environmental Assessment Practitioner (EAP) and the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development. The needs for conservation as well as the risks to other spheres of the physical and socio-cultural environment need to be compared and considered along with the need to ensure economic development of the country. It is the opinion of the ecologists that should the proposed development be undertaken medium high to low impacts are anticipated from a faunal ecological perspective and that this study provides the relevant information required in order to implement IEM and to ensure that the best long-term use of the ecological resources in the focus 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 focus area may have an impact on faunal behaviour and in turn the rate of observations. In order to increase overall observation time within the focus area, as well as increasing the likelihood of observing shy and hesitant species, Sherman traps were strategically placed within the focus area. Sherman traps were used to increase the likelihood of capturing and observing small mammal species, notably small nocturnal mammals.

Mammals

Small mammals are unlikely to be directly observed in the field because of their nocturnal/crepuscular and cryptic nature. A simple and effective solution to this problem is to use Sherman traps. A Sherman trap is a small aluminium box with a spring-loaded door (Figure A1). Once the animal is inside the trap, it steps on a small plate that causes the door to snap shut, thereby capturing the individual. In the event of capturing a small mammal during the night, the animal would be photographed and then set free unharmed early the following morning. Traps were baited with a universal mixture of oats, peanut butter, and fish paste.

Figure A1: Sherman trap and bait used to capture and identify small mammal species.

Furthermore, 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 focus 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 International Union for the Conservation of Nature (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 focus area. Specific attention was given to reptile SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (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 focus 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 International Union for the Conservation of Nature (IUCN).

Invertebrates

Whilst conducting transects through the focus area, all insect species visually observed were identified, and where possible photographs taken. Pitfall traps was also utilised during the site assessment and all insect species captured identified, photographed and set free.

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 focus 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 International Union for the Conservation of Nature (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 within the focus area.

Faunal Species of Conservation Concern Assessment

The Probability of Occurrence (POC) for each faunal SCC was determined using the following four parameters:

- Species distribution;
- Habitat availability;
- Food availability; and
- Habitat disturbance.

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 focus 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 focus 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 focus 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 focus 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 focus 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 ar surrounds while optimising development potential.
≥3.5<4.5	Moderately high	Preserve and enhance the biodiversity of the habitat un 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

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

Table B1: TOPS list of faunal species (2007) expected to occur within the Northern Cape.

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

Scientific Name	Common Name
Falco fasciinucha	Falcon
Falco naumanni	Lesser Kestrel
Falco peregrinus	Peregrine Falcon
Geronticus calvus	Bald Ibis
Neotis ludwidii	Ludwig's Bustard
Polemaetus bellicosus	Martial Eagle
Terathopius ecaudatus	Bateleur
Tyto capensis	Grass Owl
MAMMALIA	
Acinonyx jubatus	Cheetah
Chrysospalax trevelyani	Giant Golden Mole
Cricetomys gambianus	Giant Rat
Damaliscus pyrgorgus pygargus	Bontebok
Dendrohyrax arboreus	Tree Hyrax
Hippotragus equinus	Roan Antelope
Pholidota temminckii	Pangolin
Neamblysomus julianae	Juliana's Golden Mole
Neotragus moschatus	Suni
Panthera leo	Lion
Panthera pardus	Leopard
Philantomba monticola	Blue Duiker
PROTECTED SPECIES	
AMPHIBIA	
Pyxicephalus adspersus	Giant Bullfrog
Pyxicephalus edulis	Afiican Bullfrog
REPTILIA	
Bitis gabonica	Gaboon Adder
Bitis schneideri	Namaqua Dwarf Adder
Bradypodion taeniabronchum	Smith's Dwarf Chameleon
Cordylus cataphractus	Girdled Lizard
Crocodylus niloticus	Nile crocodile
Python natalensis	African Rock Python
AVES	
Bucowus leadeateri	Southern Ground-Hornbill
Circus ranivorus	African Marsh Harrier
Neotis denhami	Denham's Bustard
Spheniscus	Jackass Penguin
MAMMALIA	
Atelerix frontalis	South African Hedgehog
Ceratotherium simum	White Rhinoceros
Connochaetes	Black Wildebeest
Crocuta	Spotted Hyaena
Felis nigripes	Black-footed Cat
Parahyaena brunnea	Brown Hyaena
Leptailurus serval	Serval
Loxodonta africana	African elephant
Lutra maculicollis	Spotted-necked Otter
Millivora capensis	Honey Badger
Raphicerus sharpei	Sharpe's Grysbok
Redunca	Reedbuck
Vulpes chama	Cape **Fox**

Table B2: Threatened species not yet listed above that may occur in the focus area.

Common Name	Species	NCCA 2009 Status	IUCN 2015 Status
African wild cat	*Felis silvestris*	Specially protected	LC
Striped polecat	*Ictonyx striatus*	Specially protected	LC
African striped weasel	*Poecilogale albinucha*	Specially protected	LC
Aardwolf	*Proteles cristata*	Specially protected	LC
Cape fox	*Vulpes chama*	Specially protected	LC
Southern African hedgehog	*Atelerix frontalis*	Specially protected	LC
Leopard	*Panthera pardus*	Specially protected	VU
Black eagle	*Aquila verreauxii*	Specially Protected	VU
White-backed Vulture	*Gyps africanus*	Specially Protected	CR
Ludwig's Bustard	*Neotis ludwigii*	Specially protected	EN
Martial Eagle	*Polemeatus bellicosus*	Specially Protected	EN
Tawny Eagle	*Aquila rapax*	Specially Protected	EN
Cape Vulture	*Gyps coprotheres*	Specially Protected	EN
Lappet-faced Vulture	*Torgos tracheliotos*	Specially Protected	EN
Burchell's courser	*Cursorius rufus*	Protected	VU
Lanner Falcon	*Falco biarmicus*	Specially Protected	VU
Secretarybird	*Sagittarius serpentarius*	Specially Protected	VU
Kori Bustard	*Ardeotis kori*	NA	NT
African Rock Pipit	*Anthus crenatus*	Protected	NT
Burrowing scorpion	*Opistophthalmus carinatus*	Specially Protected	NYBA
Burrowing scorpion	*Opistophthalmus wahlbergii*	Specially Protected	NYBA
Common flap-neck chameleon	*Chamaeleo dilepis*	Specially Protected	LC
African rock python	*Python sebae*	Specially Protected	LC

EN = Endangered, CR = Critically Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, NYBA = Not yet been assessed, NE = Not Evaluated, NA = Not applicable

The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA) lists several Specially Protected (Schedule 1) and several Protected Species (Schedule 2). The list provided below (Table B3) indicates the species that scored a POC of high, or whose presence was confirmed within the focus area duing the site assessment. The lists as per the NCNCA can be accessed in the link provided:https://sherloc.unodc.org/cld/uploads/res/document/northern-cape-nature-conservation-act-9-of-2009_html/NC_Nature_Conservation_Act.pdf

Table B4: Avifaunal Species for the pentads within the QDS 2822BD.

Pentads	Link to pentad summary on the South African Bird Atlas Project 2 web page
2820_2255	http://sabap2.adu.org.za/coverage/pentad/2820_2255
2820_2250	http://sabap2.adu.org.za/coverage/pentad/2820_2250
2825_2250	http://sabap2.adu.org.za/coverage/pentad/2825_2250

APPENDIX C: Faunal Species List

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

Scientific Name	Common Name	Status	NCNCA (2009)
Antidorcas marsupialis	Springbok	LC	Protected
Hippotragus equinus	Roan Antelope	LC	Protected
* *Proteles cristatus*	Aardwolf	LC	Specially protected
* *Otocyon megalotis*	Bat-eared Fox	LC	Specially protected
* *Orycteropus afer*	Aardvark	LC	Specially protected
* *Phacochoerus africanus*	Common Warthog	LC	Protected
* *Felis silvestris*	African Wildcat	LC	Specially protected
* *Caracal caracal*	Caracal	LC	NA
* *Vulpes chama*	Cape Fox	LC	Specially protected
* *Canis mesomelas*	Black-backed Jackal	LC	NA
* *Genetta genetta*	Small-spotted Genet	LC	Protected
* *Suricata suricatta*	Meerkat	LC	Protected
* *Ictonyx striatus*	Striped Polecat	LC	Specially protected
* *Galerella sanguinea*	Slender Mongoose	LC	Protected
* *Cercopithecus pygerythrus*	Vervet Monkey	LC	NA
* *Xerus inauris*	Ground Squirrel	LC	Protected
Oryx gazelle	Gemsbok	LC	Protected
Sylvicapra grimmia	Common duiker	LC	Protected
Lepus saxatilis	Scrub hare	LC	Protected
Cynitis penicillata	Yellow Mongoose	LC	Protected
+ *Tatera leucogaster*	Bushveld gerbil	LC	Protected
+ *Rhabdomys pumilio*	Four-striped grass mouse	LC	Protected
+ *Elephantulus sp.*	Elephant shrew	NA	NA
+ *Mus minutoides*	African pygmy mouse	LC	Protected
+ *Saccostomus campestris*	Southern african pouched mouse	LC	Protected
+ *Mastomys coucha*	Southern multimammate mouse	LC	Protected
+ *Dendromus melanotis*	Grey climbing mouse	LC	Protected
+ *Crocidura sp.*	Shrew	NA	NA
Pedetes capensis	Springhare	LC	Protected
Tragelaphus strepsiceros	Kudu	LC	Protected
Raphicerus campestris	Steenbok	LC	Protected
Hystrix africaeaustralis	Porcupine	LC	Protected

LC = Least Concern, VU = Vulnerable, * = previously observed by Deacon *et al.* 2020 and + = previously observed by Avenant. 2011.

Table C2: Avifaunal species recorded during the field assessment.

Scientific name	Common name	IUCN Red List Status	NCNCA (2009)
Streptopelia capicola	Cape turtledove	LC	Protected species
Pycnonotus nigricans	Red-eyed Bulbul	LC	NA
Columba guinea	Speckled pigeon	LC	Protected
Uraeginthus granatinus	Violet eared waxbill	LC	Protected
Colies	White-backed Mousebird	LC	N/A
Sylvietta rufescens	Long-billed crombec	LC	Protected

Upupa africana	African Hoopoe	LC	Protected
Spilopelia senegalensis	Laughing Dove	LC	Protected
Afrotis afraoides	Northern Black Korhaan	LC	Protected
Sylvia subcaerulea	Chestnut-vented tit-babbler	LC	Protected
Calendulauda sabota	Sabota Lark	LC	Protected
Prinia masulosa	Karoo Prinia	LC	Protected
Emberiza impetuani	Lark-like Bunting	LC	Protected
Tricholaema leucomelas	Acacia Pied Barbet	LC	Protected
Serinus flaviventris	Yellow Canary	LC	Protected
Quelea	Red-billed Quelea	LC	N/A
Plocepasser mahali	White-browed Sparrow-weaver	LC	Protected
Crithagra albogularis	White-throated Canary	LC	Protected
Crithagra atrogularis	Black-throated Canary	LC	Protected
Passer melanurus	Cape Sparrow	LC	NA
Sporopipes squamifrons	Scaly-feathered Weaver	LC	Protected
Saxicola torquata	African Stonechat	LC	Protected
Anthus cinnamomeus	African Pipit	LC	Protected
Sigelus silens	Fiscal Flycatcher	LC	Protected
Erythropygia paena	Kalahari scrub Robin	LC	Protected

LC = Least Concern

Table C4: Reptile species recorded during the field assessment.

Scientific name	Common Name	IUCN 2016 Status
Pedioplanis inornata	Plain Sand Lizard	NYBA
-Rhinotyphlops lalandei	Delande's Beaked Blind Snake	NYBA
-Psammophis notostictus	Karoo Sand Snake	NYBA
-Dispholidus typus	Boomslang	NYBA
-Trachylepis variegata	Variegated Skink	NYBA
-Trachylepis sulcata	Western Rock Skink	NYBA
-Trachylepis spilogaster	Kalahari Tree Skink	NYBA
-Trachylepis occidentalis	Western Three-striped Skink	NYBA
-Acontias gracilicauda	Thin-tailed legless Skink	LC
-Varanus albigularis	Rock Monitor	NYBA
-Nucras intertexta	Spotted Sandveld Lizard	NYBA
-Pachydactylus rugosus	Common Rough Gecko	LC
-Pachydactylus capensis	Cape Gecko	NYBA
-Karusasaurus polyzonus	Karoo Girdled Lizard	LC (Specially Protected NCNCA 2009) yet common and widespread.
-Zygaspis quadrifrons	Kalahari Dwarf Worm Lizard	NYBA
-Agama aculeata	Common Ground Agama	NYBA
-Stigmochelys pardalis	Leopard Tortoise	LC

NYBA = Not Yet Been Assessed, LC = Least Concern and - = collected by Butler, HJB. 2013.

Table C5: General invertebrate recorded during the field assessment.

Scientific Name	Common Name	IUCN 2016 Status
Hodotermes mossambicus	Northern harvester termite	NYBA
Passalidius fortipes	Burrowing ground beetle	NYBA
Apterogyna sp.	Velvet ant	NA
Stips sp.	Ridged seed beetle	NYBA
Gonometa postica	African silk moth	NYBA
Calidea dregii	Rainbow Shield Bug	NYBA
Trinervitermes sp.	Snouted Harvester Termite	NA
Zophosis sp.	Frantic Tortoise Beetle	NA
Acrotylus sp	Burrowing grasshopper	NA
Conistica saucia	Rock Grasshopper	NYBA
Sphingonotus scabriculus	Blue-wing	NYBA
Acanthacris ruficornis	Garden Locust	NYBA
Heteronitis sp.	Grooved Dung Beetle	NA
Gastrimargus sp.	N/A	NYBA
Rhachitopis sp	N/A	NYBA
Systophlochius palochius	Orange wing	NYBA
Anterhynchium fallax	N/A	NYBA
Camponotus fulvopilosus	Bal-byter	NYBA
Crematogaster peringueyi	Cocktail Ant	NYBA
Pantala flavescens	Wandering Glider	LC
Phymateus sp.	Milkweed Locust	NA
Asilidae (*Neolophonotus* sp)	Robber fly	NA
Mylabris oculata	CMR Bean Beetle	NYBA

LC = Least Concern, NYBA = Not yet been assessed by the IUCN; NA + Not Applicable

Table C6. Arachnids recorded during the field assessment

Common Name	Scientific Name	IUCN 2016 Status
Ground-running Spider	*Hirriusa* sp.	NA
Pale Ground Spider	*Theuma* sp	NA
Sun spider	Solifugae sp	NA
Garden Orb Web Spider	*Agriope australis*	NYBA
Grass Funnel-Web Spider	*Olorunia* sp	NA
Tropical Tent Spider	*Cyrtophora citricola*	NYBA
Small Wandering Crab Spider	*Tibellus* sp	NA
Grass Neoscona Spider	*Neoscona moreli*	NYBA
Baboon Spider Burrow	NA	Possibly protected

NYBA = Not yet been assessed by the IUCN